

WILL REGULATORS CATCH THE DRIFT? *NFFC v. EPA* AND BREATHING NEW LIFE INTO PESTICIDE REGULATION

BY

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In the past half-century, U.S. agriculture has become dramatically more industrialized, consolidated, and bifurcated between livestock and crop agriculture, resulting in significant negative environmental, health, and socioeconomic effects. One pillar propping up this unsustainable industrial model is heavy reliance on synthetic pesticides and fertilizers, chemical inputs necessary for large monoculture production. In the most recent twenty-first-century version of this ever-entrenching paradigm, pesticide companies sell a seed/pesticide cropping system, comprised of crops genetically engineered (GE) to resist multiple pesticides, allowing “over the top” spraying at new times of the year and in new ways. These crop systems have significantly increased the pesticide load on our foods and into our environment, creating huge externalized environmental and health costs.

Pesticides are toxic substances intended to harm or kill. Yet, stakeholders best characterize current federal pesticide regulation under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) not by its rigor but by its weaknesses and loopholes. The U.S. Environmental Protection Agency (EPA), charged with administering FIFRA, increasingly approves new uses and variations of pesticides without fully taking into account the

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consequences these chemical cocktails have on public health, farmers, and our most imperiled species. This includes conditionally approving pesticides despite lacking vital data showing their safety and limiting the scope of agency review when it is applied. When EPA chooses to bend to the whim of powerful agrochemical corporations instead of truly evaluating the potential risks, environmentalists, farmers, and farmworker groups often turn to the courts to challenge EPA's pesticide approvals.

A recent case, National Family Farm Coalition v. EPA (NFFC), 960 F.3d 1120 (9th Cir. 2020), presented these issues in stark relief. Dicamba (3,6-dichloro-2-methoxybenzoic acid) is a broad-spectrum herbicide. Dicamba is an effective weed killer, but its toxicity is not limited to weeds. It can also kill many desirable broadleaf plants, bushes, and trees. And it has a well-known drawback: dicamba is volatile, moving easily off a field on which a farmer has sprayed it. As a result of its toxicity and its tendency to drift, dicamba has historically been limited to clearing fields of weeds, either before crops were planted or before newly planted crops emerged. This changed in 2016: despite scientists and farmers raising significant concerns, EPA conditionally registered new, over-the-top dicamba pesticide spraying as the "next generation" of pesticide-resistant cropping systems. That first-ever such approval led to 20 million more pounds of dicamba sprayed annually, a twenty-three-fold increase, across approximately 50 million acres at new times of the year and in novel ways.

EPA's approval created a debacle that agronomists say is unprecedented in the history of U.S. agriculture: the spraying of massive amounts of dicamba resulted in millions of acres of crops, trees, and wild plants damaged by dicamba spray droplets drifting off-field during application; dicamba vapor clouds damaged vast fields from fencerow to fencerow; dicamba-laced water ran off sprayed fields; and even rainfall was contaminated in areas of intensive use. Millions of acres of off-field dicamba drift and runoff resulted in widespread destruction of crops, economic losses, social upheaval to rural communities, and harm to endangered species and other wildlife.

Environmentalists and farmers challenged the approval decision in 2016. After four years of litigation, in summer 2020, the U.S. Court of Appeals for the Ninth Circuit issued a detailed fifty-six-page opinion carefully analyzing the voluminous record evidence and holding that EPA violated FIFRA in no less than six ways, grounds upon which the Court then completely vacated the registration as unlawfully issued. The Court concluded that EPA violated FIFRA by substantially underestimating several important risks and costs, including the amount of dicamba sprayed, the number of injury reports, and the amount and costs of crop damage. The Court also held that EPA completely failed to consider and account for several

other costs, such as economic losses ensuing from anti-competitive, monopolistic effects of the registrations, as well as the social costs of strife and dissension in farming communities triggered by rampant off-target dicamba damage to neighbors' crops. Finally, the Court held that EPA violated FIFRA by predicating its core conclusion that its approval would have no adverse economic and environmental effects on mitigation measures—in the form of weather-related use restrictions—that substantial record evidence demonstrated were so extreme that farmers could not both follow the mitigation measures and have any hope of controlling weeds. EPA failed to consider and analyze whether following those directions was possible in real-world farming conditions. All of these were precedential FIFRA holdings.

While the dicamba drift damage story is dramatic, EPA's mistakes and unlawful regulatory approach were not singular; instead, they are emblematic of systemic, longstanding poor pesticide oversight. Make no mistake, the needed remedy is nothing short of a complete overhaul of EPA's mission with regard to pesticides and, with it, modern, twenty-first-century legislation to address twenty-first-century agricultural challenges. However, in the absence of the political will for such changes, the NFFC precedent, and a few other important current and past cases, provide the chance to substantially improve pesticide regulation going forward and breathe some long-overdue and badly needed new life into its old statutory bones.

Part II of this Article provides a brief history of pesticides and modern industrial agriculture, its current iteration of crop systems engineered with resistance to multiple pesticides, and the adverse impacts of this pesticide-promoting system on health and the environment. Part III sets forth how pesticides are regulated under FIFRA, its implementing regulations, and the EPA modus operandi. It summarizes the many problems in the regulatory structure and implementation, including its limited scope, regulatory loopholes, lack of transparency, industry capture/bias, lack of enforcement, and limiting judicial interpretation. Part IV presents the case study of NFFC v. EPA and discusses the import of its holdings. Part V places the NFFC case in the broader context of developing pesticide litigation and law, and the legal and cultural battle for the future of our food. This Article concludes on a cautiously optimistic note, as NFFC and other similar cases may be the leading edge needed to create long-overdue improvements to pesticide regulation for the betterment of health and environmental protection.

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I. INTRODUCTION

On a muggy day in August 2017, a Missouri farmer looked out across his fifty-eight-acre soybean field, arms folded, and sighed.¹ What was shaping up to be one of his most productive plots was now full of plants with shriveled leaves, curled upward like little cups. It was an unmistakable pattern of destruction with which he was all too familiar: the herbicide dicamba. His field, adjacent to his own cattle pastures and a dirt road, shared one side with a neighboring farmer's soybean field. He recalled seeing his neighbor spray his crops recently and noticed the damaged plants were on the side closer to his neighbor's land, a strong sign that dicamba had drifted onto his field.

He bent down to examine the leaves, took a picture with his phone, and thought about what to do next. He knew about the new "GE" soybean seeds on the market, genetically engineered to be resistant to yet another herbicide, the latest new techno-fix, now that the weeds had all become resistant to Roundup, their old standby weed killer. He deliberately bought conventional seeds, not the patented ones engineered to resist the powerful herbicide that he purposefully avoided spraying in his own fields, so that he could grow his own seeds for replanting, as he and his forefathers had done. But now he might have no choice: suffer more losses, stop planting the fields hit by drift, or give in and buy the damned GE seeds purely to defend himself from damage from his neighbors.

This was not what the fourth-generation farmer had in mind for the future of the land his father bought with help from the G.I. Bill in 1948. And neither he nor his wife could have imagined something like this creating such tensions between them and their neighbors, arguments about who caused this damage and why it kept happening, leaving hard feelings and ill-will behind. He had heard how impossible it was to follow the lengthy, complex use directions, even if farmers tried their best to avoid drift, as he knew his neighbor had. Don't spray if the wind is blowing in a certain direction, or if it is above or below a certain speed, or if it is going to rain within twenty-four hours, and on and on. Had whoever wrote these instructions ever been to a real Midwestern field in summer?

Unfortunately, versions of this story unfolded thousands of times over, from Arizona and Texas, to the farmer's home in Missouri and nearby Arkansas, up to Iowa, Nebraska and Minnesota, over to Tennessee and Illinois, and more. Soybean growers reported much of the dicamba damage, which often hammered their crops multiple times in a single season, but it was by no means limited to them. Because this herbicide is an equal opportunity destroyer—it damages just about any plant that produces a flower—many others had tales to tell. Fruit orchards and vineyards were injured, some devastated, organic vegetable farms and gardens torched. Millions of acres in all, waves of damage unlike any ever seen in the history of U.S. agriculture. The scope of

¹ Adapted from Declaration of Darvin Bentlage at A093–A100, Nat'l Fam. Farm Coal. v. U.S. Env't Prot. Agency (*NFFC*), 960 F.3d 1120 (9th Cir. 2020).

damages caused by dicamba boggled the farmer's mind. At what costs, he thought? Money, sure. But livelihoods. The loss of his freedom to farm, to decide what he grows. And in and beyond farms? Beekeepers across the country saw honey production plummet thanks to dicamba's suppression of flowering plants. Millions of trees damaged, in nature reserves, along rural roadways, in peoples' yards. In some farming towns, it is difficult to find a tree not affected by this potent plant killer. And broader harm to flora and fauna, plants, birds, insects, and other common and imperiled creatures whose plant-based natural habitats are so disrupted by the damage dicamba has wrought. How did we get to this point, he thought, where such devastation has become just another fact of life? Why did we?

II. A VERY BRIEF HISTORY OF PESTICIDES AND MODERN INDUSTRIAL AGRICULTURE

Industrial agriculture as we know it today is a relatively recent development—a blip on the radar compared to humans' 12,000-year history of agricultural cultivation.² Many of the key developments transforming agriculture into its current industrial mode, especially prevalent in rich nations, happened in the past sixty years.³ The second half of the twentieth century brought the so-called “Green Revolution,” which promoted the use of new hybrid seeds and the many inputs—synthetic fertilizers, irrigation, insecticides, herbicides—they required to achieve their potential, as well as relentless mechanization and other technological changes.⁴ Its start coincided with World War II when a litany of new chemicals were developed as poisons intended for chemical warfare.⁵ After the war ended, the chemical manufacturing industry needed a new purpose for these chemicals and ultimately found one in our food system.⁶ Thus, along with fossil fuel-dependent mechanical technologies and government policies subsidizing broad-scale commodity crops like corn and soy for animal feed, pesticides quickly became a core pillar of the new age of industrial agriculture.⁷ Indeed, propped up by this heavy reliance on pesticides and fertilizers, farms grew larger and more specialized, with steadily expanding monocultures displacing farm animals, which were consigned to confined animal feeding operations.⁸ Where previously, manure was used as an elegant, natural systemic

² Erin Blakemore, *What Was the Neolithic Revolution?*, NAT'L GEOGRAPHIC (Apr. 5, 2019), <https://perma.cc/P6RN-2CDV>. Another source found evidence of plant cultivation 23,000 years ago. American Friends of Tel Aviv University, *First Evidence of Farming in Mideast 23,000 Years Ago*, SCIENCEDAILY (July 22, 2015), <https://perma.cc/66EY-ZQJX>.

³ Mary Jane Angelo & Seth Hennes, *The Environmental Impacts of Industrial Fertilizers and Pesticides*, in FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW 35, 35 (Mary Jane Angelo et al. eds., 2013).

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ *Id.* at 35–36.

⁸ *Id.* at 38.

solution to replenish the soil in crop-diversified, livestock integrated, closed-loop farms, manure later became a form of hazardous waste, and in the name of specialization, two separate incomplete systems were formed, both creating pollution.⁹ Presto: modern industrial agriculture was born.

Pesticide spraying grew exponentially to keep up with the demands of large-scale farming, benefiting from the development of World War II synthetic chemical insecticides.¹⁰ One of these was the now-infamous DDT.¹¹ DDT was effective for long-term pest control because of its persistence in the environment.¹² In 1962, American marine biologist, conservationist, and author Rachel Carson, regarded by many as the mother of the environmental movement, published *Silent Spring*, providing a vivid warning of the current (and future) ecological consequences of indiscriminate pesticide use.¹³ Shortly thereafter, DDT was banned, Congress created the Environmental Protection Agency (EPA), and enacted many of today's fundamental environmental statutes for it to oversee.¹⁴ These statutes included a complete overhaul of the pesticide law, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).¹⁵

Yet environmental and health damage from pesticides has continued and increased. Because pesticides are designed to kill living organisms, it is unsurprising that pesticide poisoning is implicated in twenty-four percent of U.S. species decline.¹⁶ Countless mammals, birds, fish, and other wildlife are exposed to these toxins from direct spraying, consuming contaminated prey, and drinking contaminated water.¹⁷ These biocides are ubiquitous in our nation's waterways from both runoff and spray drift.¹⁸ Of particular note are the documented effects of pesticides on bees,

⁹ See, e.g., Michael Pollan, *Farmer in Chief*, N.Y. TIMES MAG. (Oct. 9, 2008), <https://perma.cc/XU6J-KMTK> ("Subsidized monocultures of grain also led directly to monocultures of animals: since factory farms could buy grain for less than it cost farmers to grow it, they could now fatten animals more cheaply than farmers could."); see generally Hannah M.M. Connor, *The Industrialization of Animal Agriculture: Connecting a Model with its Impacts on the Environment*, in FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW, *supra* note 3, at 65–68, 90 (explaining that although "costs to producers and consumers have declined," environmental and public health costs have risen due to the animal "confinement production model").

¹⁰ Angelo & Hennes, *supra* note 3, at 36.

¹¹ Dichloro-diphenyl-trichloroethane.

¹² Angelo & Hennes, *supra* note 3, at 37.

¹³ RACHEL CARSON, *SILENT SPRING* 103 (First Mariner Books ed., 2002) (1962) ("Over increasingly large areas of the United States, spring now comes unheralded by the return of the birds, and the early mornings are strangely silent where once they were filled with the beauty of bird song.")

¹⁴ *Milestones in EPA and Environmental History*, U.S. ENV'T PROT. AGENCY, <https://perma.cc/ZC8H-T49W> (last visited July 31, 2021).

