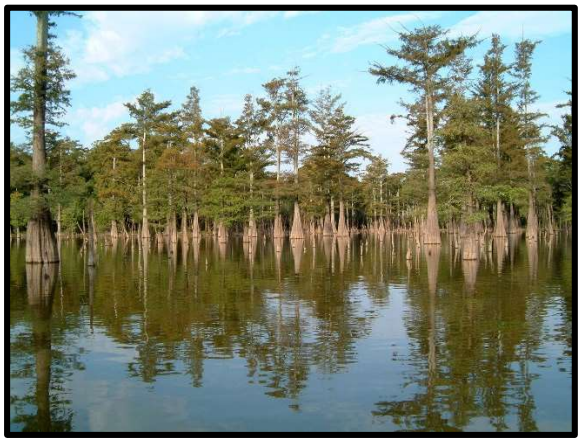
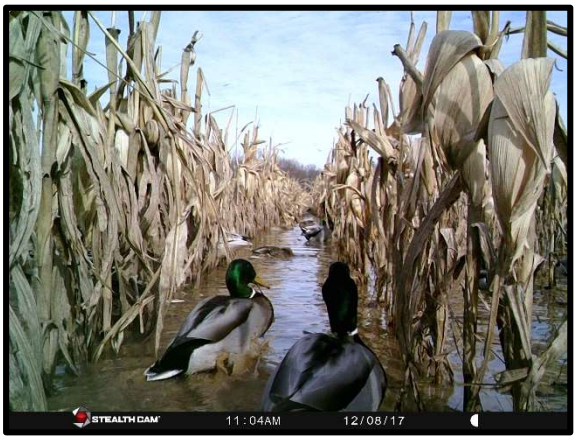
PETITION FOR RULEMAKING TO BAN THE USE OF AGRICULTURAL PESTICIDES ON NATIONAL WILDLIFE REFUGES





SUBMITTED BY: CENTER FOR BIOLOGICAL DIVERSITY & CENTER FOR FOOD SAFETY

Photo credit: Cypress Trees at Dale Bumpers White River National Wildlife Refuge by Ray Paterra, USFWS; Mallards in Corn at Chickasaw National Wildlife Refuge by Bryan Woodward, USFWS; Black Bear Walking Across Harvested Field at Alligator River National Wildlife Refuge by Rock, USFWS; Juvenile Whooping Cranes at Wheeler National Wildlife Refuge by William Gates, USFWS. Each of these refuges has approved agricultural pesticides, including 2,4-D, glyphosate, and dicamba, for use on commercial crops in the past five years.

February 24, 2022

Via Electronic and Certified Mail

Deb Haaland
Secretary
Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

Martha Williams
Principle Deputy Director
United States Fish and Wildlife Service
1849 C Street, NW
Washington, D.C. 20240

RE: Petition for Rulemaking to Ban the Use of Agricultural Pesticides on National Wildlife Refuges

Dear Secretary Haaland and Principle Deputy Director Williams,

Pursuant to the right to petition the government provided in the First Amendment of the U.S. Constitution,[1] the Administrative Procedure Act (APA),[2] and the National Wildlife Refuge System Administration Act (Refuge Act)[3] and its implementing regulations,[4] the Center for Biological Diversity and Center for Food Safety formally petition the Secretary of the Interior through the U.S. Fish and Wildlife Service (FWS) to immediately stop approving new uses of agricultural pesticides on national wildlife refuges and promptly initiate rulemaking to fully phase-out these uses across the National Wildlife Refuge System (Refuge System).

Petitioners' requested action is necessary because the facts and history overwhelmingly demonstrate that the use of harmful agricultural pesticides to grow commercial row crops such as corn and soybeans on national wildlife refuges—the only public lands where wildlife must come first—defeats the objectives of the Refuge System and poses a significant threat to the species that rely on these refuges and the habitats that they provide. It also poses a threat to the health of the people who work on or visit these refuges and may be exposed to harmful pesticides through drift, runoff, or direct exposure.

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[1] "Congress shall make no law . . . abridging . . . the right of the people . . . to petition the Government for a redress of grievances." U.S. Const. Amend. I. The right to "petition for a redress of grievances [is] among the most precious of the liberties safeguarded by the Bill of Rights." *United Mine Workers of Am. Dist. 12 v. Ill. State Bar Ass'n*, 389 U.S. 217, 222 (1967). The Supreme Court has recognized that the right to petition is logically implicit in and fundamental to the very idea of a republican form of government. *United States v. Cruikshank*, 92 U.S. 542, 552 (1875).

[2] 5 U.S.C. § 553(e).

[3] 16 U.S.C. §§ 668dd–668ee.

[4] 50 C.F.R. §§ 25–38.

With biodiversity and wildlife habitat disappearing at an alarming rate, the Refuge System provides key safeguards necessary to maintain the health, integrity, and diversity of native wildlife, soil organisms, and plants across the country. In capturing the urgency of these critical conservation objectives, Congress through the Refuge Act was clear: the mission of the Refuge System must be "to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."[5] The Refuge System cannot, however, achieve its mission if the use of agricultural poisons that are harmful to refuge lands, waters, fish, wildlife, and native plant resources is allowed to continue.

I. REQUESTED ACTIONS

Petitioners respectfully request the following actions:

1. Immediately halt approvals of new uses of pesticides for commercial agricultural purposes on national wildlife refuges;
2. Immediately withdraw the August 2, 2018 memorandum by Gregory Sheehan to the FWS Directorate entitled "Withdrawal of Memorandum Titled, 'Use of Agricultural Practices in Wildlife Management in the National Wildlife Refuge System' (July 17, 2014)";
3. Immediately reinstate the July 17, 2014 memorandum entitled "Use of Agricultural Practices in Wildlife Management in the National Wildlife Refuge System"; and
4. Promptly initiate formal rulemaking procedures to eliminate all uses of agricultural pesticides in the Refuge System.

We further request that while the rulemaking process is ongoing, FWS apply a more rigorous review and stricter scrutiny to all agricultural pesticide uses on and around Refuge System lands and waters to prevent any further damage to wildlife health and refuge diversity. We also request that FWS commit to prioritizing land use practices on national wildlife refuges that do not heavily utilize commercial agricultural uses, instead actively seeking to provide habitat and forage with native plants.

II. PROPOSED REGULATORY LANGUAGE

Petitioners propose that FWS insert the following language into regulations at Title 50 (Wildlife and Fisheries), Chapter 1 (United States Fish and Wildlife Service, Department of the Interior), Subchapter C (The National Wildlife Refuge System), Part 29 (Land Use Management), Subpart A (General Rules):

* * * * *

[5] 16 U.S.C. § 668dd(a)(2) (emphasis added).

50 C.F.R § 29.3 Use of Agricultural Pesticides on National Wildlife Refuges

(a) In general, the use of pesticides on agricultural operations on national wildlife refuges, also known as "agricultural pesticides," shall be prohibited. The use of pesticides for the control of invasive or non-native species is authorized on a limited basis when necessary so long as it is compatible with the refuge's Comprehensive Conservation Plan and strictly in conformity with an Integrated Pest Management plan. A time-limited exemption for the use of an agricultural pesticide may be granted in the event of an emergency, following a period of public notice and comment and publication in the Federal Register, for a period up to one year; the one-year emergency use may not be extended beyond one year for any refuge absent extenuating circumstances.

(b) For purposes of this subsection, an "agricultural pesticide" includes any chemical pesticide or biological pesticide authorized under Section 3 of the Federal Insecticide, Fungicide, and Rodenticide Act.

III. WILDLIFE ARE HARMED BY AGRICULTURAL PESTICIDE USES ON NATIONAL WILDLIFE REFUGES

The Refuge System was established in 1903 for the critical purpose of providing an inviolate sanctuary for threatened and endangered species, migratory birds, and other wildlife. To that end, national wildlife refuges provide habitat for more than 700 species of birds, 220 species of mammals, 250 reptile and amphibian species, and more than 200 species of fish, including more than 280 species of threatened or endangered plants and animals.[6] To protect and conserve those species, the Refuge System includes approximately 100 million acres of public lands and waters that feature a diverse array of protected habitat types such as rare and ecologically significant lowland grasslands and wetlands, and 750 million acres of oceans.

According to FWS, "[f]rom one-ton bison to half-ounce warblers, the National Wildlife Refuge System contains a priceless gift—the heritage of a wild America that was, and is."[7] Consequently, FWS must "maintain[] the biological integrity, diversity and environmental health of these natural resources for the benefit of present and future generations of Americans. Caring for fish, wildlife and plant populations and their habitat is the essence of the science of wildlife management as well as the newer disciplines of conservation biology and ecosystem management."[8] Petitioners strongly agree with these goals and celebrate the Refuge System —on behalf of themselves and their millions of members and supporters—for providing essential and protected habitats for species that are often in the most danger of disappearing, forever.

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[6] FWS, Welcome to the National Wildlife Refuge System, https://www.fws.gov/refuges/about/welcome.html (last visited Feb. 14, 2022); FWS, Threatened and Endangered Species on National Wildlife Refuges Database, https://www.fws.gov/refuges/databases/ThreatenedEndangeredSpecies/ThreatenedEndangered_Display.cfm (last visited Feb. 14, 2022).

[7] FWS, Welcome to the National Wildlife Refuge System, https://www.fws.gov/refuges/about/welcome.html (last visited Feb. 14, 2022).

[8] *Id.*

In addition to the Refuge System's inherent value to wildlife, refuges are also visited by nearly 46 million people each year.[9] According to FWS, visitor spending generates almost $1.7 billion in sales for regional economies.[10] In fact, "[a]s this spending flowed through the economy, nearly 27,000 people were employed and $542.8 million in employment income was generated."[11]

Indeed, national wildlife refuges are often the closest federal public lands to cities, making them important places for people to recreate and connect with nature. Of the 567 national wildlife refuges, 101 urban national wildlife refuges are within 25 miles of cities with populations over 250,000 — meaning they can serve the 80% of Americans who live in and around these metro areas.[12]

Despite the importance of these public lands for wildlife health and diversity and to the American public, industrial farming has become commonplace across the Refuge System, as has reliance on the heavy agricultural pesticide uses that often accompany those practices. Uses of agricultural pesticides for the purpose of growing commercial row crops such as corn and soybeans on national wildlife refuges destroys the integrity and health of these remarkable lands.

For example, in a 2021 biological evaluation, the U.S. Environmental Protection Agency (EPA) concluded that the pesticide glyphosate is likely causing harm to 1,676 threatened and endangered species of plants and animals (93% of all federally listed species) and 759 out of 792 designated critical habitats in the U.S.[13] Glyphosate is also recognized by international bodies and the state of California as a probable human carcinogen, and it has caused widespread decreases in milkweed plants, helping to trigger an 80% population decline of monarch butterflies over the past two decades.[14] Yet, glyphosate continues to be approved for agricultural use on our national wildlife refuges, with an estimated 69,143 agricultural acres in the refuge system being treated with 88,159 pounds of products containing glyphosate in 2018 alone.[15]

And that is just the tip of the iceberg.

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[9] *Id.*
[10] *Id.*
[11] *Id.*
[12] FWS, Urban National Wildlife Refuges, https://www.fws.gov/urban/wildlifeRefuges.php (last visited Feb. 22, 2022).
[13] EPA, Final National Level Listed Species Biological Evaluation for Glyphosate (2021), https://www.epa.gov/endangered-species/final-national-level-listed-species-biological-evaluation-glyphosate.
[14] Center for Biological Diversity, *No Refuge: More Acres of America's National Wildlife Refuges are Being Doused in Harmful Pesticides*, at 8-10 (2020), https://www.biologicaldiversity.org/campaigns/pesticides_reduction/pdfs/No-Refuge-Report-2020.pdf [hereinafter "No Refuge Report"].
[15] No Refuge Report, at 2.

A major study in 2019 warned that an estimated 40 percent of all insect species are facing extinction due to uses of pesticides such as neonicotinoids.[16] In 2021, EPA confirmed and expanded on those findings, concluding that just three neonicotinoid insecticides—clothianidin, imidacloprid and thiamethoxam—are likely harming all of the country's 38 protected amphibians and roughly three fourths of all other endangered plants and animals.[17] EPA found that imidacloprid is likely to be adversely affecting nearly 80% of all endangered species—1,445 plants and animals—and adversely modifying the designated critical habitats of 658 species. For thiamethoxam, 1,396 endangered species are likely to be adversely affected and the designated critical habitats of 644 species adversely modified. And about two thirds of all endangered species—1,225—are likely to be adversely affected by clothianidin and the designated critical habitats of 644 species adversely modified. Yet, neonicotinoids continue to be approved for agricultural use on our national wildlife refuges.

Last year, in a memorandum on damage related to the use of dicamba and genetically engineered (GE) dicamba-tolerant seeds—seeds that were genetically modified to grow crops that can survive otherwise lethal doses of the herbicide dicamba, EPA reported that it had received "nearly 3,500 reports alleging effects from off-target movement of dicamba onto various nontarget vegetation . . . and natural areas," believed those reports were likely an underestimate because pesticide incidents are "under-observed and underreported," **and calculated that the reported incidents "affected more than 1 million acres of non-[dicamba-tolerant] soybean and at least 160,000-acre of vegetation in a wildlife refuge in 2021**."[18] Indeed, in 2020 the United States Court of Appeals for the Ninth Circuit found that the "enormous and unprecedented damage" caused by dicamba in the last few years has "torn apart the social fabric of many farming communities."[19] Yet, dicamba and GE crops continue to be approved for agricultural use on our national wildlife refuges.

Even the very national wildlife refuge that last year reported to EPA damage to at least 160,000 refuge acres because of dicamba drift—the Dale Bumpers White River National Wildlife Refuge in Arkansas—itself approved the use of dicamba for agricultural purposes from at least 2015-2017, despite dicamba's demonstrated risk to the biological integrity, diversity, environmental health, and wildlife of that refuge. In fact, across the Refuge System between 2016 and 2018, the

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[16] Damian Carrington, Plummeting Insect Numbers 'Threaten Collapse of Nature,' The Guardian (Feb. 10, 2019), https://www.theguardian.com/environment/2019/feb/10/plummeting-insect-numbers-threaten-collapse-of-nature.

[17] *See* Docket number EPA-HQ-OPP-2021-0575 at www.regulations.gov; EPA, EPA Releases Draft Biological Evaluations of Three Neonicotinoids for Public Comment (Aug. 26, 2021), https://www.epa.gov/pesticides/epa-releases-draft-biological-evaluations-three-neonicotinoids-public-comment.

[18] EPA, Status of Over-the-Top Dicamba: Summary of 2021 Usage, Incidents and Consequences of Off-Target Movement, and Impacts of Stakeholder-Suggested Mitigations (DP# 464173: PC Code 128931), Docket ID. EPA-HQ-OPP-2020-0492 (Dec. 21, 2021), https://www.regulations.gov/document/EPA-HQ-OPP-2020-0492-0021.

[19] *Nat'l Family Farm Coal. v. EPA*, 960 F.3d 1120, 1143 (9th Cir. 2020).

use of pesticides containing dicamba for agricultural purposes surged from approximately 2,797 pounds to 5,300 pounds annually, an almost 89% increase.[20] These abuses must stop.

IV. STATEMENT OF LAW

A. ADMINISTRATIVE PROCEDURE ACT, 5 U.S.C. § 500 *et seq.*

Under the APA, agencies must "give an interested person the right to petition for the issuance, amendment, or repeal of a rule."[21] Agency decisions "that [are] inconsistent with a statutory mandate or that frustrate the congressional policy underlying a statute" are impermissible.[22] The APA establishes the applicable standard for review of agency actions, which is whether the agency's decision was arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with the law.[23] The APA requires an agency to "conclude a matter presented to it" "within a reasonable time."[24] Judicial review under the APA requires that "the reviewing court shall compel agency action unlawfully withheld or unreasonably delayed."[25]

B. NATIONAL WILDLIFE REFUGE ACT, 16 U.S.C. § 668dd et seq.

The Refuge System is the world's largest and most diverse collection of lands set aside specifically for the preservation of fish and wildlife. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife System Improvement Act of 1997 (collectively "Refuge Act"), governs the management of national wildlife refuges. [26] The Act establishes as the mission of the Refuge System "to administer a network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."[27] The Secretary of the Interior and FWS are responsible for managing the Refuge System.[28] The mission of the FWS is to conserve, enhance, and protect fish and wildlife and their habitats through federal programs.[29]

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[20] No Refuge Report, at 1-2.
[21] 5 U.S.C. § 553(e).
[22] *See Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 858–59 (9th Cir. 2005) (internal citation omitted).
[23] 5 U.S.C. § 706(2)(A); *see also W. Watersheds Project v. Kraayenbrink*, 632 F.3d 472, 496 (9th Cir. 2010).
[24] 5 U.S.C. § 555(b) ("[W]ithin a reasonable time, each agency shall proceed to conclude a matter presented to it."); *id*. § 706(1) ("The reviewing court shall . . . compel agency action unlawfully withheld or unreasonably delayed."); *id.* § 555(e) ("Prompt notice shall be given of the denial in whole or in part of a written application, petition, or other request of an interested person made in connection with any agency proceeding.").
[25] *Id.* § 706(1).
[26] 16 U.S.C. § 668dd (a)(1).
[27] *Id*. at § 668dd(a)(2).
[28] *Id.* § 668dd(a)(1).
[29] 142 DM 1.1.