¹⁵ 7 U.S.C. §§ 136–136y (2018).

¹⁶ Angelo & Hennes, *supra* note 3, at 39.

¹⁷ *Id.* at 39.

¹⁸ John H. Minan & Tracy M. Frech, *Pesticides as "Pollutants" Under the Clean Water Act*, 47 SAN DIEGO L. REV. 109, 119–20 (2010).

which play a vital pollination role in both nature and agriculture.¹⁹ Beyond concerns about acute toxicity, we know that pesticides have chronic effects on lifespan, physiology, reproduction, and behavior of non-target organisms, including humans.²⁰ Farmworkers and farmers are on the front lines of exposure to agricultural chemicals and suffer from neurological problems, birth defects, and various types of cancer as a direct result.²¹ This creates an enormous equity issue: those who are most vulnerable face the greatest risks as farmworkers often lack access to healthcare and fear workplace retaliation for reporting occupational exposure to pesticides.²²

Pesticides alone are only half of the modern story. These environmental and human health harms have been exacerbated since the mid-1990s because of the large-scale planting of GE commodity crops specifically engineered to withstand the additional spraying of plant-killing pesticides (also known as herbicides) over a longer period of time.²³ The overwhelming majority of commercial GE crops are genetically engineered by pesticide companies, such as Monsanto (recently acquired by Bayer),²⁴ Syngenta (acquired by ChemChina),²⁵ and Corteva (the merged agricultural divisions of Dow and DuPont),²⁶ to withstand the application of herbicides they also sell.²⁷ Consequently, these GE crops

¹⁹ Angelo & Hennes, *supra* note 3, at 41; JENNIFER HOPWOOD ET AL., HOW NEONICOTINOIDS CAN KILL BEES, at v (2d ed. 2016), <https://perma.cc/P86C-FKRH>; see also Yijia Li et al., *Neonicotinoids and Decline in Bird Biodiversity in the United States*, 3 NATURE SUSTAINABILITY 1027, 1027 (2020) (“Numerous laboratory and field studies have confirmed substantial negative impacts of neonicotinoid insecticides on honeybees [and] wild bees.”).

²⁰ Angelo & Hennes, *supra* note 3, at 41–42.

²¹ Thomas A. Arcury & Sara A. Quandt, *Chronic Agricultural Chemical Exposure Among Migrant and Seasonal Farmworkers*, 11 SOC. NAT. RES. 829, 830–31 (1998).

²² Joanne Bonnar Prado et al., *Acute Pesticide-Related Illness Among Farmworkers: Barriers to Reporting to Public Health Authorities*, 22 J. AGROMEDICINE 395, 396–97 (2017).

²³ See David A. Mortensen et al., *Navigating a Critical Juncture for Sustainable Weed Management*, 62 BIOSCIENCE 75, 75–76 (2012) (noting that the “[g]rowers were attracted to the flexibility and simplicity” of the GE commodity crop and “adopted the technology at an unprecedented rate”); Scott Kilman, *Superweed Outbreak Triggers Arms Race*, WALL STREET J. (June 4, 2010), <https://perma.cc/TM6J-4Y6K>.

²⁴ *Bayer Closes Monsanto Acquisition*, BAYER GLOBAL (June 7, 2018), <https://perma.cc/XL67-PSV3>.

²⁵ *Syngenta Shareholders Accept ChemChina Offer*, SYNGENTA GLOBAL (May 5, 2017), <https://perma.cc/6EXK-PSED>.

²⁶ *Our History*, CORTEVA AGRISCIENCE, <https://perma.cc/5HXE-APHD> (last visited July 31, 2021).

²⁷ Kristina Hubbard, *The Sobering Details Behind the Latest Seed Monopoly Chart*, CIVIL EATS (Jan. 11, 2019), <https://perma.cc/W5NW-YMXH>. Further, despite billions of dollars in research and nearly three decades of commercialization, no GE crops are commercially produced to increase yields, reduce world hunger, or mitigate the climate crisis. DOUG GURIAN-SHERMAN, UNION OF CONCERNED SCIENTISTS, FAILURE TO YIELD: EVALUATING THE PERFORMANCE OF GENETICALLY ENGINEERED CROPS 1–5 (Apr. 2009), <https://perma.cc/C6M9-FB9E>; Jack A. Heinemann et al., *Reply to Comment on Sustainability and Innovation in Staple Crop Production in the US Midwest*, 12 INT’L J. AGRIC. SUSTAINABILITY 387, 387 (2014).

have dramatically increased the overall pesticide output of American agriculture into our environment.²⁸ Monsanto's GE "Roundup Ready" crops,²⁹ which are resistant to glyphosate, made glyphosate the most widely used pesticide in history, with roughly 280 million pounds applied annually in U.S. agriculture since 2012.³⁰ Reliance on these pesticide-promoting GE crop systems has caused a number of harms, including widespread pollution of our waterways and ecosystems,³¹ degradation of the habitat of beneficial insects such as pollinators,³² and harm to soil health.³³ And, as discussed in the following paragraph, newer GE crop varieties have increased the use of older pesticides such as dicamba and 2,4-D.³⁴

The overuse of pesticides is a related problem. Monsanto told farmers they could rely entirely on Roundup without weeds becoming resistant to glyphosate, contrary to weed science experts' warnings.³⁵ But, similar to antibiotic overuse,³⁶ Roundup overuse generated an epidemic of glyphosate-resistant "superweeds," now infesting an estimated 120 million acres of U.S. cropland.³⁷ These weeds have flourished, infesting farm fields and roadsides, complicating weed control for farmers, and leading to the use of more—and increasingly toxic—pesticides.³⁸ This set

²⁸ Charles M. Benbrook, *Impacts of Genetically Engineered Crops on Pesticide Use in the U.S. – The First Sixteen Years*, ENV'T SCI. EUR., Sept. 2012, at 1, 2.

²⁹ See generally *Ctr. for Food Safety v. Vilsack*, 718 F.3d 829, 841 (9th Cir. 2013) (discussing the pesticidal harms of these crop systems in the context of "Roundup Ready" alfalfa).

³⁰ Pesticide National Synthesis Project, *Pesticide Use Maps - Glyphosate, 2012*, U.S. GEOLOGICAL SURV., <https://perma.cc/V2TN-95HM> (last visited July 31, 2021); Benbrook, *supra* note 28, at 3; RAMON J. SEIDLER, PESTICIDE USE ON GENETICALLY ENGINEERED CROPS 3 (2014), <https://perma.cc/4BB2-K4K3>.

³¹ Feng-Chih Chang et al., *Occurrence and Fate of the Herbicide Glyphosate and Its Degradate Aminomethylphosphonic Acid in the Atmosphere*, 30 ENV'T TOXICOLOGY & CHEMISTRY 548, 548, 550 (2011); Richard H. Coupe et al., *Fate and Transport of Glyphosate and Aminomethylphosphonic Acid in Surface Waters of Agricultural Basins*, 68 PEST. MGMT. SCI. 16, 16–17 (2011).

³² Richard Conniff, *Tracking the Causes of Sharp Decline of the Monarch Butterfly*, YALE ENV'T 360 (Apr. 1, 2013), <https://perma.cc/72QV-B7PN>; John M. Pleasants & K.S. Oberhauser, *Milkweed Loss in Agricultural Fields Because of Herbicide Use: Effect on the Monarch Butterfly Population*, 6 INSECT CONSERVATION & DIVERSITY 135, 142 (2013).

³³ Robert J. Kremer, *Soil and Environmental Health After Twenty Years of Intensive Use of Glyphosate*, 6 ADVANCES IN PLANTS & AGRIC. RES., 122, 122–23 (2017).

³⁴ Mortensen et al., *supra* note 23, at 76; Brandon Keim, *New Generation of GM Crops Put Agriculture in a 'Crisis Situation'*, WIRED (Sept. 25, 2014), <https://perma.cc/ED5J-WCQW>.

³⁵ See generally William Freese, *Response to Questions from Domestic Policy Subcommittee of the House Oversight and Government Reform Committee – With Regard to Herbicide-Resistant Weeds Following Testimony Delivered Before the Subcommittee* (Sept. 30, 2010), <https://perma.cc/RDY8-3Q28>.

³⁶ *Antibiotic Resistance*, WORLD HEALTH ORG. (July 2020), <https://perma.cc/XB93-TG5D>.

³⁷ Jackie Pucci, *The War Against Weeds Evolves in 2018*, CROPLIFE (Mar. 20, 2018), <https://perma.cc/3K5S-U8HQ>; see H. Claire Brown, *Attack of the Superweeds*, N.Y. TIMES (Aug. 18, 2021), <https://perma.cc/46JG-HAQE>.

³⁸ Mortensen et al., *supra* note 23, at 76; Kilman, *supra* note 23.

the stage for the current situation: the “next generation” of GE seeds, the pesticide industry’s “solution” to the problem it created.³⁹ Their new business model is to engineer commodity crops with resistance to older, more toxic pesticides like 2,4-D, dicamba, imidazolinones, and others, often in combination.⁴⁰ These multiple, “stacked” herbicide-resistant crops continue the pesticide treadmill of spraying more and more toxic cocktails. Yet, there is no panacea. Pesticide companies touted their products’ ability to kill glyphosate-resistant weeds, but after just a few seasons of use, weeds have already begun developing resistance to dicamba, making them more intractable, as many experts predicted.⁴¹ In truth, they will foster more resistant weeds and perpetuate the toxic cycle of increased pesticide use in response.

Now, we are facing a new crop of public health and environmental harms from pesticides, as the American agricultural system is fully plunged in this “next generation” cycle of GE seeds and pesticide reliance.⁴² As farmers plant more and more acres of GE seed, to be sprayed with more pesticide cocktail mixtures, wild pollinators and the flowering plants they depend upon face increasingly existential threats.⁴³ Threatened and endangered species are relentlessly subject to harm from the use of EPA-sanctioned pesticides, even while under the supposed protection of the Endangered Species Act (ESA).⁴⁴ In a 2020 evaluation, EPA itself found that *ninety-three* percent of endangered and threatened species exposed to the nation’s most commonly used pesticide, glyphosate, will likely experience adverse effects that could jeopardize their very existence.⁴⁵ At a time when endangered species are already facing incredible habitat loss due to human development and the climate crisis, toxic pesticide exposures could easily be the final blow for any of these imperiled species.

³⁹ Kilman, *supra* note 23.

⁴⁰ *Id.*

⁴¹ Chris Bennett, *First Signs of Dicamba Resistance?*, AGWEB (Mar. 6, 2017), <https://perma.cc/G8KS-62ZT>; Matt Hagny, *Dicamba & Palmer Pigweeds*, PINNACLE CROP TECH., INC. (May 2017), <https://perma.cc/5AWB-8JM5>; Nathan Donley & Stephanie M. Parent, *Comment on Dicamba: New Use on Herbicide-Tolerant Cotton and Soybean* (May 31, 2016), <https://perma.cc/QLP4-LLP8>; Mortensen et al., *supra* note 23, at 77.

⁴² Minan & Frech, *supra* note 18, at 117.

⁴³ Mary Jane Angelo, *The Killing Fields: Reducing the Casualties in the Battle Between U.S. Species Protection Law and U.S. Pesticide Law*, 32 HARV. ENV'T L. REV. 95, 100 (2008).

⁴⁴ 16 U.S.C. §§ 1531–1544 (2018); Angelo, *supra* note 43, at 101.

⁴⁵ U.S. ENV'T PROT. AGENCY, DRAFT NATIONAL LEVEL LISTED SPECIES BIOLOGICAL EVALUATION FOR GLYPHOSATE: GLYPHOSATE EXECUTIVE SUMMARY FOR DRAFT BIOLOGICAL EVALUATION 5 (2020).

III. THE FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)

Currently, there are over 18,000 pesticide formulations sold in the U.S.⁴⁶ For a pesticide to be distributed or sold in the U.S., it must first be registered and labeled by EPA under FIFRA.⁴⁷ Since its original enactment, Congress has amended FIFRA to improve EPA's oversight of pesticide safety. Nonetheless, FIFRA still leans heavily toward a system of registration in favor of expeditious approval of pesticides.⁴⁸ Over the years, EPA has also exercised its regulatory discretion to create several loopholes, resulting in pesticides being approved for widespread use without the agency analyzing the necessary safety data.⁴⁹

Congress first enacted FIFRA in 1947, giving the Secretary of Agriculture (USDA) authority to regulate "economic poisons" (pesticides) in interstate commerce, but the statute did not contain any environmental or safety standards for pesticides.⁵⁰ The 1947 FIFRA centered on labeling and ensuring that pesticides were not adulterated, and allowed registration based on a description of the chemical's composition and what the chemical claimed to achieve.⁵¹ That version remained in place until 1972 when Congress transferred authority to implement FIFRA from the USDA to the newly created EPA and overhauled the statute with provisions aimed at better protecting human health and the environment.⁵² Against the backdrop of the country's new awareness of the risks and consequences of unfettered pesticide use through new knowledge about DDT and the warnings of *Silent Spring*,⁵³ the 1972 FIFRA amendments provide the framework for pesticide registration and data requirements that we use today.⁵⁴

A. The FIFRA Framework

FIFRA adopts a broad definition of pesticide that includes any chemical meant to control or kill any pest or plant.⁵⁵ The main mechanism used to regulate pesticides is known as registration.⁵⁶ Before any

⁴⁶ Linda-Jo Schierow & Robert Esworthy, *Pesticide Law: A Summary of the Statutes* 1 (Nov. 14, 2012), <https://perma.cc/R6GE-ARDK>.

⁴⁷ 7 U.S.C. § 136a(a) (2018).

⁴⁸ *Merrell v. Thomas*, 807 F.2d 776, 778 (9th Cir. 1986).

⁴⁹ Alex Formuzis, *A Loophole for Pesticides Puts Public's Health at Risk*, EWG (Mar. 29, 2013), <https://perma.cc/ELM7-DEA3>.

⁵⁰ Federal Insecticide, Fungicide, and Rodenticide Act, ch. 125, 61 Stat., 163 (1947); Mary Jane Angelo, *The Federal Insecticide, Fungicide, and Rodenticide Act*, in FOOD, AGRICULTURE, AND ENVIRONMENTAL LAW, *supra* note 3, at 129, 130.

⁵¹ Federal Insecticide, Fungicide, and Rodenticide Act, ch. 125, § 4a(3)–(4), 61 Stat. 163, 167 (1947).

⁵² Angelo, *supra* note 50, at 130.

⁵³ *Id.*

⁵⁴ Schierow & Esworthy, *supra* note 46, at 2–3.

⁵⁵ 7 U.S.C. § 136(u) (2018).

⁵⁶ *Id.* § 136a(a).

pesticide can be sold or used in the U.S., EPA must register the pesticide: provide a license that establishes the terms and conditions under which the pesticide may be lawfully sold, distributed, and used within the U.S.⁵⁷ The terms and conditions of the registration include exactly what product may be sold and used, and for what specific use(s), and how it may be used (e.g., what crops it may be sprayed on and how).⁵⁸

In registering pesticides, the core baseline statutory standard EPA applies is the “unreasonable adverse effects” standard.⁵⁹ EPA may deny an application for registration when “necessary to prevent unreasonable adverse effects on the environment.”⁶⁰ FIFRA defines “unreasonable adverse effects on the environment” to mean “any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide.”⁶¹ EPA and the courts have interpreted FIFRA’s “unreasonable adverse effect” standard to require EPA to conduct a cost-benefit analysis “to ensure that there is no unreasonable risk created for people or the environment from a pesticide.”⁶² Thus, EPA balances the claimed economic and social benefits against the pesticide’s potential costs or harms. Congress anticipated that EPA’s careful balancing of costs and benefits would “take every relevant factor that the [agency] can conceive of into account.”⁶³

One difference between FIFRA and other environmental laws intended to control pollution, such as the Clean Water Act,⁶⁴ is that FIFRA regulates by product label rather than direct-use restrictions. That is to say, “the label is the law” and EPA’s ability to regulate pesticide use through FIFRA is limited to establishing label restrictions, such as application instructions or restrictions for use on only certain types of crops.⁶⁵ Generic label warnings may be difficult to translate into real-world application practices, while complex label restrictions put the onus on the applicator rather than on the registrant to prove that the pesticide is safe.

Congress tasked EPA with implementing the specific data that an applicant must submit to support this no “unreasonable adverse effect”

⁵⁷ *Id.* § 136a(c).

⁵⁸ 40 C.F.R. § 152.115 (2019); 40 C.F.R. § 156.10 (2019).

⁵⁹ *Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Federal Facilities*, U.S. ENV’T PROT. AGENCY, <https://perma.cc/E3EW-CVVZ> (last visited July 31, 2021).

⁶⁰ 7 U.S.C. § 136a(a).

⁶¹ *Id.* § 136(bb).

⁶² *Pollinator Stewardship Council v. U.S. Env’t Prot. Agency (Pollinator I)*, 806 F.3d 520, 522–23 (9th Cir. 2015) (quoting 7 U.S.C. § 136(bb) (2018)).

⁶³ S. REP. NO. 92-838, at 10 (1972), reprinted in 1972 U.S.C.C.A.N. 3,993, 4,032. Congress intended for EPA, among other relevant factors, to carefully consider “hazards to farm-workers, hazards to birds and animals and children yet unborn . . . the need for food and clothing and forest products, forest and grassland cover to keep the rain where it falls, prevent floods, provide clear water . . . aesthetic values, the beauty and inspiration of nature, the comfort and health of man.” *Id.*

⁶⁴ 33 U.S.C. §§ 1251–1388 (2018).

⁶⁵ 40 C.F.R. § 156.10 (2019).

finding.⁶⁶ To register a new pesticide, a manufacturer must submit an application describing how the pesticide will be used, its claimed benefits, the ingredients, and a description (and results) of all tests and studies performed on the product's health, safety, and environmental effects.⁶⁷

FIFRA is the main regulatory hurdle⁶⁸ that a pesticide must clear. While all federal agencies are subject to the requirements of the National Environmental Policy Act (NEPA)⁶⁹ when taking federal action,⁷⁰ in *Merrell v. Thomas*,⁷¹ the Ninth Circuit held that EPA is not required to comply with NEPA when approving pesticide registrations under FIFRA because FIFRA's unreasonable adverse effect standard includes consideration of environmental impact and thus, FIFRA serves as a functional equivalent to NEPA.⁷² This may be true as a textual matter, because FIFRA's "unreasonable adverse effect" definition broadly encompasses "any unreasonable risk to man or the environment, taking into account the *economic, social, and environmental* costs and benefits of the use of any pesticide."⁷³ However, because FIFRA is intended to authorize the use of chemicals that, by their nature, will harm living organisms and the environment, using a risk-benefit standard means that for each environmental risk associated with a pesticide registration, EPA looks to answer the question of how much risk is reasonable. This method of analysis is distinct from NEPA, where a federal agency is focused solely on analyzing the environmental impacts of its proposed action.⁷⁴

B. Conditional Registrations and Registration Review

FIFRA requires pre-market data and approval before a pesticide may be used. However, Congress amended FIFRA in 1978 to authorize EPA to

⁶⁶ 7 U.S.C. § 136a(c)(2)(A) (2018).

⁶⁷ *Id.* § 136a(c)(1).

⁶⁸ As discussed *infra* Part V.D.i, the Endangered Species Act (ESA) imposes additional mandatory legal duties that EPA must—but often does not—comply with in its pesticide registration process.

⁶⁹ 42 U.S.C. §§ 4321–4370h (2018).

⁷⁰ *See Id.* § 4333 (describing the requirement of federal agencies to review projects for consistency with NEPA's purpose and intent).

⁷¹ 807 F.2d 776 (9th Cir. 1986).

⁷² *Id.* at 778 ("Congress created a registration procedure within FIFRA to ensure consideration of environmental impact—a procedure that apparently made NEPA superfluous."); *see also* Uma Outka, *NEPA and Environmental Justice: Integration, Implementation, and Judicial Review*, 33 B.C. ENV'T AFF. L. REV. 601, 613 (2006) (noting that "[c]ourts have long held that if a statute contains the 'functional equivalent' of NEPA's review process, a NEPA review would be redundant and unnecessary").

⁷³ 7 U.S.C. § 136(bb) (2018) (emphases added).

⁷⁴ *See* *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1247–48 (9th Cir. 1984) ("The EPA registration process for herbicides under FIFRA is inadequate to address environmental concerns under NEPA."); *see also* Michael Mahoney, *Perpetuating the Cycle: The Failure of APHIS and EPA to Consider the Cumulative Impact of Pairing Herbicides with Herbicide-Resistant Crops*, 40 COLUM. J. ENV'T L. 183, 193–96 (2015) (describing the procedural elements of NEPA).

issue what is now commonly referred to as “conditional registrations” of pesticides (registrations without all the required data, in contrast to an unconditional registration, which contains all the required data) to address the delay and backlog in approving new pesticide products made using old chemicals under the more stringent data standards set by the 1972 FIFRA amendment.⁷⁵ Per the 1978 amendments, EPA may nonetheless grant a temporary “conditional” registration for a pesticide that is lacking all required health and safety data but only under three specific circumstances: 1) for pesticide uses that are identical or similar to a previously-registered pesticide, commonly referred to as “me-too” registrations;⁷⁶ 2) for additional uses of a previously-registered pesticide;⁷⁷ or 3) for pesticides with new active ingredients if certain conditions are met.⁷⁸

For the first category, EPA may conditionally register a proposed pesticide product if EPA determines that “the pesticide and proposed use are identical or substantially similar to any currently registered pesticide and use thereof, or differ[s] only in ways that would not significantly increase the risk of unreasonable adverse effects on the environment.”⁷⁹ For the second category, subject to certain exceptions, EPA may also conditionally register additional uses of an already-registered pesticide if EPA finds that the agency has “(i)... satisfactory data pertaining to the proposed additional use, and (ii) amending the registration in the manner proposed by the applicant would not significantly increase the risk of any unreasonable adverse effect on the environment.”⁸⁰ This is the category of our case study, *NFFC v. EPA*, discussed in Part IV. For the third category, EPA may conditionally register a pesticide containing a new active ingredient for which required data is otherwise lacking for a set period of time but only if it finds that 1) “use of the pesticide is in the public interest,” 2) the required data is “lacking because a period reasonably sufficient for generation of the data has not elapsed since the Administrator first imposed the data requirement,” and 3) the “use of the pesticide during [the conditional registration] period will not cause any unreasonable adverse effect on the environment.”⁸¹

The 1978 amendment also allowed EPA to require “additional data” to support the continued registrations of existing pesticide registrations.⁸² EPA codified this authority to require reassessment every fifteen years, in a process referred to as registration review, to make sure that all

⁷⁵ See *Mobay Chem. Corp. v. Costle*, 517 F. Supp. 254, 281 (W.D. Penn. 1981) (attributing the registration backlog to the “[in]adequacy of the decades-old studies on which the approval of current pesticides”); Federal Pesticide Act of 1978, Pub. L. No. 95-396, 92 Stat., 819, 825 (1978) (describing the conditional registration process).

⁷⁶ 7 U.S.C. § 136a(c)(7)(A).

⁷⁷ *Id.* § 136a(c)(7)(B).

⁷⁸ *Id.* § 136a(c)(7)(C).

⁷⁹ *Id.* § 136a(c)(7)(A).

⁸⁰ *Id.* § 136a(c)(7)(B).

⁸¹ *Id.* § 136a(c)(7)(C).

⁸² *Id.* § 136a(c)(2)(B).

registered pesticides continue to meet FIFRA's no "unreasonable adverse effects" standard using the latest science and data.⁸³ In practice, however, EPA has failed to meet the fifteen-year registration review mark, instead, allowing these lapsed pesticides to remain in use, in many cases despite overwhelming evidence demonstrating their harm to human health and the environment.⁸⁴

C. Application of the Unreasonable Adverse Effect Standard

Accordingly, whether it is unconditional registration, conditional registration, or registration review, the standard for EPA's pesticide decision-making centers around some form of risk-benefit analysis, requiring EPA to make a finding that the registration will not have an unreasonable adverse effect, or no significant increase in the risk of any unreasonable adverse effect, on the environment. This risk-benefit review standard sets FIFRA apart from other environmental statutes. While most environmental laws strive to prevent harm to the environment and living organisms, FIFRA is designed to approve the *release* of pesticides that are intended to kill or harm living organisms and that, by their nature, carry unintended risks to mankind and the environment.⁸⁵

Even though the pesticide industry often claims that all registered pesticides have been thoroughly assessed under FIFRA and are therefore safe for the environment, the reality is that EPA often registers pesticides without giving due consideration to their potential environmental and human health effects.

Within FIFRA's registration framework, EPA has abused its discretion and further weakened the "risks," or costs side of the "unreasonable adverse effect" analysis, when it allows pesticides to be used without the requisite safety data required for unconditional registration. EPA overuses the conditional registration process.⁸⁶ Congress intended the conditional registration process to be the exception of pesticide registration, not the norm. Proponents of the conditional registration process explained that EPA was not to use the process "to allow the indiscriminate registration of any pesticide after an application

⁸³ 40 C.F.R. § 155.40(a)(1) (2019).

⁸⁴ U.S. ENV'T PROT. AGENCY, GLYPHOSATE: INTERIM REGISTRATION REVIEW DECISION, EPA-HQ-OPP-2009-0361, at 4 (Jan. 22, 2020) (showing delay in review from 1993 to 2020); U.S. ENV'T PROT. AGENCY, EPA-HQ-OPP-2013-0266, ATRAZINE: INTERIM REGISTRATION REVIEW DECISION 7–8 (Sept. 14, 2020) (showing that registration review began in 2013, with only an interim registration decision issued in 2020); *Chlorpyrifos*, U.S. ENV'T PROT. AGENCY, <https://perma.cc/B6F7-QAQM> (last visited July 31, 2021) (showing that chlorpyrifos was first registered in 1965, with ongoing registration review beginning in 2000).

⁸⁵ Angelo, *supra* note 50, at 138.

⁸⁶ See *supra* notes 82–85 and accompanying text (describing EPA's over-reliance on conditional registration); see 7 U.S.C. § 136a(c)(7)(C) (showing an example of the overbreadth of conditional registration).

for registration is filed, but before all the safety data is submitted.”⁸⁷ Similarly, the EPA Administrator at the time testified in Congress that conditional registration would be used for “rare” situations—for example, to prevent a serious pest outbreak.⁸⁸

In practice, however, this exception has become the rule; the majority of EPA pesticide registrations now appear to be conditional registrations and with almost no accountability to ensure that the registrants of these conditionally registered pesticides timely submit the missing data.⁸⁹ A watchdog investigation found that as of August 2010, more than 11,000—about sixty-five percent—of the 16,000-plus currently active pesticide products have been conditionally registered and allowed on the market.⁹⁰ The U.S. Government Accountability Office (GAO) conducted an examination of EPA’s use of conditional registrations and confirmed that EPA’s own internal review found roughly sixty-nine percent of the 16,156 active pesticide registrations were conditionally registered, though the number could have been overstated since the GAO report also revealed that EPA did not have an accurate database for tracking conditional registrations.⁹¹ The GAO report also found significant issues relating to EPA’s management of conditional registrations. The GAO found that EPA did not have a system in place to track whether registrants submitted the required additional data within the timeframe set by EPA.⁹² Nor did EPA have a system in place to timely review any additional data that were submitted.⁹³ Crucially, in addition to the lack of systemic tracking of conditional registrations, the GAO concluded that EPA has conditionally approved registrations for pesticides that did not meet the limited statutory criteria set forth for conditional registrations.⁹⁴ The GAO report also criticized the lack of public transparency and information that EPA has provided regarding conditional registrations.⁹⁵ Since the publication of the GAO report, EPA has stated it is taking steps to improve its

⁸⁷ S. REP. NO. 95-334, at 10 (1977); *see also* 123 CONG. REC. 25,706 (daily ed. July 29, 1977) (statement of Sen. Leahy) (“I want to stress this use of conditional registration would only be in exceptional cases.”).