Under the Refuge Act, "each refuge shall be managed to fulfill the mission of the system, as well as the specific purposes for which the refuge was established."[30] The Act defines the "purposes of the refuge" as the "purpose specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit."[31]

Pursuant to this directive, FWS must prepare a comprehensive conservation plan (CCP) for each refuge; that CCP must be consistent with sound principles of fish and wildlife management and conservation and revise the plan every 15 years.[32] The purpose of a CCP is to provide refuge managers with a comprehensive plan for achieving the refuge's purposes and contributing towards the mission of the Refuge System.[33] In establishing the plan, FWS is supposed to ensure public involvement, and that the "programs" it approves for continued use on a refuge are "compatible" with the purpose of the refuge and the mission of the Refuge System.[34]

A "compatible use" is generally a use of a refuge that, based on "sound professional judgment, [] will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge."[35] To be compatible, a use must also contribute to the maintenance of the refuge's biological integrity, diversity, and environmental health.[36] **However, if the use is a "public or private economic use of the natural resources of any national wildlife refuge," as cooperative farming is,[37] FWS may *only* authorize that use where it "determine[s] that the use contributes to the *achievement* of the national wildlife refuge purposes or the National Wildlife Refuge System mission."[38]** Such uses must be reevaluated for compatibility when conditions under which the use is permitted change significantly, if there is significant new information regarding the effects of the use, or at least every 10 years.[39]

Sound professional judgment is limited to mean "a finding, determination, or decision that is consistent with the principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of [the Refuge] Act and other applicable laws."[40] In determining whether a use is compatible, FWS must consider the anticipated impacts of the use on the refuge's purposes and on the mission of the Refuge

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[30] 16 U.S.C. § 668dd(a)(3)(A).
[31] *Id*. at § 668ee(10).
[32] *Id*. at § 668dd(e)(1)(A), (B).
[33] 50 C.F.R. § 25.12.
[34] 16 U.S.C. §§ 668dd(d)(1)(A), (d)(3)(A) (FWS "shall not initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge, unless [it] has determined that the use is a compatible use.").
[35] *Id*. at § 668ee(1); *see also* 50 C.F.R. § 25.12.
[36] 16 U.S.C. § 668dd(a)(4); 601 FW 3, §§ 3.3, 3.7, 3.10, 3.15; 603 FW 2, § 2.5.
[37] An economic use is an "activity on a national wildlife refuge that results in generation of a commodity which is or can be sold for income or revenue or traded for good and services. Examples include: farming[.]" 603 FW 2, § 2.6(N), (Q).
[38] 50 C.F.R. § 29.1 (emphasis added).
[39] 16 U.S.C. § 668dd(d)(3)(B)(vii).
[40] *Id*. at § 668ee(3); *see also* 603 FW 2, § 2.11(A).

System.[41] Impacts that FWS must consider include direct impacts, "indirect impacts associated with the use," and cumulative impacts, including "uses of adjacent lands or waters that may exacerbate the effects of refuge use."[42] This is because, over time, mounting impacts can become quite substantial, threatening the ability of refuges to be protective of wildlife and enjoyed by "present and future generations of Americans."[43]

Uses that are reasonably anticipated "to reduce the quality or quantity or fragment habitats on a national wildlife refuge will not be compatible."[44] **When a use is incompatible, FWS must "expeditiously terminate or modify the use to make it compatible."[45] "Under no circumstances (except emergency provisions necessary to protect the health and safety of the public or any fish or wildlife population) may [FWS] authorize any use not determined to be compatible."[46]** However, even when a use is compatible, FWS may decline to allow it.[47] FWS has the authority to reevaluate the compatibility of a use "at any time."[48]

V. STATEMENT OF LEGAL GROUNDS: FWS MUST TAKE ACTION TO PROHIBIT THE USE OF AGRICULTURAL PESTICIDES ON NATIONAL WILDLIFE REFUGES

A. LEGAL AUTHORITY TO BAN AGRICULTURAL PESTICIDES UNDER THE REFUGE ACT

Under the Refuge Act, "each refuge shall be managed to fulfill the mission of the system, as well as the specific purposes for which the refuge was established."[49] In crafting the Refuge Act, Congress granted the Secretary of the Interior—acting through FWS—the broad power to promulgate regulations to carry out the purposes of the Act.[50] In promulgating regulations to ban agricultural pesticides uses on national wildlife refuges, FWS will be carrying out the objectives of the Refuge Act and putting in place a set of common-sense protections to ensure that the Refuge System is able to achieve its mission by eliminating the myriad harms to wildlife, lands, and waters caused by agricultural pesticides.

FWS further has the authority to reevaluate the compatibility of any use, but especially an economic use like commercial farming, "at any time."[51] Uses that are reasonably anticipated "to reduce the quality or quantity or fragment habitats on a national wildlife refuge will not be compatible"[52] When a use is incompatible, FWS must "expeditiously terminate or modify the use

[41] 50 C.F.R. § 26.41(a)(8).
[42] 603 FW 2, §§ 2.11(B)(3), 2.12(A)(8)(c).
[43] 16 U.S.C. § 668dd(a)(2).
[44] 603 FW 2, § 2.5(A).
[45] 50 C.F.R. § 26.41(d); *see also* 16 U.S.C. § 668dd(d)(3)(B)(vi).
[46] 603 FW 2, § 2.11(A)(3).
[47] 603 FW 1, § 1.8; 603 FW 2, §§ 2.11(G), 2.15.
[48] 603 FW 2, § 2.11(H)(1); *see also id.* at § 2.11(H)(4),(5).
[49] 16 U.S.C. § 668dd(a)(3)(A).
[50] *Id*. at § 668dd(b)(5).
[51] 603 FW 2, § 2.11(H)(1); *see also id.* at § 2.11(H)(4),(5).
[52] 603 FW 2, § 2.5(A).

to make it compatible."[53] "Under no circumstances (except emergency provisions necessary to protect the health and safety of the public or any fish or wildlife population) may [FWS] authorize any use not determined to be compatible."[54] Even when a use is compatible, FWS may decline to allow it.[55]

B. AGRICULTURAL PESTICIDE USE IS HARMFUL TO THE REFUGE SYSTEM

1. *A Ban on Agricultural Pesticide Use is Necessary to Maintain the Biological Integrity, Diversity, and Environmental Health, as well as the Mission, of the Refuge System*

The Refuge Act states that the agency "shall . . . (B) ensure that the biological integrity, diversity, and environmental health of the [Refuge] System are maintained for the benefit of present and future generation of Americans; [and] (C) plan and direct the continued growth of the [Refuge] System in a manner that is best designed to accomplish the mission of the System, to contribute to the conservation of the ecosystems of the United States . . . ."[56] Given the significant threat of continued agricultural pesticides use to the biological integrity, diversity, and environmental health, as well as the mission, of the Refuge System, FWS should utilize its authority under the Refuge Act to ban the use of pesticides for commercial agricultural purposes.

The Key Cave National Wildlife Refuge (Key Cave) in Alabama illustrates the significance of the ecological risk and danger to endangered species from the continued use of agricultural pesticides in the Refuge System; it also demonstrates the need for quick action from FWS in responding to and taking action on this petition, so as not to preventably lose another species—the Alabama cavefish—to extinction.

Key Cave was created in 1997 to preserve the limited remaining habitat for the endangered Alabama cavefish, a species of cavefish found exclusively on Key Cave; as a priority one maternity cave for the endangered gray bat; and to "ensure that the biological integrity of the Key Cave, Collier Cave, and Collier Bone Cave remains intact."[57] The Alabama cavefish is a small, blind colorless fish that is considered to be one of the rarest of all North American freshwater fish.[58] The cavefish is federally listed as an endangered species, with an estimated population of less than 100 fish. The cavefish lives off of food sources in the Key Cave that include small crustaceans and insects, as well as organic matter washed into the cave and, symbiotically, gray bat guano. The cavefish is specially adapted to navigate the cave using ridges on its head that sense vibrations and minute changes in water pressure. The Alabama cavefish has no natural predators; threats to the cavefish instead include changes in aquifer characteristics, pollution, and threats to their food sources.