⁸⁸ S. REP. NO. 95-334, at 74 (1977).

⁸⁹ *See* U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-13-145, PESTICIDES: EPA SHOULD TAKE STEPS TO IMPROVE ITS OVERSIGHT OF CONDITIONAL REGISTRATIONS 3 (2013) (“EPA’s Office of Pesticide Programs Information Network (OPPIN) data system showed that conditional registrations represented the majority of active registrations.”).

⁹⁰ JENNIFER SASS & MAE WU, SUPERFICIAL SAFEGUARDS: MOST PESTICIDES ARE APPROVED BY FLAWED EPA PROCESS, NATIONAL RESOURCE DEFENSE COUNCIL 2 (2013), <https://perma.cc/Q5BY-23FM>.

⁹¹ *See* U.S. GOV’T ACCOUNTABILITY OFFICE, *supra* note 89, at 13.

⁹² *Id.* at 19.

⁹³ *Id.*

⁹⁴ *Id.* at 37.

⁹⁵ *Id.* at 38–40.

internal tracking as well as making available to the public the status of conditional registrations of new active ingredients.⁹⁶

In addition to conditional registrations, EPA has also relied on its authority to grant emergency local use exemptions under Section 18 of FIFRA to authorize uses of pesticides without making the requisite no “unreasonable adverse effect” finding.⁹⁷ Section 18 of FIFRA grants EPA the discretion to exempt any state and federal agencies from FIFRA’s registration requirements, so long as EPA “determines that emergency conditions exist which require such exemption.”⁹⁸ The scope of this exemption power is broad: EPA’s regulations authorize the agency to grant an exemption “in an emergency condition to avert” anything from significant economic loss,⁹⁹ to control “any pest that is an invasive species, or is otherwise new to . . . the United States”¹⁰⁰ or “a[ny] pest that will cause a significant risk to human health,”¹⁰¹ and finally a catch-all exemption to avoid a crisis.¹⁰² In recent years, EPA has repeatedly relied on the catch-all crisis exemption to authorize agricultural uses of pesticides for use on major crops even though those uses have not been vetted through the FIFRA registration process, meaning that no “unreasonable adverse effect” finding has been made.¹⁰³ The use of the FIFRA Section 18 exemptions does not end with just pesticide uses that EPA has yet to review. In the case of EPA’s sulfoxaflor pesticide registration discussed *infra*,¹⁰⁴ after the Ninth Circuit held that EPA lacked substantial evidence to support its conclusion that sulfoxaflor would not result in unreasonable adverse effects on the environment and vacated the unconditional registration, EPA issued several emergency use exemptions to allow sulfoxaflor uses to continue while the registrant generated the additional studies called for by the Ninth Circuit ruling.¹⁰⁵

⁹⁶ See *Conditional Pesticide Registration*, U.S. ENV’T PROT. AGENCY, <https://perma.cc/4D9Y-PJHS> (last updated Aug. 4, 2020) (outlining EPA’s efforts to implement GAO recommendations); see U.S. ENV’T PROT. AGENCY, STATUS OF CONDITIONAL REGISTRATIONS UNDER FIFRA SEC. 3(C)(7)(C) FROM 2000 THROUGH 2020 (2020), <https://perma.cc/89N5-J5CV> (implementing GAO recommendation to improve transparency and publicly available information).

⁹⁷ 7 U.S.C. § 136p (2018); see Victoria Clark, *Enforcement of Pesticide Regulation in California: A Case Study of the Experience with Methyl Bromide*, 31 GOLDEN GATE U. L. REV. 465, 472–76 (2001) (describing the regulatory and statutory schemes underlying emergency use registrations).

⁹⁸ 7 U.S.C. § 136p.

⁹⁹ 40 C.F.R. § 166.2(a) (2019).

¹⁰⁰ *Id.* § 166.2(b).

¹⁰¹ *Id.* § 166.2(c).

¹⁰² *Id.* § 166.2(d).

¹⁰³ See, e.g., Pesticide Emergency Exemptions, 86 Fed. Reg. 8782, 8783 (Feb. 9, 2021) (exempting numerous state entities from the FIFRA registration process due to various emergencies); see also Clark, *supra* note 97, at 472 (describing this loophole as one which “you could drive the proverbial farm truck through”).

¹⁰⁴ See *infra* text accompanying notes 401–406.

¹⁰⁵ Pesticide Emergency Exemptions, 81 Fed. Reg. 90,836, 90,837 (Dec. 15, 2016); Pesticide Emergency Exemptions, 84 Fed. Reg. 28,041, 28,042 (June 17, 2019).

Outside of these exemptions, more fundamentally, as shown by the decisions discussed *infra*, even when faced with an application for unconditional registration, EPA often ignores its duty to risk-benefit assessment by relying on generalized benefit claims without any actual weighing of the two factors.¹⁰⁶ On the benefits side of the scale, FIFRA allows EPA to waive data requirements regarding efficacy, which EPA has done by rule, essentially creating an assumption that economic or social benefits of any given pesticide.¹⁰⁷ As a result, when approving new pesticide uses, EPA typically only offers generalized, unsubstantiated benefit claims—such as stating that a new active ingredient is beneficial because it provides a “new mode of action” for controlling pests, and therefore may increase agricultural yields by reducing pests, without making any attempt to quantify just how much the claimed benefit actually may be—such that the agency can then compare the benefits against potential risks.¹⁰⁸ And on the risks side of the scale, even though the definition of “unreasonable adverse effect” includes “the economic, social, and environmental costs,”¹⁰⁹ EPA often foregoes such analysis and instead claims that the costs are unquantifiable or minimizes their effect without any data or quantification, although the recent cases have something to say about that.¹¹⁰

Fundamentally, EPA’s pesticide registration analysis—whether conditional or unconditional—also suffers from EPA’s intentionally narrow scope of analysis to just the pesticide active ingredient that a registrant seeks to register, rather than the whole pesticide formulation. A pesticide formulation is a mixture of one or more active ingredients—the pesticide’s active ingredients, along with other chemicals, statutorily defined and so-called “inert” ingredients.¹¹¹ The mixture of the pesticide active ingredients and inert ingredients is what makes up a pesticide that is sold and used in the marketplace.¹¹² Though inerts may or may not have a direct effect on the target species, they can be toxic, biologically

¹⁰⁶ See *infra* Part II.B.6.c.

¹⁰⁷ 40 C.F.R. § 158.45 (2019).

¹⁰⁸ *E.g.*, U.S. ENV’T PROT. AGENCY, OVER-THE-TOP DICAMBA PRODUCTS FOR GENETICALLY MODIFIED COTTON AND SOYBEANS: BENEFITS AND IMPACTS 11–13 (Oct. 31, 2018), <https://perma.cc/P87A-2FAV> [hereinafter OVER-THE-TOP DICAMBA PRODUCTS]; *e.g.*, U.S. ENV’T PROT. AGENCY, REVIEW OF BENEFITS AS DESCRIBED BY THE REGISTRANT OF ENLIST DUO 2,4-D CHOLINE ON HERBICIDE RESISTANT ENLIST COTTON TO IMPROVE THE PERFORMANCE OF CURRENT WEED CONTROL SYSTEMS AND PROVIDE NEW WEED RESISTANCE MANAGEMENT OPTIONS 5, 7 (Oct. 28, 2016), <https://perma.cc/847Q-HXBY>.

¹⁰⁹ 7 U.S.C. § 136(bb) (2018).

¹¹⁰ See *infra* text accompanying notes 215–216.

¹¹¹ NATIONAL RESEARCH COUNCIL, COMMITTEE ON ECOLOGICAL RISK ASSESSMENT UNDER FIFRA AND ESA, ASSESSING RISKS TO ENDANGERED AND THREATENED SPECIES FROM PESTICIDES 65 (2013). The term inert is used to distinguish active ingredients from “chemical[s] that [are] not classified as an active ingredient.” *Id.* at 66.

¹¹² *Id.* at 65.

active, and potentially hazardous.¹¹³ A growing body of research indicates that a pesticide's active ingredients in combination with its inert and adjuvant ingredients can increase pesticide toxicity, ecotoxicity, and exposure, both independently and through their synergistic effects.¹¹⁴ Nonetheless, in regulating and approving pesticide usage, EPA focuses its data requirements on active ingredients *alone*—and often only the new or dominant active ingredient—largely ignoring inerts and adjuvants as well as synergistic effects of the chemicals once combined.¹¹⁵ EPA's insufficient safety assessment of pesticides endangers the health of the public and the environment as a whole.¹¹⁶ As a result, “[m]ost of the tests required to register a pesticide are performed with the active ingredient alone, not the full pesticide formulation.”¹¹⁷ Similarly, while farmers and pesticide applicators commonly mix different pesticides and apply them to the crops simultaneously, called “tank-mixing,” EPA does not require testing of common tank mixtures before registration or any cumulative or synergistic effects from them.¹¹⁸

Finally, despite the unmistakable clarity of the environmental risks of pesticide spraying and the cognizable environmental costs to be considered by the agency in its process, EPA's regulatory data requirements largely focus instead on estimating the human health effects from exposure to pesticides, while testing and data requirements for ecological and wildlife effects are much more limited.¹¹⁹ Even for the wildlife testing EPA does require, it only looks at acute toxicity and

¹¹³ *Id.* at 66; see also Christopher A. Mullin, *Effects of 'Inactive' Ingredients on Bees*, CURRENT OPINION IN INSECT SCI., Aug. 2015, at 194, 194 (“Numerous studies have found that pesticide [active ingredients] elicit very different physiological effects on non-target organisms when combined with their formulation ingredients.”).

¹¹⁴ Caroline Cox & Michael Surgan, *Unidentified Inert Ingredients in Pesticides: Implications for Human and Environmental Health*, 114 ENV'T HEALTH PERSPECTIVES 1803, 1803–05 (2006).

¹¹⁵ NATIONAL RESEARCH COUNCIL, *supra* note 111, at 66.

¹¹⁶ Generally, EPA requires data on the toxicological significance of the active ingredients in pesticide products, but not necessarily of the whole formulas. See 40 C.F.R. § 158.130(e) (2019) (hazards to nontarget species); see also *id.* § 158.500 (toxicology data requirements); see also *id.* § 158.630 (data requirements for terrestrial and aquatic non-target organisms); see generally *id.* § 158.320 (product identity and composition).

¹¹⁷ See Cox & Surgan, *supra* note 114, at 1803–04 (“Of the 20 toxicologic tests required (or conditionally required) to register a pesticide in the United States, only 7 short-term acute toxicity tests use the pesticide formulation; the rest are done with only the active ingredient. The medium- and long-term toxicity tests that explore end points of significant concern (cancer, reproductive problems, and genetic damage, for example) are conducted with the active ingredient alone. The requirements for other types of tests are similar. Only half of the required (or conditionally required) tests of environmental fate use the formulated product, as do only a quarter of the tests for effects on wildlife and nontarget plants.”).

¹¹⁸ U.S. ENV'T PROT. AGENCY, ECOLOGICAL RISK ASSESSMENT FOR DICAMBA DGA SALT AND ITS DEGRADATE, 3,6-DICHLOROSALICYLIC ACID (DCSA), FOR THE PROPOSED POST-EMERGENCE NEW USE ON DICAMBA-TOLERANT COTTON 5 (Mar. 24, 2016), <https://perma.cc/4NL9-DHTX>; U.S. ENV'T PROT. AGENCY, FINAL REGISTRATION OF DICAMBA ON DICAMBA-TOLERANT COTTON AND SOYBEAN 22 (Nov. 9, 2016), <https://perma.cc/R356-EPW4> [hereinafter EPA, FINAL REGISTRATION OF DICAMBA].

¹¹⁹ Angelo, *supra* note 50, at 131.

generally does not require data on behavioral, neurological, reproductive, or other chronic effects.¹²⁰ And as discussed above, even for the data that is required, the data reviewed is cabined to just the active ingredient in isolation, not the actual product formulation being approved and to which wildlife will be exposed.

Thus, despite the broad definition of risks encompassed within FIFRA's unreasonable adverse effect standard and the Congressional intent to pass amendments in 1972 to make FIFRA a comprehensive environmental protection statute, EPA has not applied it as such. Rather its approach has left gaps in the rigor and scope of the data applied; weaknesses in the legal threshold applied; lapses in the ways it has analyzed or considered (or failed to consider entirely) costs of registration; failings in transparency and accountability; and even circumventing that key data be submitted and analyzed at all before allowing registration. The reality is that EPA has relied on courts' tendency to defer to the agency's scientific expertise¹²¹ to sidestep its duty to conduct a risk-benefit analysis of every pesticide before allowing its use in U.S. agriculture.