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[53] 50 C.F.R. § 26.41(d); *see also* 16 U.S.C. § 668dd(d)(3)(B)(vi).
[54] 603 FW 2, § 2.11(A)(3).
[55] 603 FW 1, § 1.8; 603 FW 2, §§ 2.11(G), 2.15.
[56] 16 U.S.C. § 668dd(4)(B)-(C).
[57] 72 Fed. Reg. 16812; 70 Fed. Reg. 42085.
[58] FWS, Wheeler National Wildlife Refuge Complex Comprehensive Conservation Plan, at 52 (2007) [hereinafter "Wheeler CCP"].

In addition, Key Cave serves as a priority one maternity cave for the federally endangered gray bat, provides habitat for two species of blind crayfish, the *Procambarus pecki* and *Cambarus jonesi,* and is believed to provide habitat for at least one cave shrimp that may be unique to Key Cave (likely because of the rare ecosystem Key Cave's cave system provides, discussed further below).[59] The refuge also provides habitat for a variety of migratory and resident wildlife species, including "[s]everal bird species that are of management concern also use the refuge's grasslands. These species include grasshopper sparrows, dickcissels, northern harriers, short-eared owls, loggerhead shrikes, and northern bobwhites."[60] Key Cave is, however, "not managed as a waterfowl refuge."[61]

Key Cave and the rare cave systems it protects are situated along the Tennessee River and in a "limestone karst area that contains numerous sinkholes and several underground cave systems."[62] Key Cave is one of few refuges in the Refuge System that contains cave/karst[63] habitat. Its vulnerable sinkholes are considered to be "an integral component of groundwater recharge to the caves."[64] "The area directly north of Key Cave was identified as a potential high hazard risk area for groundwater recharge and this is where the 1,060-acre refuge was established."[65]

Pollution from agricultural production is an ongoing concern to the unique ecology of Key Cave. In listing the Alabama cavefish as critically endangered, for example FWS explicitly observed that "[t]he land immediately above and around Key Cave has numerous sinkholes and water collecting depressions and is in agricultural row-crops. The application of pesticides to these crops may impact the fauna in Key Cave," and "[g]roundwater contamination represents a major threat to the Alabama cavefish. Most of the probable recharge area for Key Cave is in agricultural production."[66]

Yet, private, commercial farming currently takes place on 295 of the 1,060 total acres of Key Cave.[67] Between 2014 and 2019, the years for which Petitioners have access to public records on agricultural pesticide use on Key Cave, pesticides approved for use for farming purposes on Key Cave include: 2,4-D, glyphosate, dicamba, thiamethoxam, flumioxazin, and clethodim, among others.[68] Crops grown include corn, soy, rice, milo, and millet.[69]

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[59] 72 Fed. Reg. 16812.
[60] 70 Fed. Reg. 42085; *see also* Wheeler CCP, at 297-313, 319-323.
[61] FWS, Draft Farming Compatibility Determination for Key Cave National Wildlife Refuge, at 2 (2021) [hereinafter "Draft Key Cave Farming CD"].
[62] 72 Fed. Reg. 16812; 70 Fed. Reg. 42085.
[63] Karst describes landscapes characterized by caves, sinkholes, underground streams, and other features formed by the slow dissolving of bedrock. Karst areas are sensitive to groundwater pollution because contaminants quickly migrate to wells and springs in the porous geology.
[64] 72 Fed. Reg. 16812; 70 Fed. Reg. 42085.
[65] *Id*.
[66] 53 Fed. Reg. 37968.
[67] Public Notice of Availability for Comment – Draft Compatibility Determination for Cooperative Farming, https://www.fws.gov/nwrs/threecolumn.aspx?id=6442470784.
[68] *See* Atts.
[69] *See* Atts.; Draft Key Cave Farming CD, at 2, 12.

In addition, following the lifting of the prohibition on the use of genetically engineered (GE) crops and neonicotinoid pesticides on national wildlife refuges in 2018, Key Cave Refuge Managers expressed an interest in allowing GE crops to be grown on the refuge, potentially as well as neonicotinoid pesticide uses. If granted, those GE crops, which could include herbicide-tolerant corn and soy, could lead to further increases in pesticide use.

Granting this petition would, at a minimum, ensure that the Key Cave refuge, and other refuges like it, can achieve the purpose for which it was created: to conserve endangered species and preserve the limited remaining habitat for that species. **However, more fundamentally, it would put the necessary guideposts in place to help endangered species like the Alabama cavefish avoid potential extinction.** Taking action to avoid preventable species extinction—especially extinction that is precipitated by the FWS's own actions and decision making—should be the priority.

Furthermore, that Key Cave is currently in the process of reconsidering the Compatibility Determination (CD) for farming on the refuge illustrates the need for quick action from FWS in responding to and taking action on this petition.[70] The draft CD was made available to the public for comment in October, 2021, and has yet to be finalized by FWS. In promptly taking action to grant this petition, FWS will be acting to prevent Key Cave from finalizing a CD that is incompatible with the purpose of the refuge and mission of the Refuge System, and that will open FWS up to additional litigation. In short, FWS will be taking an essential step towards managing all national wildlife refuges for wildlife and the ecosystems on which they rely, as directed by the Refuge Act.

2. *Continuing to Allow for Pesticide-Dependent Agriculture is Incompatible with Achieving Refuges' Wildlife Purposes*

All national wildlife refuges were created for the purpose of wildlife conservation.[71] Some, like Key Cave, were created for the express purpose of supporting and sustaining critically endangered wildlife populations; some were created to provide sanctuary to waterfowl and other migratory fowl; and some were created for other wildlife-dependent purposes. But these purposes cannot be achieved if the wildlife that depend on these refuges and their unique ecosystems are adversely impacted by needless pesticide use.

For example, the Dale Bumpers White River National Wildlife Refuge (Dale Bumpers) in Arkansas was established in 1935 by President Franklin D. Roosevelt with the purpose to protect and conserve migratory birds and other wildlife resources.[72] The refuge is considered "one of the most important areas for wintering waterfowl in North America" and the nation's largest

[70] Public Notice of Availability for Comment – Draft Compatibility Determination for Cooperative Farming, https://www.fws.gov/nwrs/threecolumn.aspx?id=6442470784.
[71] FWS, National Wildlife Refuge System, About Us, https://www.fws.gov/refuges/about/ (last visited Feb. 16, 2022) (under the subheading "Wildlife-Driven Purpose," describes that "Each refuge is established to serve a statutory purpose that targets the conservation of native species dependent on its lands and waters").
[72] FWS, Dale Bumpers White River National Wildlife Refuge, About the Refuge, https://www.fws.gov/refuge/White_River/about.html (last visited Feb. 16, 2022).

contiguous block of bottomland hardwood forest in the Mississippi River Valley.[73] Lying within the Mississippi River's alluvial plain in southeast Arkansas, the refuge is home to Arkansas' only native population of black bears and is designated as a Wetland of International Importance.

Approximately 350 acres on Dale Bumpers are used for commercial agricultural purposes to grow crops such as corn.[74] According to the FWS, "[t]hese . . . cropland areas are heavily utilized by wildlife. They serve as a sanctuary and feeding area to resident wildlife such as black bear, deer, turkey, and non-resident wildlife such as waterfowl."[75] Yet, despite its exceptional ecological importance and use by wildlife, agricultural pesticides are being used on Dale Bumpers. Public records from FWS indicate that in the last 10 years, Dale Bumpers has approved for agricultural use at least the following pesticides: glyphosate, 2,4-D dimethylamine, *dicamba*, and flupyradifurone—all pesticides that pose risks to non-target species.[76] Each of these pesticide uses is of individual concern, but the cumulative and synergist use of these pesticides in combination—a combined interaction that is not reviewed by the FWS during the pesticide use approval process—drastically elevates that concern.

Recent circumstances illustrate just how harmful these uses can be to refuge resources. By 2021, it appears Dale Bumpers had stopped approving dicamba for commercial farming use on the refuge. Nevertheless, the refuge still experienced significant dicamba-related damage that year from nearby uses of the pesticide that drifted onto refuge lands from surrounding fields; that damage reportedly included harm to "several tree species, most notably sycamore."[77] If such significant damage can occur when the uses originate off-refuge, it goes without question that on-refuge uses certainly poses significant risks to Dale Bumpers or any other refuge that utilizes such toxic pesticides.

As these facts illustrate, and as the science continues to demonstrate, the use of toxic pesticides for agricultural purposes on national wildlife refuges is devastating the environment and facilitating wildlife extinction. Accordingly, the goals of the Refuge Act cannot be achieved if the wildlife that depend on refuges in the Refuge System are adversely impacted by pesticide exposure from discretionary economic agricultural practices.