IV. CASE STUDY: THE DICAMBA ISSUE AND LITIGATION

Dicamba is an herbicide in the benzoic acid family used for selective control of emerged broadleaf weeds.¹²² It is extremely toxic to all broadleaf plants, including conventional cotton and soybean.¹²³ It damages or kills fruiting vegetables, fruit trees, grapes, beans, peas, potatoes, tobacco, squash-family plants, ornamentals—essentially any flowering plant.¹²⁴ Dicamba also damages or kills many species of large trees, including oaks, elms, and maples.¹²⁵ Dicamba damage is easily identified by its signature marker: “leaf cupping.”¹²⁶

¹²⁰ *Id.* at 132.

¹²¹ *See, e.g.*, *Kleppe v. Sierra Club*, 427 U.S. 390, 412 (1976) (“Resolving these issues requires a high level of technical expertise and is properly left to the informed discretion of the responsible federal agencies.”).

¹²² U.S. ENV'T PROT. AGENCY, REGISTRATION DECISION FOR THE CONTINUATION OF USES OF DICAMBA ON DICAMBA TOLERANT COTTON AND SOYBEAN 4 (Oct. 31, 2018), <https://perma.cc/F297-HZWH> [hereinafter EPA, 2018 DICAMBA REGISTRATION DECISION]; U.S. ENV'T PROT. AGENCY, MEMORANDUM SUPPORTING DECISION TO APPROVE REGISTRATION FOR THE USES OF DICAMBA ON DICAMBA TOLERANT COTTON AND SOYBEAN 12 (Oct. 27, 2020), <https://perma.cc/J5EH-A82L> [hereinafter EPA MEMO].

¹²³ U.S. ENV'T PROT. AGENCY, XTENDIMAX REGISTRATION NOTICE AND LABEL 8 (Oct. 27, 2020), <https://perma.cc/RG95-S6XH>.

¹²⁴ *Id.*

¹²⁵ Brian Dintelmann et al., *Evaluations of Dicamba and 2,4-D Injury on Fruiting Trees and Various Other Woody Species*, MIZZOU WEED SCI. (2018), <https://perma.cc/3YJD-8HM5>.

¹²⁶ U.S. ENV'T PROT. AGENCY, DICAMBA DGA AND BAPMA SALTS – 2020 ECOLOGICAL ASSESSMENT OF DICAMBA USE ON DICAMBA-TOLERANT (DT) COTTON AND SOYBEAN INCLUDING EFFECTS DETERMINATIONS FOR FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES 134 (Oct. 26, 2020) [hereinafter EPA, DICAMBA DGA AND BAPMA

Consequently, EPA previously restricted dicamba's soybean and cotton uses to before planting (pre-plant) to clear a field of early-season weeds and to season's end to control late-season weeds (pre-harvest in soybeans, postharvest in cotton); EPA had never before allowed direct, over-the-top application to these crops during the critical growing seasons of spring and summer.¹²⁷ However, in 2005, Monsanto (now Bayer) announced the development of GE soybean and cotton that altered the use pattern of dicamba. Monsanto licensed the gene that, when genetically engineered into soybean and cotton crops, made them resistant to dicamba.¹²⁸ Monsanto and BASF developed dicamba herbicides for use on these engineered crops.¹²⁹

A. Dicamba and Drift Harm

Several dicamba properties render it much more likely than other herbicides to cause widespread damage to plants and other organisms, both on treated fields and in surrounding areas. First, as described above, dicamba is highly toxic to an extremely broad range of flowering plants, including trees, shrubs, soybeans and cotton, as well as nearly all vegetables and fruit crops.¹³⁰ Second, dicamba is also very potent, such that vanishingly small amounts can cause considerable damage.¹³¹ And third, while the majority of herbicides pose a drift threat only when they are being applied, dicamba is extremely volatile and is known to volatilize from soil and plant surfaces days after the initial application, forming vapor clouds that drift and damage plants at great distances and in all directions from the application site.¹³²

Dicamba contaminates the environment via spray drift, vapor drift, in rainfall, and in runoff from dicamba-treated fields.¹³³ Such pollution has ramped up dramatically with the over-the-top spraying dicamba

SALTS], <https://perma.cc/BQ39-HGSW>; Weed Ecology and Mgmt. Lab., *Banvel / dicamba*, CORNELL UNIV., <https://perma.cc/GM2T-J2DJ> (last visited July 31, 2021).

¹²⁷ EPA MEMO, *supra* note 122, at 6–7.

¹²⁸ Heartland Health Research Alliance, *Monsanto, UNL Sign Agreement to Develop Dicamba-Tolerant Crops* (Mar. 23, 2005), <https://perma.cc/7SE8-UAPU>.

¹²⁹ Caitlin Dewey, *This Miracle Weed Killer Was Supposed to Save Farms. Instead, It's Devastating Them.*, WASH. POST (Aug. 29, 2017), <https://perma.cc/52YL-QS8W>.

¹³⁰ See *supra* notes 123–125 and accompanying text.

¹³¹ O. Adewale Osipitan & Stevan Knezevic, *Sensitivity of Grape and Tomato to Micro-rates of Dicamba-Based Herbicides*, CROPWATCH (May 3, 2018), <https://perma.cc/2BWS-J6EQ>.

¹³² Kevin Bradley, *Off-target Movement of Dicamba in Missouri. Where Do We Go from Here?*, INTEGRATED PEST MGMT., UNIV. MO. (Aug. 21, 2017), <https://perma.cc/Q662-MKHT>; Larry Steckel, *Dicamba Drift Problems Not an Aberration*, FARMPROGRESS (Aug. 8, 2018), <https://perma.cc/DV2Y-RTGL>; Greg D. Horstmeier, *Dicamba's PTFE Problem*, PROGRESSIVE FARMER (Aug. 29, 2017), <https://perma.cc/XN2V-PPZZ>.

¹³³ ROBERT E. WOLF, STRATEGIES TO REDUCE SPRAY DRIFT, KAN. STATE UNIV. AGRIC. EXPERIMENT STATION AND COOP. EXTENSION SERV. (Mar. 2000), <http://cotton.tamu.edu/Weeds/Spray%20Drift%20Strat.pdf>; EPA, DICAMBA DGA AND BAPMA SALTS, *supra* note 126, at 61–62.

registrations due to increased use over a longer season.¹³⁴ Spray drift, also called particle drift, occurs during application.¹³⁵ As a dicamba-spray solution is forced under pressure through a nozzle, spray droplets are formed.¹³⁶ Small droplets remain aloft for considerable periods of time and are carried by even moderate winds to damage crops or wild plants in neighboring fields.¹³⁷ Spray drift damage increases with wind speed and is characterized by injuries that decline in severity with distance from the treated field.¹³⁸

On the other hand, vapor drift arises from the volatilization of dicamba, that is, its conversion from liquid or solid form to vapor. Dicamba volatilizes during spray operations, but also up to several days after an application, as dicamba residues left on treated soil and plant surfaces evaporate.¹³⁹ Vapor drift increases with temperature, and thus is far more common with late spring and summer over-the-top spraying of dicamba than with traditional pre-plant use.¹⁴⁰ Vapor drift is also worse under still conditions, with little or no wind, which promote temperature inversions.¹⁴¹ Finally, vapor drift is characterized by broad-scale injuries that are uniform in severity, fencerow to fencerow.¹⁴²

The damaging effects of spray and vapor drift increase dramatically during a temperature inversion, an extremely common atmospheric condition in which cool air at the earth's surface is trapped by warmer air above it.¹⁴³ The trapped cool air accumulates a concentrated cloud of dicamba spray droplets and vapor, which is then easily moved by light winds to cause broad-scale injury to crops and plants near and far from application areas.¹⁴⁴ Dicamba is also subject to atmospheric loading, where intensive spraying by many farmers in a localized area results in substantial clouds of airborne dicamba that can then, as with temperature inversions, move off-field to cause widespread damage.¹⁴⁵ Dicamba can also damage off-field plants when rainfall washes it out of

¹³⁴ See generally *Growing Seasons in a Changing Climate*, U.S. DEP'T AGRICULTURE, <https://perma.cc/AS9L-VPHK> (last visited July 31, 2021); see generally *Pesticides and Climate Change*, CALI. FOR PESTICIDES REFORM, <https://perma.cc/GT33-6RAK> (last visited July 31, 2021).

¹³⁵ Bradley, *supra* note 132.

¹³⁶ See WOLF, *supra* note 133 (explaining how nozzle size impacts droplet size and drift).

¹³⁷ Robin Booker, *Dicamba Volatility Causes Anxiety as New Season Nears*, WESTERN PRODUCER (May 3, 2018), <https://perma.cc/3HHV-DDXX>.

¹³⁸ WOLF, *supra* note 133, at 2; Mark Loux & Bill Johnson, *Ohio Soybeans: Dicamba Drift Injury Becoming More Evident*, AGFAX (July 12, 2017), <https://perma.cc/SQE3-CXPM>.

¹³⁹ Booker, *supra* note 137; Bradley, *supra* note 132.

¹⁴⁰ WOLF, *supra* note 133.

¹⁴¹ *NFFC*, 960 F.3d 1120, 1125 (9th Cir. 2020).

¹⁴² Bradley, *supra* note 132; Loux & Johnson, *supra* note 138.

¹⁴³ Bradley, *supra* note 132.

¹⁴⁴ Booker, *supra* note 137.

¹⁴⁵ Johnathan Hettinger, 'Buy It or Else': Inside Monsanto and BASF's Moves to Force Dicamba on Farmers, FLATLAND (Dec. 10, 2020), <https://perma.cc/6P6F-MYBU>.

the atmosphere and brings it down to earth.¹⁴⁶ Moreover, rainfall washes dicamba from the plant surfaces and soil of a treated field, resulting in dicamba-contaminated runoff water that can damage plants.¹⁴⁷

The environmental risks from dicamba use are numerous. Animals and plants, including threatened and endangered species, those in danger of extinction, may be exposed to dicamba via atmospheric loading (spray drift, volatilization), contamination of soils, and runoff from treated fields.¹⁴⁸ Spray drift and volatilization of dicamba impacts vegetation near crop fields and also at a distance, impacting plants in many different habitats as well as the animals that consume and rely upon them and the larger ecosystem.¹⁴⁹

Mammals, birds, and insects are directly exposed to dicamba and its far more toxic breakdown product, 3,6-dichlorosalicylic acid (DCSA), through ingesting it in treated fields, through ingesting crop material that leaves the field via wind or runoff, and through consuming insects that have fed on crops contaminated with dicamba products.¹⁵⁰ Bees and other pollinators are at risk from direct exposure to dicamba spray or vapor drift and by feeding on dicamba-sprayed crops and other plants exposed to dicamba.¹⁵¹ Importantly, dicamba spray and vapor drift has also impacted pollinators indirectly, far beyond the treated field, by suppressing the flowering plants they require for pollen and nectar.¹⁵² Dicamba enters water bodies via runoff and drift, where it has been frequently detected.¹⁵³ Dicamba-laced runoff water can impact off-field plants for up to one week after application.¹⁵⁴

Dicamba also harms plants through its presence in rainwater. A recent study of twelve sites in Missouri during the 2019 season revealed

¹⁴⁶ Emily Unglesbee, *New 2,4-D and Dicamba Data: Four Things Missouri Scientists Learned about 2,4-D and Dicamba in 2020*, PROGRESSIVE FARMER (Dec. 7, 2020), <https://perma.cc/SBT6-GM4S>; B.D. Hill et al., *Phenoxy Herbicides in Alberta Rainfall: Potential Effects on Sensitive Crops*, 82 CAN. J. PLANT SCI. 481, 482 (2002).

¹⁴⁷ EPA, DICAMBA DGA AND BAPMA SALTS, *supra* note 126, at 61–62; U.S. ENV'T PROT. AGENCY, SUMMARY OF NEW INFORMATION AND ANALYSIS OF DICAMBA USE ON DICAMBA-TOLERANT (DT) COTTON AND SOYBEAN INCLUDING UPDATED EFFECTS DETERMINATIONS FOR FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES 132 (2018).

¹⁴⁸ Complaint for Declaratory and Equitable Relief at 24, Ctr. for Biological Diversity v. U.S. Env't Prot. Agency, No. 4:20-cv-00555-DCB (D. Ariz. 2020).

¹⁴⁹ *Id.*

¹⁵⁰ *Id.*; EPA, DICAMBA DGA AND BAPMA SALTS, *supra* note 126, at 12–15, 28, 35–40 (finding that “in mammals, DCSA has similar acute toxicity as [its] parent dicamba, but is substantially (17x) more toxic on a chronic basis” and EPA assumed similar effects of DCSA on birds).

¹⁵¹ EPA, DICAMBA DGA AND BAPMA SALTS, *supra* note 126, at 42.

¹⁵² Liza Gross, *Bees Face Yet Another Lethal Threat in Dicamba, a Drift-Prone Pesticide*, GRIST (Jan. 28, 2019), <https://perma.cc/PE42-6MQP>; Eric W. Bohnenblust et al., *Effects of the Herbicide Dicamba on Nontarget Plants and Pollinator Visitation*, 35 ENV'T TOXICOLOGY & CHEM. 144, 147–48 (2016).

¹⁵³ E.M. Thurman et al., *Regional Water-Quality Analysis of 2,4-D and Dicamba in River Water Using Gas Chromatography-Isotope Dilution Mass Spectrometry*, 79 INT'L J. ENV'T ANALYTICAL CHEM. 185 (2001).