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[73] *Id*.
[74] FWS, Dale Bumpers White River National Wildlife Refuge, Resource Management, https://www.fws.gov/refuge/White_River/what_we_do/resource_management.html (last visited Feb. 16, 2022).
[75] *Id*.
[76] *See* App'x A.
[77] EPA, Status of Over-the-Top Dicamba: Summary of 2021 Usage, Incidents and Consequences of Off-Target Movement, and Impacts of Stakeholder-Suggested Mitigations (DP# 464173: PC Code 128931), Docket ID. EPA-HQ-OPP-2020-0492, at 24 (Dec. 21, 2021), https://www.regulations.gov/document/EPA-HQ-OPP-2020-0492-0021.

3. *The Legislative History of the 1997 Amendments to the Refuge Act Further Supports Banning Agricultural Pesticide Use*

The legislative history of the 1997 amendments to the 1966 Refuge Act is replete with bipartisan expressions of concern that support Petitioners' request. For example, in noting that "public use has not always been carried out in a manner that is consistent with the well- being of our refuges and their wildlife," Senator Lindsey Graham (R) acknowledged that secondary activities considered harmful to wildlife resources, including farming, were occurring on nearly 60 percent of refuges and that a 1991 FWS study found such activities to be harmful to wildlife at 63 percent of refuges.[78] Senator Graham went on to contend that the 1997 amendments were necessary because "[r]efuge managers, despite their best efforts, have often been susceptible to outside pressure to allow these damaging activities because the laws governing the Refuge System are not completely clear."[79] Senator Graham also observed that decisions on what uses are compatible with wildlife conservation were often made improperly, making plain that the purpose of the 1997 amendments was to reign in these harmful activities and refocus agency activities on wildlife conservation.[80] Senator Graham was right.

Further, in signing the 1997 amendments into law, President Clinton emphasized the wildlife-centered mission of the Refuge System, stating that "[w]ildlife conservation is the purpose of the refuges."[81] These expressions of intent make plain that the Refuge Act allows—even mandates—the actions requested by Petitioners. The farming practices at issue do nothing to promote wildlife conservation and indeed, they cause significant harm to wildlife. These are the very types of harms that the 1997 amendments to the Refuge Act were enacted to prohibit.

C. EXECUTIVE ORDER 13,990 DEMANDS THAT AGRICULTURAL PESTICIDE USE BE DISCONTINUED IN THE REFUGE SYSTEM

Continuing to wantonly allow agricultural pesticides to be used on national wildlife refuges is fundamentally at odds with the policy goals set forth by the Biden Administration through Executive Order 13,990, which directs that "[o]ur Nation has an abiding commitment to empower our workers and communities; promote and protect our public health and the environment . . . . In carrying out this charge, the Federal Government must be guided by the best science and be protected by processes that ensure the integrity of Federal decision-making. It is, therefore, the policy of my Administration to listen to the science; to improve public health and protect our environment; to ensure access to clean air and water; [and] to limit exposure to dangerous chemicals and pesticides . . . ."[82]

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[78] 143 Cong. Rec. S9092-04, 1997 WL 561070 (statement of Sen. Graham).
[79] *Id.*
[80] *Id.*
[81] The White House, Office of Communications, President's Statement on Signing the National Wildlife Refuge System Improvement Act of 1997 (Oct. 9, 1997).
[82] Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, Exec. Order No. 139990, 86 Fed. Reg. 7037 (Jan. 20, 2021).

VI. PETITIONERS

The Center for Biological Diversity (CBD) is a nonprofit conservation organization with more than 1.7 million members and supporters dedicated to the preservation, protection, and restoration of biodiversity and ecosystems throughout the world. CBD works to insure the long-term health and viability of animal and plant species across the United States and elsewhere, and to protect the habitat these species need to survive.

The Center for Food Safety (CFS) is a Washington, D.C.-based, public interest, nonprofit membership organization that has offices in San Francisco, CA; Portland, OR; Honolulu, Hawai'i; and Washington, D.C. Since CFS's founding in 1997, it has sought to ameliorate the adverse impacts of industrial farming and food production systems on human health, animal welfare, and the environment. CFS has more than 900,000 members nationwide. CFS seeks to protect human health and the environment by promoting organic and other forms of sustainable agriculture while advocating against the use of harmful food production technologies. Specifically, CFS promotes the cultivation of crops in a manner that minimizes negative impacts such as increased use of pesticides.

VII. CONCLUSION

Toxic agricultural pesticide use is killing us, it's killing biological diversity, and it's killing our planet. Such a tragedy is preventable, but nowhere more so than on refuges that are critical to maintaining species health and diversity. Petitioners, therefore, respectfully request that Secretary of the Interior, through the FWS, act immediately to stop approving new uses of agricultural pesticides on national wildlife refuges and promptly initiate rulemaking to fully phase-out these uses across the Refuge System. The requested actions are necessary because using pesticides to grow commercial crops like soy and corn in the Refuge System presents an unacceptable risk to species health and diversity that diminishes the biological integrity of these public lands. Moreover, the widespread use of pesticides on refuges for private agricultural purposes directly conflicts with the mission of the Refuge System. Granting this petition will be in service of our public lands, wildlife, and environmental health.

In accordance with the APA, Petitioners request that FWS expeditiously respond to this Petition.

Dated: February 24, 2022

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Appendix A

Abstracts on Negative Effects to Species and Environmental Health from a Sampling of Agricultural Pesticides being use on National Wildlife Refuges

Pesticides are poisons; their purpose is to kill. Even when used as instructed, chemicals pose grave risks to people, especially pesticide applicators, children, and fenceline communities; waterways; soil organisms; wildlife; native plants; and endangered species. Indeed, many pesticides are highly persistent, and the full scope of their impacts are largely unknown, especially in public lands settings where they have barely been studied, if at all. While not comprehensive, the following are summary abstracts that address many of the negative effects to species and environmental health from a sampling of the agricultural pesticides being used on national wildlife refuges.

I. Flupyradifurone

Flupyradifurone is a systemic pesticide that is taken up and distributed through a plant to control insects. The U.S. Environmental Protection Agency (EPA) has approved flupyradifurone for a wide range of uses on about twenty crop types from alfalfa to soybeans. EPA authorized these uses of flupyradifurone without consulting with the expert Wildlife Agencies including the U.S. Fish and Wildlife Service (FWS), despite finding they would likely harm numerous listed species. *See Center for Biological Diversity v. U.S. EPA*, Case No. 15-1054 (lead) (D.C. Cir.).

In its more limited review of the pesticide's environmental health and impacts to species, EPA concluded that there are potential direct and indirect effects to federally listed taxa associated with all authorized uses of flupyradifurone.[1] EPA identified "direct and indirect effect concerns, by taxa, that are triggered by exceeding listed species" Levels of Concern. EPA determined that approved uses of flupyradifurone may cause direct effects to protected birds, mammals, reptiles, terrestrial-phase amphibians, and aquatic invertebrates (freshwater and marine/estuarine). Because these species may serve as prey or habitat, EPA also concluded that approved uses of flupyradifurone may cause indirect effects to birds, mammals, reptiles, terrestrial-phase amphibians, fish (freshwater and marine/estuarine), aquatic-phase amphibians, mollusks, and aquatic invertebrates fish (freshwater and marine/estuarine). EPA stated it was "uncertain" whether there is potential to affect dicotyledonous plants but concluded risks of concern "cannot be ruled out" and that there would be indirect effects on terrestrial and semi-aquatic plants when other affected species, such as birds and mammals, are required for seed dispersal or pollination. EPA's risk assessment concludes that approved uses of flupyradifurone may affect nearly every taxonomic group that is represented on the list of Endangered Species Act (ESA) protected species.

Flupyradifurone is also known to be "highly toxic to honeybees on an acute oral exposure basis." Toxicity studies further indicate potential effects of flupyradifurone to non-target terrestrial arthropods, such as insects and spiders, at or below application rates. Arthropods include species such as lady beetles (ladybugs), which are beneficial insects because they prey on pest insects and insect eggs.

[1] *See* EPA, Memorandum on Environmental Fate and Ecological Risk Assessment for Foliar, Soil Drench, and Seed Treatment Use of the New Insecticide Flupyradifurone (BYI 02960) (June 25, 2014).

Flupyradifurone is considered "very highly toxic" to freshwater insects and estuarine/marine crustaceans, is mobile in the environment, and is persistent in the aquatic environment. EPA states that "methodologies are not available to determine the distance that is needed to eliminate the risk of concern from transport in runoff," and, despite acute risk to ESA-listed species, EPA did not require any buffer between the application sites and aquatic environments.

II. Dicamba

The popular herbicide dicamba is extremely drift-prone, causing more than 5 million acres of damage to crops, trees, and backyard gardens over the past few years—including documented damage on the Dale Bumpers White River National Wildlife Refuge in Arkansas.[2]

Dicamba is highly mobile with the potential to contaminate and persist in groundwater.[3] Dicamba is known to run off into water bodies following rainfall,[4] and a nationwide sampling of surface waters by the EPA found that 40% were contaminated with dicamba.[5] As an illustration, dicamba was one of the most frequently detected herbicides in water and sediment samples in California.[6]

Similarly as it relates to air pollution and drift, 90 percent of air samples throughout Canada's agricultural region contained dicamba with distributions being suggestive of both local and long-distance transport.[7] Dicamba is characterized as a volatile compound and prone to extensive spray drift, which can severely impact non-target crops and wild plants.[8,9] Bottom line: Dicamba doesn't stay put, it migrates away from the area of application and contaminates the surrounding environment.

This is exemplified by the unprecedented amount of damage to crop fields, backyard gardens, century-old trees, and natural landscapes that has occurred in the recent years. Indeed, 200-year

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[2] *See* https://www.npr.org/sections/thesalt/2018/09/27/651262491/a-drifting-weedkiller-puts-prized-trees-at-risk (last visited Feb. 23, 2022); Bradley, K, A Final Report on Dicamba-injured Soybean Acres, University of Missouri (Oct. 30, 2017), https://ipm.missouri.edu/ipcm/2017/10/final_report_dicamba_injured_soybean/; Bradley, K, Dicamba injury update: Different Year, same questions (July 19, 2018), https://ipm.missouri.edu/IPCM/2018/7/July-15-Dicamba-injury-update-different-year-same-questions/.

[3] EPA, Reregistration Eligibility Decision (RED) Document for Dicamba and Associated Salts (2006), http://www.epa.gov/pesticides/reregistration/REDs/dicamba_red.pdf.

[4] Carroll, M. J., Hill, R. L., Pfeil, E., & Herner, A. E., Washoff of Dicamba and 3,6-Dichlorosalicylic Acid from Turfgrass Foliage, 7(2) Weed Technology 437-442 (1993).

[5] EPA Office of Drinking water, Dicamba: health advisory (1987).

[6] Ensminger, M.P., et al., Pesticide occurrence and aquatic benchmark exceedances in urban surface waters and sediments in three urban areas of California, USA, 2008-2011, 185(5) Environ Monit Assess 3697-710 (2013).

[7] Yao, Y., et al., Spatial and temporal distribution of pesticide air concentrations in Canadian agricultural regions, 40(23) Atmospheric Environment 4339-4351 (2006).

[8] Behrens, R. and W. Lueschen, Dicamba Volatility, 27(5) Weed Science 486-93 (1979).

[9] Egan, J.F. and D.A. Mortensen, Quantifying vapor drift of dicamba herbicides applied to soybeans, 31(5) Environ Toxicol Chem 1023-31 (2012).

old cypress trees,[10] oak trees,[11] and fruiting trees[12] have not escaped the onslaught of damage from this pesticide.

Even further, doses of dicamba meant to approximate herbicide drift reduced and delayed the flowering of multiple plant species, reducing the floral resources that pollinators rely on in farmed regions.[13] Dicamba levels far below those estimated to be contained in particle and vapor drift are known to reduce plant diversity.[14] Similarly, drift-level rates of dicamba were found to reduce flowering of multiple plants, a reduction scientists have found coincides with reduced visitation by pollinators.[15] Studies have also shown dicamba to be particularly harmful to milkweed, a plant the monarch caterpillar uses as its only food source, putting the monarch butterfly at risk of harm.[16]

The EPA has determined that small birds and mammals would exceed the agency's level of concern for dicamba if they foraged on plants or insects in treated fields following treatment and that dicamba had the potential for causing risk to endangered birds, mammals, and non-target plants.[17] Furthermore, the EPA stated that "mammals could potentially be at risk for developmental/reproductive effects or for direct effects on foraging behavior when chronically exposed to dicamba as a result of the labeled uses of the herbicide."[18] Dicamba has also been shown to disrupt behavioral patterns in fish[19] and low doses were shown to induce mortality in

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[10] Charles, D, A Drifting Weedkiller Puts Prized Trees At Risk, National Public Radio (Sept. 27, 2018), https://www.npr.org/sections/thesalt/2018/09/27/651262491/a-drifting-weedkiller-puts-prized-trees-at-risk.

[11] Hettinger, J, Complaints surge about weed killer dicamba's damage to oak trees, Midwest Center for Investigative Reporting (Oct. 9, 2017), https://investigatemidwest.org/2017/10/09/complaints-surge-about-weed-killer-dicambas-damage-to-oak-trees/.

[12] Ruff, C, Jury Awards Missouri Peach Farmer $15 Million In Damages In Dicamba Suit, St. Louis Public Radio (Feb. 14, 2020), https://news.stlpublicradio.org/post/jury-awards-missouri-peach-farmer-15-million-damages-dicamba-suit#stream/0.

[13] Bohnenblust, E.W., et al., Effects of the herbicide dicamba on non-target plants and pollinator visitation, Environ Toxicol Chem (2015).

[14] Egan, J.F, Bohnenblust, E, Goslee, S, Mortensen, D.A, and Tooker, J., Herbicide drift can affect plant and arthropod communities, 185 Agriculture, Ecosystems, and Environment 77-87 (2014).

[15] Bohnenblust, E.W, Vaudo, A.D, Egan, J.F, Mortensen, D.A, Tooker, J.F., Effects of the herbicide dicamba on nontarget plants and pollinator visitation, 35(1) Environ Toxicol Chem 144-51 (2016).

[16] Donley, N., A Menace to Monarchs Drift-prone Dicamba Poses a Dangerous New Threat to Monarch Butterflies, Center for Biological Diversity (2018), https://www.biologicaldiversity.org/species/invertebrates/monarch_butterfly/pdfs/Menace-to-Monarchs.pdf.

[17] EPA, Reregistration Eligibility Decision (RED) Document for Dicamba and Associated Salts (2006), http://www.epa.gov/pesticides/reregistration/REDs/dicamba_red.pdf.

[18] *Id.*

[19] Ruiz de Arcaute, C., S. Soloneski, and M.L. Larramendy, Evaluation of the genotoxicity of a herbicide formulation containing 3,6-dichloro-2-metoxybenzoic acid (dicamba) in circulating

coho salmon that were given a biologically-appropriate seawater challenge.[20] There are early indications that dicamba may affect hormone signaling[21,22] and induce developmental toxicities[23] at biologically-relevant doses. Multiple studies have also indicated that it is a mutagen.[24,25,26]

III. 2,4-D

2,4-D is a persistent, mobile herbicide used for control of broadleaf plants. It is a widespread water contaminant; according to monitoring data from the USGS, EPA, USDA, the California Department of Pesticide Regulation and the Washington Department of Agriculture, traces of the pesticide have been found in 37-59 percent of all surface water samples tested.[27] 2,4-D is highly prone to pesticide drift events due to its volatility and toxicity and has consistently been the most common pesticide involved in drift complaints.[28]

The labeled, aquatic use of 2,4-D can kill aquatic plants and invertebrates that endangered fish rely on for food and shelter, resulting in the U.S. National Marine Fisheries Service concluding that the use of 2,4-D was likely to jeopardize the continued existence of endangered Pacific salmon and steelhead species.[29] In addition the EPA determined that nearly all current labeled

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blood cells of the tropical fish *Cnesterodon decemmaculatus*, 773 Mutat Res Genet Toxicol Environ Mutagen 1-8 (2014).

[20] Lorz, H., et al., EPA. Corvallis Environmental Research Laboratory, Office of Research and Development. Effects of selected herbicides on smolting of coho salmon (1979).

[21] Zhu, L., et al., Dicamba affects sex steroid hormone level and mRNA expression of related genes in adult rare minnow (Gobiocypris rarus) at environmentally relevant concentrations, 30(6) Environ Toxicol 693-703 (2015).

[22] Goldner, W.S., et al., Hypothyroidism and pesticide use among male private pesticide applicators in the agricultural health study, 55(10) J Occup Environ Med 1171-78 (2013).

[23] Greenlee, A.R., T.M. Ellis, and R.L. Berg, Low-dose agrochemicals and lawn-care pesticides induce developmental toxicity in murine preimplantation embryos, 112(6) Environ Health Perspect 703-09 (2004).