¹⁵⁴ EPA, DICAMBA DGA AND BAPMA SALTS, *supra* note 126, at 297–98.

that, at some sites, dicamba remained detectable throughout the season.¹⁵⁵ The detection of dicamba in rainwater directly correlated with adoption rates of dicamba-resistant crops; areas with higher adoption had more dicamba in rainwater.¹⁵⁶ University of Missouri weed scientists determined that, in the sites located in the southeastern corner of Missouri, the amounts in rainwater were high enough to harm sensitive crops, especially with repeated exposure.¹⁵⁷

B. Chronological History

While dicamba has been sold in other forms since 1967,¹⁵⁸ prior to EPA's 2016 new use registration actions for dicamba, dicamba uses on soybeans and cotton were limited to pre-plant and pre-harvest applications in soybeans and pre-plant and post-harvest applications in cotton.¹⁵⁹ Monsanto first sought registrations for new uses of dicamba on GE soy and cotton in 2010 and 2012, originally seeking registration of a different dicamba pesticide, M1691.¹⁶⁰ Monsanto and BASF developed new dicamba products, while DuPont/Corteva obtained a license to market Monsanto's product under a different name.¹⁶¹

As shown in Figure 1, from 2012-2016, farmers applied, on average, 768,000 pounds of dicamba to soybeans and cotton, combined, each year.¹⁶² In just the first year of dicamba's registration for over-the-top spraying, dicamba usage on these crops rose to nearly ten million pounds per year.¹⁶³ The 2018-2020 saw further substantial increases. The thirteen million pounds applied to soybeans and nearly five million pounds sprayed on cotton represented a more than twenty-three-fold increase in the amount of dicamba sprayed on these crops in just the second year over-the-top spraying was permitted.¹⁶⁴ The large volume of dicamba sprayed and the spraying later in the season when hot conditions exacerbated drift, had devastating consequences.

¹⁵⁵ Unglesbee, *supra* note 146.

¹⁵⁶ *Id.*

¹⁵⁷ *Id.*

¹⁵⁸ Dan Flynn, *Herbicides Purchased for this Planting Season and Ready for the Field are Now Illegal*, FOOD SAFETY NEWS (June 9, 2020), <https://perma.cc/3T2F-9N7E>.

¹⁵⁹ EPA, 2018 DICAMBA REGISTRATION DECISION, *supra* note 122, at 5.

¹⁶⁰ EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 2–3.

¹⁶¹ Carey Gillam, *Monsanto, DuPont Strike \$1.75 Billion Licensing Deal, End Lawsuits*, REUTERS (Mar. 26, 2013), <https://perma.cc/VVR5-AEUN>.

¹⁶² See *NFFC*, 960 F.3d 1120, 1127 (9th Cir. 2020) (describing the use of OTT dicamba on soybeans and cotton between 2012-2016).

¹⁶³ *Id.*

¹⁶⁴ Complaint for Declaratory and Equitable Relief at 26, *Ctr. for Biological Diversity v. U.S. Env't Prot. Agency*, No. 4:20-cv-00555-DCB (D. Ariz. Dec. 23, 2020).

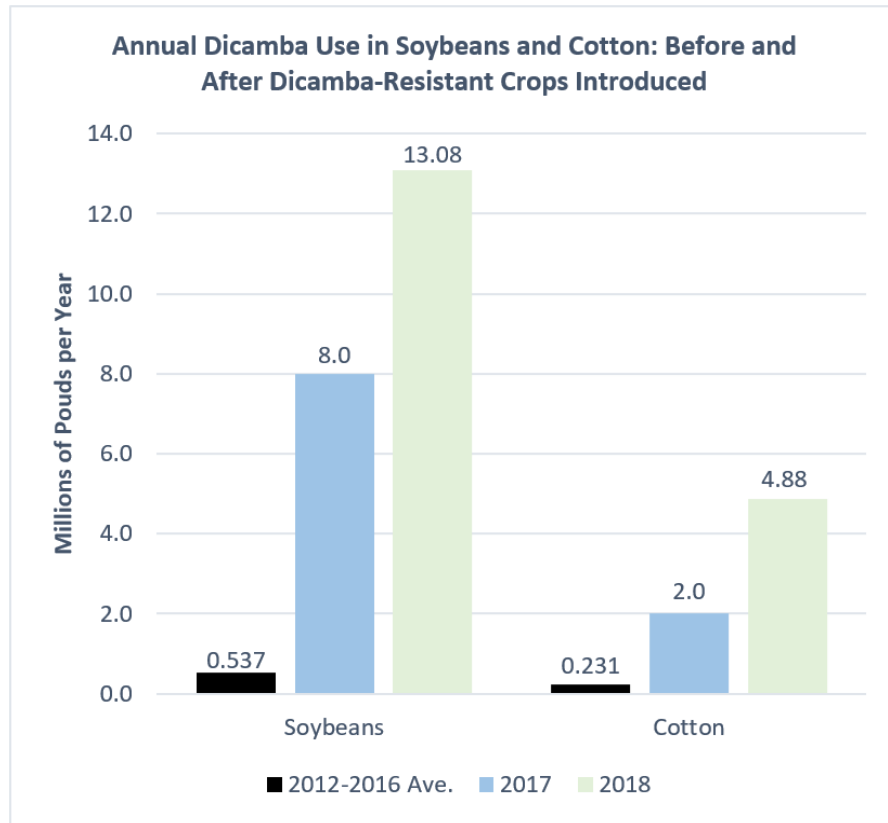


Figure 1: Annual dicamba use for soybeans and cotton before dicamba-resistant crops were introduced (average figure for 2012-2016) and the two years after broad introduction (2017, 2018). Based on EPA figures.¹⁶⁵

1. “A Potential Disaster”

According to discovery documents uncovered in subsequent civil litigation brought by peach farmers whose peach trees were damaged by dicamba drift, Monsanto knew of the serious drift threat posed by its dicamba-resistant crop system for more than a decade. The issue was extensively discussed in meetings of the company’s Dicamba Advisory

¹⁶⁵ OVER-THE-TOP DICAMBA PRODUCTS, *supra* note 108, at 5; U.S. ENV’T PROT. AGENCY, ASSESSMENT OF THE BENEFITS OF DICAMBA USE IN GENETICALLY MODIFIED, DICAMBA-TOLERANT SOYBEAN PRODUCTION 11, TABLE 3B (Oct. 26, 2020), <https://perma.cc/T296-5TX4>; U.S. ENV’T PROT. AGENCY, ASSESSMENT OF THE BENEFITS OF DICAMBA USE IN GENETICALLY MODIFIED, DICAMBA-TOLERANT COTTON PRODUCTION 11, TABLE 3B (Oct. 26, 2020), <https://perma.cc/6TM2-F6G7>.

Council as far back as 2009.¹⁶⁶ Monsanto and its advisors not only foresaw drift damage, but anticipated lawsuits (“when neighbors start suing each other”), and discussed possible measures to address it, such as an “indemnity fund for crop loss.”¹⁶⁷ Rather than reconsider its dicamba project, however, Monsanto decided that the threat of dicamba drift damage could be exploited to market its seeds to soybean farmers who “do not perceive the value of Dicamba” for their own purposes.¹⁶⁸ These farmers would be “educat[ed]” into buying dicamba-resistant soybean seeds to avoid drift damage arising from a neighbor’s use of dicamba (i.e. “protection from your neighbors”).¹⁶⁹

In 2010, Monsanto officer John Soteres was developing arguments to “defend[] dicamba relative to drift and volatilization to nearby crops,” noting that Monsanto would need to address these issues not only with regulators, “but also potentially in the courts.”¹⁷⁰ Monsanto received further warnings of the damaging effects its dicamba crop system would have in 2011. One of its employees wrote in a summary of academic surveys the company commissioned, “DON’T DO IT; expect lawsuits,”¹⁷¹ while Del Monte Foods called the new system a “potential disaster” in a 2011 letter.¹⁷² Agronomists studying dicamba drift also informed EPA that Monsanto’s system would likely harm off-field plants, affecting organisms that rely on those plants, including pollinators, via habitat loss.¹⁷³ EPA was also aware that dicamba use would increase with resistant crops and that neighbors of dicamba users would plant resistant crops for self-defense.¹⁷⁴

Unsurprisingly, Monsanto observed extensive dicamba drift damage in its own field trials. From 2012 to 2014, the company reported to EPA seventy-three off-target incidents that occurred during its testing of M1691, the precursor to the XtendiMax product that Monsanto first sought to register for over-the-top use.¹⁷⁵ The Missouri Department of

¹⁶⁶ Hettinger, *supra* note 145.

¹⁶⁷ Plaintiff Exhibit PLTF-6, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 2, 2019).

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*; Hettinger, *supra* note 145.

¹⁷⁰ Plaintiff’s Exhibit PLTF-502, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

¹⁷¹ Hettinger, *supra* note 145.

¹⁷² Plaintiff Exhibit PLTF-1140, *Bader Farms, Inc. v. Monsanto*, No. 1:16-cv-00299-SNLJ (E.D. Mo. June 20, 2019).

¹⁷³ U.S. ENV’T PROT. AGENCY, ECOLOGICAL RISK ASSESSMENT FOR DICAMBA AND ITS DEGRADATE, 3,6-DICHLOROSALICYLIC ACID (DCSA), FOR THE PROPOSED NEW USE ON DICAMBA-TOLERANT SOYBEAN (Mar. 8, 2011), <https://perma.cc/G9QA-3MPK>.

¹⁷⁴ *Id.*

¹⁷⁵ Petitioners’ Excerpts of Record Volume VII of IX, *Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency*, No. 19-70115 (9th Cir. 2020); see John Frank Knox, *Sowing the Seeds of Controversy: What the Dicamba Debacle Reveals About the Modern Pesticide Registration Process and Why the EPA Must Act*, 48 ENV’T L. 835, 857 (2018) (discussing Monsanto’s EPA registration process of XtendiMax, which contains the same active ingredient as the previously registered M1691).

Agriculture informed EPA of two incidents in 2013 and 2014, in which M1691 dicamba vapor caused drift damage to non-resistant soybeans at 2,800 feet and 2.2 miles, respectively, from treated fields of dicamba-resistant soy.¹⁷⁶

Instead of studying the issue further, Monsanto responded to EPA's growing concern by halting its own field-testing of XtendiMax with VaporGrip Technology in 2015.¹⁷⁷ Monsanto also prohibited trials by independent academics and expressed concerns to BASF about "how tightly BASF controls the release of data by the third parties."¹⁷⁸ EPA proposed only a small omnidirectional vapor drift buffer zone far smaller in width than the distances it knew dicamba vapor could travel, but subsequently dropped even this proposal.¹⁷⁹

In 2016, Monsanto elaborated upon its 2009 scheme of using protection from drift damage as a marketing strategy. The company conducted a careful analysis to project the number of dicamba damage episodes—from 1,300 to over 3,200—that would occur in each of the first five years of its system's use and even calculated the staff budget that would be required for the investigation of these complaints.¹⁸⁰ Similarly, in a September 2016 meeting, BASF also identified "[d]efensive [p]lanting" as a marketing strategy.¹⁸¹ That following January, BASF had a market research document that confirmed the role of defensive planting in contributing to sales.¹⁸²

2. 2016 Registration

In November 2016, EPA conditionally registered three dicamba products for new use under FIFRA Section 3(c)(7)(B).¹⁸³ The 2016 registration greatly extended permissible times to spray dicamba deep

¹⁷⁶ U.S. ENV'T PROT. AGENCY, DICAMBA DGA: SECOND ADDENDUM TO THE ENVIRONMENTAL FATE AND ECOLOGICAL RISK ASSESSMENT FOR DICAMBA DGA SALT AND ITS DEGRADATE, 3,6-DICHLOROSALICYLIC ACID (DCSA) FOR THE SECTION 3 NEW USE ON DICAMBA-TOLERANT SOYBEAN 7–8 (Mar. 24, 2016) (available at <https://perma.cc/ZQ54-U9WE>).

¹⁷⁷ Plaintiff's Exhibit PLTF-493, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. 2016).

¹⁷⁸ Plaintiff Exhibit PLTF-293, *Bader Farms, Inc. v. Monsanto*, No. 1:16-cv-00299-SNLJ (E.D. Mo. June 27, 2019); *see also* Plaintiff Exhibit PLTF-1149, *Bader Farms, Inc. v. Monsanto*, No. 1:16-cv-00299-SNLJ (E.D. Mo. June 20, 2019).

¹⁷⁹ U.S. ENV'T PROT. AGENCY, M-1691 HERBICIDE, EPA REG. NO. 524-582 (ACTIVE INGREDIENT: DICAMBA DIGLYCOLAMINE SALT) AND M-1768 HERBICIDE, EPA REG. NO. 524-617 (AI: DIGLYCOLAMINE SALT WITH VAPORGRIP™) – REVIEW OF EFED ACTIONS AND RECENT DATA SUBMISSIONS ASSOCIATED WITH SPRAY AND VAPOR DRIFT OF THE PROPOSED SECTION 3 NEW USES ON DICAMBA-TOLERANT SOYBEAN AND COTTON 2–3 (Nov. 3, 2016), <https://perma.cc/6QL9-NWXS>.

¹⁸⁰ Plaintiff's Exhibit PLTF-158, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

¹⁸¹ Plaintiff's Exhibit PLTF-1009, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

¹⁸² Hettinger, *supra* note 166.

¹⁸³ EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 2.

into the hot summer months, for the first time allowing a new use for post-emergent, over-the-top applications to cotton and soybean crops genetically engineered with resistance to the pesticide.¹⁸⁴ The registration covered millions of acres in thirty-four states.¹⁸⁵

EPA based its 2016 registration on the supposition that the three dicamba products were less volatile than prior dicamba formulations.¹⁸⁶ Even so, EPA found it necessary to impose a host of use instructions, a form of mitigation, contained on a lengthy label.¹⁸⁷ These instructions restricted applications to a narrow range of wind speeds, required a downwind buffer, stipulated a maximum spray boom height, and specified temperature and humidity adjustments, among other instructions.¹⁸⁸ EPA claimed these instructions would “effectively limit” any impacts if followed.¹⁸⁹ These registrations were time-limited with two-year automatic expiration dates “because of the concerns about resistance and off-target movement,” unless “EPA determine[d] before that date that off-site incidents [we]re not occurring at unacceptable frequencies or levels.”¹⁹⁰

Monsanto knew its research left many unanswered questions about the real-world risks posed by dicamba’s volatility. In a February 2016 email to coworkers, a Monsanto researcher wrote: “we don’t know how long a sensitive plant needs in a natural setting to show volatility damage. We don’t know what concentration in the air causes a response, either. There is a big difference for plants exposed to dicamba vapor for

¹⁸⁴ *Id.* at 3–4.

¹⁸⁵ *Id.* at 2, 28.

¹⁸⁶ *Id.* at 29, 35; *EPA Responds to Dicamba Complaints*, DAILY SCOOP (Aug. 29, 2017), <https://perma.cc/2E59-Y24Z> (as explained by Dan Kenny, Office of Pesticide Programs, Acting Registration Division Deputy Director, “[t]he 2-year expiration was put in place because of the concerns about resistance and off-target movement”).

¹⁸⁷ See EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 29–36 (including specific instructions aimed toward worker protection, environmental hazards, resistance management, spray drift management, protection of sensitive areas, and application restrictions); see generally U.S. ENV’T PROT. AGENCY, PRIA LABEL AMENDMENT—ADDING NEW USES ON DICAMBA-RESISTANT COTTON AND SOYBEANS 2 (Nov. 9, 2016), <https://perma.cc/KJE9-2SYU> [hereinafter EPA, PRIA LABEL AMENDMENT] (including as enclosures the supplemental labeling for XtendiMax with VaporGrip Technology instructing proper procedures for herbicide application).

¹⁸⁸ EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 29, 32, 33; see generally EPA, PRIA LABEL AMENDMENT, *supra* note 187 (including as enclosures the supplemental labeling for XtendiMax with VaporGrip Technology, which mandates application equipment and techniques to manage spray drift as well as account for temperature and humidity, spray boom height, and wind speed and direction).

¹⁸⁹ EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 29; see generally EPA, PRIA LABEL AMENDMENT, *supra* note 187, at 2 (enclosing XtendiMax with VaporGrip Technology supplemental labeling mandating application equipment, techniques, and restrictions to manage spray drift as well as account for temperature and humidity, spray boom height, and wind speed and direction).

¹⁹⁰ *EPA Responds to Dicamba Complaints*, *supra* note 186; EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 35.

24 vs. 48 hours. Be careful using this externally.”¹⁹¹ BASF also knew dicamba still posed risks. A BASF executive admitted that “from a practical standpoint” the Engenia product was not different from older dicamba versions,¹⁹² and the company privately told applicators that drift could harm farmers’ harvests.¹⁹³ Monsanto responded to BASF’s admission that volatility was an issue with an email from a Monsanto salesman to coworkers stating, “we need to get on this right now! – deny! Deny! DENY!”¹⁹⁴

In response to the registrations, four environmental and farming nonprofits filed a lawsuit, *National Family Farm Coalition v. U.S. Environmental Protection Agency*,¹⁹⁵ on behalf of farmers and conservationists in January 2017. The petitioners¹⁹⁶ argued that EPA disregarded environmental and crop harms from foreseeable off-field drift, failed to consider socioeconomic impacts, and lacked substantial evidence to support the registrations.¹⁹⁷

3. The 2017 Season: “We have never seen anything like this before . . . in our agricultural history.”

Farmers began using the dicamba products for the first time during the 2017 planting season under the new use registration.¹⁹⁸ The events that transpired were unprecedented in the history of U.S. agriculture. In the registration decision, EPA had concluded that its label mitigation was “expected to eliminate any offsite exposures.”¹⁹⁹ But complaints skyrocketed. By the end of the season Professor Kevin Bradley of the University of Missouri issued a report finding 2,708 formal complaints nationwide.²⁰⁰ Based on estimates by university weed scientists, 2.5 million acres of soybean were damaged by dicamba drift by early August, a figure rising to 3.6 million acres by the end of the summer.²⁰¹ This was

¹⁹¹ Plaintiff’s Exhibit PLFT-202, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

¹⁹² Plaintiff’s Exhibit PLFT-1134, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. June 20, 2019).

¹⁹³ Plaintiff’s Exhibit PLFT-1091, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

¹⁹⁴ Plaintiff’s Exhibit PLFT-514, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

¹⁹⁵ 960 F. 3d 1120 (9th Cir. 2020).

¹⁹⁶ Under FIFRA’s judicial review provision, 7 U.S.C. § 136n(b) (2018), EPA’s dicamba registration decision was subject to direct petition for review in the courts of appeals, rather than federal district court. Accordingly, this Article refers to what would otherwise be “plaintiffs” in district court cases as “petitioners” when discussing direct petition for review cases. The nonprofits are the National Family Farm Coalition, Pesticide Action Network, Center for Biological Diversity, and Center for Food Safety. *Id.*

¹⁹⁷ Petitioners’ Opening Brief (Redacted), at 13–14, *Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency*, 747 F. App’x 646 (9th Cir. Feb. 9, 2018) (No. 17-70196).

¹⁹⁸ *Id.* at 8.

¹⁹⁹ EPA, FINAL REGISTRATION OF DICAMBA, *supra* note 118, at 29.

²⁰⁰ Bradley, *supra* note 132.

²⁰¹ *Id.*

about four percent of all soybean acreage nationwide.²⁰² And these numbers substantially under-reported the total damage, since the majority of injured farmers do not report drift incidents.²⁰³ In addition, a still higher percentage of susceptible soybeans were injured: an astounding fifty percent of non-dicamba-resistant soybeans in Illinois.²⁰⁴

And this was just the soybean damage; many other crops were also damaged, including tomatoes, melons, fruit and nut trees, and vegetables, as well as residential gardens, shrubs, and trees.²⁰⁵ According to Missouri weed science expert, Dr. Kevin Bradley, “*we have never seen anything like this before . . . in our agricultural history.*”²⁰⁶

Numerous state agricultural departments also reported extensive damage to EPA. University scientists expressed unanimous concern that the dicamba products were more volatile than manufacturers admitted.²⁰⁷ One of the key messages from state and academic experts was that the EPA label restrictions were not working because they did not address volatility.²⁰⁸ During this time, university scientists affirmed volatility, or vapor drift, as one of the major routes of dicamba drift injury, based on air sampling data, field volatility studies, and field visits.²⁰⁹ EPA received extensive test results showing that, contrary to Monsanto’s

²⁰² Eric Lipton, *Crops in 25 States Damaged by Unintended Drift of Weed Killer*, N.Y. TIMES (Nov. 1, 2017), <https://perma.cc/E5HG-R9FH>.

²⁰³ Petitioners’ Opening Brief (Redacted), *supra* note 197, at 9.

²⁰⁴ *Id.*

²⁰⁵ Petitioners’ Excerpts of Record Volume III at 40, 45, 48–49, Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency, 747 F. App’x 646 (9th Cir. 2019) (No. 17-70196); Petitioners’ Excerpts of Record Volume II at 13, Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency, 747 F. App’x 646 (9th Cir. 2019) (No. 17-70196); *see also* David Bennett, *Might Dicamba be Affecting Pollinators?*, FARMPROGRESS (Sept. 26, 2017), <https://perma.cc/5XWB-EB9P> (“In fencerows and ditches, vegetation like wild grape, red vine and even ragweed were damaged.”).

²⁰⁶ Bradley, *supra* note 132 (emphasis omitted). EPA was well-aware of the unfolding crisis, sharing newspaper and wire reports, yet, took no action. Petitioners’ Excerpts of Record Volume II at 171, Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency, 747 F. App’x 646 (9th Cir. 2019) (No. 17-70196) (sharing Tom Polansek, *U.S. Regulator Aiming to Allow Controversial Herbicide Use with Safeguards*, REUTERS (Sept. 19, 2017), <https://perma.cc/434W-QDZ3> via email); Petitioners’ Excerpts of Record Volume III at 13–21, Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency, 747 F. App’x 646 (9th Cir. 2019) (No. 17-70196) (sharing Tom Polansek & Emily Flitter, *Exclusive: EPA Eyes Limits for Agricultural Chemical Linked to Crop Damage*, REUTERS (Sept. 5, 2017), <https://perma.cc/8KXN-MPB9> and Tiffany Stecker, *As Dicamba Dust Settles, Scientists and Industry Spar*, BLOOMBERG LAW (Aug. 30, 2017), <https://perma.cc/743A-ATGB> via email).

²⁰⁷ Tiffany Stecker, *As Dicamba Dust Settles, Scientists and Industry Spar*, BLOOMBERG LAW (Aug. 30, 2017), <https://perma.cc/8VCF-2S5U>.

²⁰⁸ *See* Petitioners’ Excerpts of Record Volume II at 184–236, Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency, 747 F. App’x 646 (9th Cir. 2019) (No. 17-70196) (45 pages of independent vapor drift testing by universities); *see also* Petitioners’ Excerpts of Record Volume III at 48–49, Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency, 747 F. App’x 646 (9th Cir. 2019) (No. 17-70196) (listing dicamba-sensitive species).

²⁰⁹ Bradley, *supra* note 132.

claims, the products volatilized for as many as three or four days following application.²¹⁰

By late summer 2017, Monsanto and BASF began responding to these damage reports by taking measures to shield themselves from lawsuits.²¹¹ Among other pretexts, Monsanto began to blame the damage on a different BASF weed killer, glufosinate.²¹² Monsanto designed a form for investigators to use in looking into farmer complaints that would “gather data that could defend Monsanto.”²¹³ BASF drafted a script for its investigators that directed them to deny liability for drift damage and to assure the complainant that even severe damage would not result in yield loss.²¹⁴

In internal communications in summer 2017, Monsanto made clear it would only investigate a dicamba drift complaint if it came from a Monsanto customer.²¹⁵ It treated its employees’ investigative visits to such “driftees” as an opportunity to sell them dicamba-resistant seeds to avoid crop injury from future drift.²¹⁶ A Monsanto sales employee emailed: “I think we can significantly grow business and have a positive effect on the outcome of 2017 if we reach out to all the driftee people.”²¹⁷

Faced with the unprecedented 2017 summer of drift, and pressured by state pesticide departments and farmers to take some action to stop it, EPA briefly considered state experts’ recommendations to prohibit use after a spring “cutoff date” to mitigate vapor drift damage, but rejected it after Monsanto opposed it.²¹⁸ When EPA finally acted, it took its orders not from the states or their experts, but from Monsanto, repeatedly meeting with its representatives and letting them dictate what label changes EPA would make.²¹⁹ Upon sending the final new label back to Monsanto, the EPA official assured them: “[*l*]ike I said, no surprises.”²²⁰ In October 2017, EPA and Monsanto amended the 2016 registration and

²¹⁰ *Id.*; see Stecker, *supra* note 207 (university field test illustrating XtendiMax volatilization).

²¹¹ Hettinger, *supra* note 166.

²¹² *Id.*

²¹³ *Id.*

²¹⁴ Plaintiff’s Exhibit PLFT-1091, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-CV-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

²¹⁵ See *Baderfarm Exhibit All*, DOCUMENTCLOUD, <https://perma.cc/8J9W-6CPC> (last visited Aug. 20, 2021) (noting “[d]o not visit a driftee inquiry if the driftee is not a MON customer”).

²¹⁶ Hettinger, *supra* note 166.

²¹⁷ Plaintiff’s Exhibit PLFT-177, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-CV-00299-SNLJ (E.D. Mo. Apr. 24, 2020).

²¹⁸ Tom Polansek & Emily Flitter, *Exclusive: EPA Eyes Limits for Agricultural Chemical Linked to Crop Damage*, REUTERS (Sept. 5, 2017), <https://perma.cc/8KXN-MPB9>; Tom Polansek, *U.S. Regulator Aiming to Allow Controversial Herbicide Use with Safeguards*, REUTERS (Sept. 19, 2017), <https://perma.cc/434W-QDZ3>; Donnelle Eller, *Iowa Farmers Make Record Number of Pesticide Misuse Claims*, DES MOINES REGISTER (Sept. 11, 2017), <https://perma.cc/YJB8-6AYC>.

²¹⁹ Petitioners’ Excerpts of Record Volume IV of IX at 152–57, 200–04, *NFFC*, 960 F.3d 1120 (9th Cir. Aug. 13, 2019) (No. 19-70115).

²²⁰ *Id.* at 157 (emphasis added).

added further new mitigation, use instructions, and requirements.²²¹ These label amendments included a restricted use pesticide designation for the dicamba products, a lower application wind speed limit, applicator training, greater record-keeping burdens, and a ban on spraying from dusk to dawn.²²² But crucially, and contrary to the state experts' urgent requests, EPA's changes did nothing to address volatility or vapor drift.