[24] Ruiz de Arcaute, C., S. Soloneski, and M.L. Larramendy, Evaluation of the genotoxicity of a herbicide formulation containing 3,6-dichloro-2-metoxybenzoic acid (dicamba) in circulating blood cells of the tropical fish *Cnesterodon decemmaculatus*, 773 Mutat Res Genet Toxicol Environ Mutagen 1-8 (2014).

[25] Cenkci, S., et al., Evaluation of 2,4-D and Dicamba genotoxicity in bean seedlings using comet and RAPD assays, 73(7) Ecotoxicol Environ Saf 1558-64 (2010).

[26] Gonzalez, N.V., et al., A combination of the cytokinesis-block micronucleus cytome assay and centromeric identification for evaluation of the genotoxicity of dicamba, 207(3) Toxicol Lett 204-12 (2011).

[27] EPA, Preliminary Ecological Risk Assessment for Registration Review of 2,4-D, at 24 (June 29, 2016), https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0330-0047.

[28] AAPCO, Association of American Pesticide Control Officials, 2005 Pesticide Drift Enforcement Survey Report (2005), https://www.centerforfoodsafety.org/files/aapco-2005_29712.pdf.

[29] NMFS, National Marine Fisheries Service Endangered Species Act Section 7 Consultation. Biological Opinion Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr

uses of 2,4-D were likely to adversely affect endangered amphibians and reptiles like the endangered California Red-legged Frog and Alameda Whipsnake.[30]

In a 2016 evaluation, EPA found that 2,4-D can cause direct harm to all plants and animals if used according to the EPA-approved label.[31] Harms found are to ESA-listed vascular aquatic plants,[32] chronic harm to all species of birds that feed on short grasses,[33] acute harm to all species of mammals,[34] sublethal effects to pollinators such as bees,[35] and all terrestrial plants.[36] The potential for harm to non-target plants from spray drift extends up to 250 ft away from the site of application at an application rate of 2 lb/acre (the maximum application rate for non-crop uses is twice as high at 4 lb/acre).[37]

There have also been a high number of incidents involving human harm from 2,4-D. From 2007 to 2012, there were over 2,000 incidents reported to the EPA involving neurological, respiratory, liver, and kidney dysfunctions.[38] EPA also identified occupational exposure risks of concern via inhalation.[39] The EPA also found that "Based on currently available toxicity data, which demonstrate effects on the thyroid and gonads following exposure to 2,4-D, there is concern regarding its endocrine disruption potential."[40] Altered hormone levels have also been associated with urinary 2,4-D levels in human epidemiological studies.[41,42]

BEE, Diuron, Linuron, Captan, and Chlorothalonil (June 30, 2011), https://www3.epa.gov/pesticides/endanger/litstatus/final-4th-biop.pdf.

[30] EPA, Risks of 2,4-D Use to the Federally Threatened California Red-legged Frog (Rana aurora draytonii) and Alameda Whipsnake (Masticophis lateralis euryxanthus); Pesticide Effects Determination (Feb. 20, 2009) https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/2-4-d/analysis.pdf.

[31] *Id.*

[32] *Id.* at 45-46.

[33] *Id.* at 47-48.

[34] *Id.* at 48-49.

[35] *Id.* at 50-51.

[36] *Id.* at 51-55.

[37] *Id.* at 63.

[38] EPA, 2,4-D: Tier II Incident Report, at 2-3 (June 28, 2016), https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0330-0046.

[39] EPA, 2,4-D. Revised Occupational and Residential Exposure Assessment for Registration Review (Nov. 15, 2016), https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0330-0085.

[40] EPA, *Reregistration Eligibility Decision for 2,4-D* (2005), http://www.epa.gov/pesticides/reregistration/REDs/24d_red.pdf.

[41] Garry, V.F., et al., Biomarker correlations of urinary 2,4-D levels in foresters: genomic instability and endocrine disruption, 109(5) Environ Health Perspect 495-500 (2001).

[42] Schreinemachers, D.M., Perturbation of lipids and glucose metabolism associated with previous 2,4-D exposure: a cross-sectional study of NHANES III data, 1988-1994, 9 Environ Health 11 (2010).

IV. Glyphosate

A 2015 EPA analysis found multiple environmental harms from glyphosate use. Use of glyphosate in accordance with the label was found to:

1) Result in concentrations that can potentially impact the survival and biomass of aquatic plants, upland plants, and riparian/wetland plants;[43]
2) Result in residues on foliage that can potentially impact the growth of herbivorous birds, reptiles and terrestrial amphibians;[44] and
3) Potentially impact the growth and reproduction of terrestrial mammals following ground applications of glyphosate.[45]

This analysis also indicated that considerable no-spray buffers would be needed to keep off-target plants from being harmed by glyphosate use, more than 1000 feet for certain aerial applications and nearly 400 feet for certain ground applications.[46] The states of California and Arkansas both adopted mandatory no-spray buffers of 500 feet for aerial applications.[47]

Ecological incident data also reinforce the finding that the current labelled uses of glyphosate are having devastating effects to plant and animal life outside of the sprayed field.[48] Approximately 600 incidents have been reported and logged on the Ecological Incident Information System (EIIS) and Avian Monitoring Information System (AIMS) databases. A separate Incident Data System (IDS) database has identified 269 separate aggregate incident reports. Ecological incidents are also significantly underreported for pesticides so this should be viewed as the absolute bare minimum of ecological incidents that involve glyphosate.

In a 2021 biological evaluation, EPA concluded that glyphosate would "Likely Adversely Affect" 1,676 threatened and endangered species of plants and animals (93% of federally listed species) and 759 out of 792 designated critical habitats in the U.S.[49] The EPA found, for example, that glyphosate poses risks to a federally listed amphibian including the California Red-legged frog, making a Likely to Adversely Affect determination for the species.[50] Some

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[43] EPA, Preliminary Ecological Risk Assessment for Glyphosate and Its Salts, at 2 (2015), https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0361-0077.
[44] *Id.*
[45] *Id.*
[46] *Id*. at 92.
[47] EPA, Drinking Water Assessment for the Registration Review of Glyphosate, at 16 (June 15, 2017).
[48] EPA, Preliminary Ecological Risk Assessment for Glyphosate and Its Salts, at 59-62 (2015), https://www.regulations.gov/document?D=EPA-HQ-OPP-2009-0361-0077.
[49] EPA, Final National Level Listed Species Biological Evaluation for Glyphosate (2021), https://www.epa.gov/endangered-species/final-national-level-listed-species-biological-evaluation-glyphosate.
[50] EPA, Risks of Glyphosate Use to Federally Threatened California Red-legged Frog (Rana aurora draytonii): Pesticide Effects Determination (Oct. 17, 2008), https://www3.epa.gov/pesticides/endanger/litstatus/effects/redleg-frog/glyphosate/determination.pdf.

glyphosate formulations and co-formulants have been found to be "highly toxic" to certain species of fish.[51]

Researchers have further found negative associations between glyphosate use and monarch population size.[52] Use of glyphosate has been tied to widespread declines of milkweed, which is essential to monarch butterfly survival.[53]

The World Health Organization's International Agency for Research on Cancer (IARC) conducted an exhaustive review of the publicly available scientific literature in 2015 and concluded that glyphosate is "probably carcinogenic to humans" (Group 2A).[54] IARC carefully weighed evidence in three areas, and found that: 1) There was sufficient evidence to conclude that glyphosate causes cancer in animal studies; 2) There was limited evidence that exposure to glyphosate causes cancer (non-Hodgkin lymphoma) in humans; and 3) There was strong evidence that glyphosate can damage DNA and induce oxidative stress,[55] two well characterized pathways that can lead to cancer.[56]

IARC's finding that glyphosate causes cancer in animals prompted California's Office of Environmental Health Hazard Assessment to list glyphosate as a known carcinogen under

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[51] *Id.* at 82, 84.

[52] Semmens, B. X., D. J. Semmens, W. E. Thogmartin, R. Wiederholt, L. Lopez-Hoffman, J. E. Diffendorfer, J. M. Pleasants, K. S. Oberhauser and O. R. Taylor, Quasi-extinction risk and population targets for the Eastern, migratory population of monarch butterflies (Danaus plexippus), 6 Sci Rep 23265 (2016).

[53] Center for Biological Diversity, Petition to Protect the Monarch Butterfly (*Danaus Plexippus Plexippus*) Under the Endangered Species Act, at 7 (2014), http://www.biologicaldiversity.org/species/invertebrates/pdfs/Monarch_ESA_Petition.pdf ("A primary threat to the monarch is the drastic loss of milkweed caused by increased and later season use of the herbicide glyphosate in conjunction with widespread planting of genetically engineered, herbicide-resistant corn and soybeans in the Corn Belt region of the United States and to planting of genetically-engineered cotton in California. In the Midwest, nearly ubiquitous adoption of, glyphosate-resistant 'Roundup Ready' corn and soybeans has caused a precipitous decline of common milkweed, and thus of monarchs, which lay their eggs only on milkweeds. The majority of the world's monarchs originate in the Corn Belt region of the United States where milkweed loss has been severe, and the threat that this habitat loss poses to the resiliency, redundancy, and representation of the monarch cannot be overstated.").

[54] WHO, IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 112: Some Organophosphate Insecticides and Herbicides, Glyphosate (2017), http://monographs.iarc.fr/ENG/Monographs/vol112/mono112.pdf

[55] *Id.*

[56] Klaunig, J.E., et al., The role of oxidative stress in chemical carcinogenesis, 106 Suppl 1 Environ Health Perspect 289-95 (1998); Lee, S.J., et al., Distinguishing between genotoxic and non-genotoxic hepatocarcinogens by gene expression profiling and bioinformatic pathway analysis, 3 Sci Rep 2783 (2013).

California's Proposition 65 law.[57] The agency has also finalized a No Significant Risk Level for glyphosate, which estimated the daily exposure level that will result in a 1/100,000 chance of developing cancer, of 1.1 mg/day.[58]

V. Sethoxydim

Sethoxydim is highly water soluble and has very low soil adsorption, making it highly likely to run-off and seep into groundwater.[59] Sensitive aquatic and terrestrial species that rely on wetlands or cave systems fed by ground or surface water are at most risk from groundwater pollution of sethoxydim from nearby usage areas.

When used according to label directions, sethoxydim presents a risk to non-target terrestrial and aquatic plants from exposure in drift and runoff, with negative effects to terrestrial plants occurring as far as 548 ft and 144 ft from the treated area for aerial and ground applications, respectively.[60]

EPA's 2019 ecological risk assessment found that sethoxydim can have sublethal effects to mammals that feed on plants and insects sprayed with the pesticide.[61] Sethoxydim can also impact the feeding and growth of terrestrial invertebrates like bees as far as 69 ft and 10 ft away from the treated area with aerial and ground applications, respectively.[62] Data gaps remain in EPA's risk assessment for sethoxydim, as there are no data for larval chronic toxicity to bees nor any toxicity data for terrestrial invertebrates other than honey bees. Despite its low overall usage sethoxydim has been detected in a national survey of honey bee pollen.[63] Ecological incidents involving sethoxydim include a bee kill of hives that were feeding on blueberry, one mammal incident, and seven plant incidents.[64]

Endangered butterflies are potentially at risk from sethoxydim used for habitat conservation if application is poorly timed or overused. Sethoxydim residues on larval food plants have been shown to reduce cabbage white butterfly survival, reduce development time for the Puget blue

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[57] OEHHA, The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment: Glyphosate Listed Effective July 7, 2017, as Known to the State of California to Cause Cancer (2017), https://oehha.ca.gov/proposition-65/crnr/glyphosate-listed-effective-july-7-2017-known-state-california-cause-cancer.

[58] OEHHA, The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment: Amendment to Section 25705 No Significant Risk Level - Glyphosate (Apr. 10, 2018), https://oehha.ca.gov/proposition-65/crnr/amendment-section-25705-no-significant-risk-level-glyphosate-april-10-2018.

[59] EPA, Sethoxydim: Draft Ecological Risk Assessment for Registration Review, at 19-20 (Aug. 16, 2019), https://www.regulations.gov/document/EPA-HQ-OPP-2015-0088-0019.

[60] *Id.* at 48

[61] *Id.* at Table 9-4.

[62] *Id.* at 45-46.

[63] Nancy Ostiguy et al., Honey Bee Exposure to Pesticides: A Four-Year Nationwide Study, *Insects*, https://doi.org/10.3390/insects10010013 (Jan. 2019).

[64] US EPA, Sethoxydim Interim Registration Review Decision Case Number 2600, at 11.

butterfly,[65] reduce survival in *Euphydryas* butterfly larvae,[66] and reduce the number of Behr's metalmark butterfly pupae.

VI. Simazine

Simazine is a very mobile and persistent pesticide, having a half-life of nearly three years in some environments and a high potential to move into surface and ground water.[67]

EPA found that all uses of simazine resulted in reproductive risks of concern to birds and mammals that ate plants or insects contaminated with the pesticide, by as much as 800-fold.[68] Risks of concern to mammals were still exceeded for all uses when modelling a reduced rate of 0.5 lb active ingredient/acre, a rate that is 8 times lower than that allowed on the label.[69] The EPA found spray drift concerns to mammals as far as 200-600 ft from the treated area for ground applications and even farther for aerial applications.[70]

Similar concerns exist for off-target plants, where EPA threshold of concerning risk is exceeded by 250-fold and as far away as 450 ft from the site of application.[71]

A biological evaluation was prepared by the EPA on how use of simazine may affect all endangered and threatened species in the United States. The agency concluded that simazine would "Likely Adversely Affect" approximately 55% of threatened and endangered species and adversely modify about a third of designated critical habitat in the U.S.[72]

VII. *Fluazifop-P-Butyl*

Using fluazifop according to the pesticide label can expose mammals to concentrations that are known to cause reduced pup viability and pup weight.[73] Fluazifop can also cause chronic harm to bee larva following every use of the pesticide that was modelled by EPA.[74] Terrestrial plants can

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[65] Cheryl Russell and Cheryl B. Schultz, Effects of Grass-Specific Herbicides on Butterflies: An Experimental Investigation to Advance Conservation Efforts, *Journal of Insect Conservation*, https://doi.org/10.1007/s10841-009-9224-3 (Feb. 1, 2010).
[66] Cheryl B. Schultz et al., Non-Target Effects of Grass-Specific Herbicides Differ among Species, Chemicals and Host Plants in Euphydryas Butterflies, *Journal of Insect Conservation*, https://doi.org/10.1007/s10841-016-9920-8 (Oct. 2016).
[67] EPA, Preliminary Ecological Risk Assessment for Simazine, at 37 (Apr. 13, 2016), https://www.regulations.gov/docket?D=EPA-HQ-OPP-2018-0551.
[68] *Id*. at 104-105.
[69] *Id*. at 103.
[70] *Id.* at 106-108.
[71] *Id.* at 112-118.
[72] EPA, Final National Level Listed Species Biological Evaluation for Simazine, Executive Summary (2021), https://www.epa.gov/endangered-species/final-national-level-listed-species-biological-evaluation-simazine.
[73] EPA, Fluazifop-p-butyl: Draft Ecological Risk Assessment for Registration Review, at 61 (June 27, 2019), https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0779-0017.
[74] *Id.* at 64-65.

be exposed to levels of fluazifop via spray drift that can cause harm from 100 to 1,000 ft from the treated area.[75]

VIII. Clopyralid

Clopyralid uses can expose small and medium-sized mammals to levels that can decrease body weight and food consumption.[76] Risks of concern were also identified for endangered herbivorous birds, reptiles and terrestrial amphibians, and terrestrial invertebrates, based on short-term exposures from the labelled uses of clopyralid.[77] The EPA found that clopyralid spray drift can result in harm to ESA-listed and non-ESA listed plants at a distance of more than 1,000 ft from where it is sprayed.[78] When modelling the *lowest approved application rate*, EPA found that plants can be harmed more than 1000 feet away from aerial applications and nearly 500 feet away from ground applications.[79]

IX. Clethodim

Clethodim poses a risk to many non-target organisms, including freshwater fish and amphibians.[80] Mammals are also estimated to experience chronic harms from many uses of clethodim.[81] Terrestrial plants, particularly monocots, are expected to experience reduced seedling emergence more than 1000 ft away from the treated area and experience growth impairment nearly 500 ft from the treated area.[82]

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[75] *Id*. at 67.
[76] EPA, Clopyralid: Draft Ecological Risk Assessment for Registration Review, at 7 (Dec. 14, 2018), https://www.regulations.gov/document?D=EPA-HQ-OPP-2014-0167-0032.
[77] *Id.* at 33, 39.
[78] *Id.* at 41.
[79] *Id.* at 42.
[80] EPA, Clethodim: Preliminary Ecological Risk Assessment for Registration Review, at 51-52 (Jan. 13, 2014), https://www.regulations.gov/document?D=EPA-HQ-OPP-2008-0658-0020.
[81] *Id.* at 59.
[82] *Id.* at 61.