Overall, despite the evidence of how wrong its 2016 decision and risk assessment had been, EPA declared that the revised document "d[id] not affect the conclusions in the supporting assessment of risk," and that, rather than provide any new data or analysis supporting the new measures' efficacy, EPA "continue[d] to rely on all the assessments" supporting the original registration.²²³ In other words, EPA continued to rely on its 2016 conclusions and risk assessments. The challengers amended their petition for review to encompass these new revisions to the registration and the case continued.²²⁴

4. *The 2018 Growing Season*

The 2017 label amendments failed to prevent continuing massive dicamba drift damage in 2018. By July, Dr. Bradley reported an estimated 1.1 million acres of soybean damage in eighteen states.²²⁵ The number of official dicamba damage reports rose even higher than 2017 in the leading soybean-production states of Iowa, Illinois, Indiana, Ohio, Nebraska, and North Dakota.²²⁶

Dicamba drift slowed the growth of affected soybeans and often slashed yields, costing farmers many millions of dollars in lost revenue.²²⁷ The damage was so severe that by late July 2018, the U.S.'s fourth-largest soybean seed seller wrote to EPA urging prohibition of over-the-top

²²¹ Off. of Chemical Safety and Pollution Prevention, U.S. Env't Prot. Agency, Registration Amendment – Label Amendment to Change Directions for Use and additional Terms and Conditions to the Registration as Registered on February 7, 2017 for Use on Dicamba-tolerant Cotton and Dicamba-tolerant Soybeans (October 16, 2017); Off. of Chemical Safety and Pollution Prevention, U.S. Env't Prot. Agency, Registration Amendment - Label Amendment to Change Directions for Use and Additional Terms and Conditions to the Registration as Registered on November 9, 2016 for Use on Dicamba-tolerant Cotton and Dicamba-tolerant Soybeans (Oct. 12, 2017).

²²² Faced with EPA's inaction and catastrophic losses, several states passed restrictions to address vapor drift, such as spray cut off dates and temperature limits. See Pamela Smith, *Dicamba 2018: States Struggle with Application Restrictions – DTN*, AGFAX (Dec. 14, 2017), <https://perma.cc/R2GJ-9482> ("Most of the state-by-state changes are being made, they stated, because the federal EPA labels do not address herbicide volatility."); Petitioners' Excerpts of Record Volume III of IX at 74–87, *NFFC*, 960 F.3d 1120 (9th Cir. 2020) (No. 19-70115).

²²³ *NFFC*, 960 F.3d 1120, 1128 (9th Cir. 2020).

²²⁴ *Id.* at 1130.

²²⁵ *Id.* at 1128.

²²⁶ *Id.* at 1127–28.

²²⁷ See *id.* at 1125, 1139 (discussion of the growth inhibiting effect of dicamba and how dicamba drift has impacted yields and farmers).

applications of dicamba.²²⁸ Another university expert told EPA that the 2018 season demonstrated “*that minimizing the off target movement of dicamba to a reasonable level is NOT possible.*”²²⁹ Just as Monsanto and BASF had anticipated years before, the widespread damage placed pressure on farmers to purchase dicamba-resistant soybean seeds, not out of choice, but defensively, to protect themselves from rampant dicamba drift damage.²³⁰

However, growers of other crops, who lacked a dicamba-resistant alternative, were left defenseless. As in 2017, dicamba caused extensive damage to specialty crops, vegetables, tobacco, and fruit trees.²³¹ For example, a South Dakota vegetable farmer had his crops destroyed by successive waves of dicamba drift.²³² An Arkansas beekeeping operation experienced sharp declines in honey production in areas hard-hit by dicamba drift, which deprived his bees of sufficient flowering plants for their nectar needs, causing him to move his operation out of state.²³³

A second year of massive atmospheric loading of dicamba also took a toll on residential and shade trees as well as other ornamental plants throughout rural America.²³⁴

Dicamba drift damage also provoked disputes between dicamba users and those affected by drift, turning farmer against farmer, family against family, tearing apart the fabric of rural communities.²³⁵ In at least one case, a dicamba drift dispute resulted in a gunshot death.²³⁶

Overall, two years of dicamba use in 2017 and 2018 resulted in 4,200 official complaints and more than 4.7 million acres of soybeans injured, as well as scores of other plants and crops, including valuable specialty crops.²³⁷

²²⁸ *Id.* at 1142.

²²⁹ *Id.* at 1139.

²³⁰ *Id.* at 1142.

²³¹ Dan Nosowitz, *Reports from Dicamba’s Drift Across America*, MODERN FARMER (July 23, 2018), <https://perma.cc/X2RG-LDWN>.

²³² Emily Unglesbee, *When Drift Hits Home*, PROGRESSIVE FARMER (July 20, 2018), <https://perma.cc/BD79-3XKM>.

²³³ Lisa Gross, *Bees Face Yet Another Lethal Threat in Dicamba, a Drift-Prone Pesticide*, GRIST (Jan. 28, 2019), <https://perma.cc/ND8V-33Y5>.

²³⁴ Nosowitz, *supra* note 231; Steve Smith, *Dicamba Herbicide Drift: A Disaster in 2017, Will Be Much Worse in 2018*, IND. SCI. NEWS (Oct. 20, 2017), <https://perma.cc/DY2Z-CWQB>.

²³⁵ *NFFC*, 960 F.3d 1120, 1124–25 (9th Cir. 2020).

²³⁶ Marianne McCune, *A Pesticide, A Pigweed and a Farmer’s Murder*, NPR (June 14, 2017), <https://perma.cc/WAL8-TUHB>.

²³⁷ Complaint for Declaratory and Equitable Relief at 35, *Ctr. for Biological Diversity v. U.S. Env’t Prot. Agency*, No. 4:20-cv-00555-DCB (D. Ariz. Dec. 23, 2020).

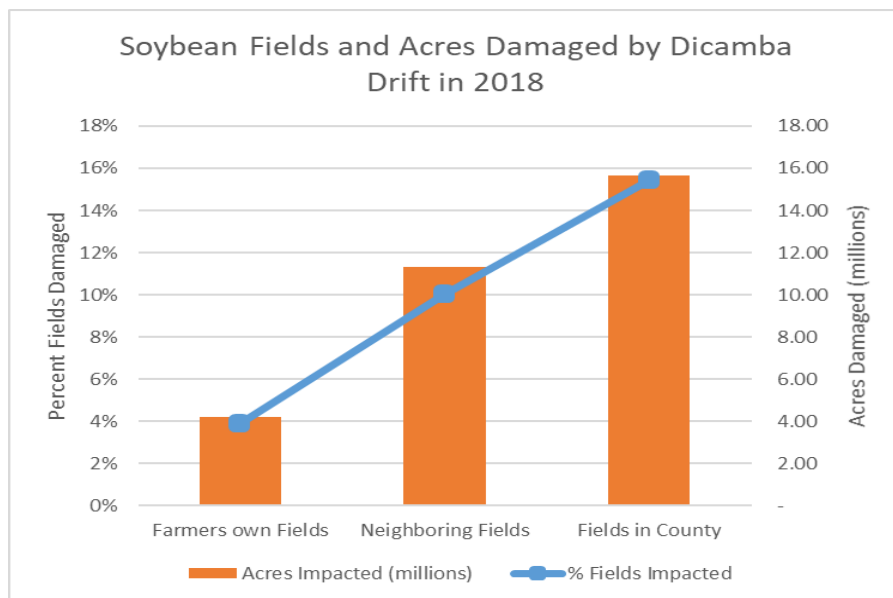


Figure 2: Farmers in nineteen major soybean states were surveyed by USDA and reported dicamba-damaged fields of their own, their neighbors', and in their counties. Source: USDA Agricultural Resource Management Survey (2018), as reported in EPA, *Dicamba Use on Genetically Modified Dicamba-Tolerant (DT) Cotton and Soybean: Incidents and Impacts to Users and Non-Users from Proposed Registrations* 31, tbl. 8 (Oct. 26, 2020).²³⁸

Notably, these figures, as dramatic as they are, are substantial *underestimates* since only a small fraction of injured farmers report drift damage episodes.²³⁹ Indeed, as shown in Figure 2, a USDA survey in 2018 found that soybean growers alone suffered at least 65,000 adverse effect incidents to their own fields from dicamba drift, “25 times the number of dicamba incidents reported to EPA for all crops.”²⁴⁰ Farmers reported still more injury when queried about dicamba damage to their neighbors' fields and in their county, with damage rising to an astounding ten percent and nearly sixteen percent of soybean fields, representing over eleven million and *nearly sixteen million damaged acres*, respectively.²⁴¹

²³⁸U.S. ENV'T PROT. AGENCY, DICAMBA USE ON GENETICALLY MODIFIED DICAMBA-TOLERANT (DT) COTTON AND SOYBEAN: INCIDENTS AND IMPACTS TO USERS AND NON-USERS FROM PROPOSED REGISTRATIONS, APPENDIX I, TABLE 3, 58–63 (Oct. 26, 2020), <https://perma.cc/32A2-AYR3> [hereinafter INCIDENTS AND IMPACTS TO USERS AND NON-USERS]

²³⁹ *NFFC*, 960 F.3d 1120, 1138 (9th Cir. 2020).

²⁴⁰ INCIDENTS AND IMPACTS TO USERS AND NON-USERS, *supra* note 238, at 31–32.

²⁴¹ See *supra* Part.IV.B.4 Figure 2.

5. The 2018 Registration Continuation

Despite these two years of unprecedented widespread drift damage, in late October 2018, EPA continued the 2016 new use registration for another 2 years.²⁴² EPA continued the registration even though it did not make a finding that drift damage episodes were not occurring at “unacceptable frequencies or levels” —the condition that EPA had stipulated for continuing the registration.²⁴³

EPA for the first time assessed field studies of dicamba spray and vapor drift conducted by university scientists from 2016 to 2018.²⁴⁴ These twelve studies collectively revealed dicamba drift damage to susceptible off-field plants at far greater distances than the registrant studies and modeling EPA had relied upon for prior registrations. More than half of the studies identified injury to plants at distances greater than 130 feet (39.6 meters).²⁴⁵

Based on these studies, EPA scientists provisionally recommended expansion of the action area to 196 feet (60 meters) on all sides of fields where overlap would be possible with endangered species’ range. Once EPA scientists had confirmed the validity of an additional 2018 study, which revealed injury to dicamba-sensitive soybeans 136 meters from the edge of a treated field, they then recommended expansion of the action area to 443 feet (135 meters) beyond the fields.²⁴⁶ Yet EPA added only a 57-foot buffer, a buffer eight times smaller than recommended by the EPA’s scientists, which is only required in the minority of counties with listed species (8% of counties).²⁴⁷

Again, rather than address volatility problems *inherent* with the dicamba products and assuring safety, EPA just piled even more complex use mitigation instructions on farmers, such as further limiting the time of day when applications could be made, limiting the number of applications and the length of time after planting applications could be made, and allowing only certified applicators to make applications.²⁴⁸

6. The 2019 and 2020 Growing Seasons

The 2019 and 2020 summer growing seasons followed the same damaging drift patterns as those prior: drift damage to crops, trees, gardens, and the environment writ large; real world farming conditions making it impossible to effectively and lawfully spray; state regulators

²⁴² U.S. ENV’T PROT. AGENCY, *EPA Announces Changes to Dicamba Registration*, (Nov. 1, 2018), <https://perma.cc/WW5A-GQ2R>.

²⁴³ EPA, 2018 DICAMBA REGISTRATION DECISION, *supra* note 122, at 24.

²⁴⁴ *Id.* at 8.

²⁴⁵ Petitioners’ Reply to Respondents’ Brief at 17, *Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency*, No. 19-70115 (9th Cir. Nov. 18, 2019).

²⁴⁶ Petitioners’ Opening Brief (Redacted) at 61–62, *Nat’l Fam. Farm Coal. v. U.S. Env’t Prot. Agency*, No. 19-70115 (9th Cir. Aug. 13, 2019).

²⁴⁷ EPA, 2018 DICAMBA REGISTRATION DECISION, *supra* note 122, at 13.

²⁴⁸ *NFFC*, 960 F.3d at 1130.

overwhelmed with injury complaints even as farmers stopped filing them, feeling them futile; and more farmers forced to defensively adopt dicamba-resistant soybeans.

From 2017 to 2019, “[n]early 5,600 farmers reported dicamba damage to Bayer and BASF, makers of dicamba.”²⁴⁹ “EPA estimate[d] this could be as much as a 25-fold underreporting of incidents.”²⁵⁰ In 2019, nearly 3,000 drift incidents were reported to EPA.²⁵¹ Compared to prior years, 2019 was “*as bad, if not worse, than last year*,” according to Leo Reed, president-elect of the Association of American Pesticide Control Officials (AAPCO) and pesticide licensing manager for the Office of Indiana State Chemist.²⁵² According to AAPCO, there was approximately a ten percent increase in reported incidents as compared to 2018.²⁵³ In Illinois, “the number of complaints soared from about 120 in the pre-dicamba era to more than 700 in 2019.”²⁵⁴ “In Indiana, [complaints] went from 60 to 200.”²⁵⁵ As explained above, these numbers are gross underestimates since most incidents go unreported.²⁵⁶

“Illinois led the country in dicamba injury, with regulators actively investigating 724 cases of alleged dicamba injury, a record for the state.”²⁵⁷ “Illinois regulators mentioned that you would be hard-pressed to find a non-dicamba-tolerant soybean field in some counties that wasn’t damaged, because there were whole counties that appeared to be damaged.”²⁵⁸ “With the exception of Missouri, most of the states in EPA Region 7 (Iowa, Kansas, Missouri, and Nebraska) [have] all investigat[ed] as many or more injury cases” in 2019 than 2018.²⁵⁹ In Indiana, dicamba drift complaints rose from 135 in 2018 to 178 in 2019.²⁶⁰

Despite the exponential numbers of reported injuries, these numbers nonetheless discount the actual drift incidents dramatically. In states like Missouri, complaint numbers went down, but almost certainly not because drift stopped. Rather, “[a]ccording to a [2019] survey of farmers in Missouri, 80% of them aren’t bothering to file formal complaints anymore, in large part because they don’t think it d[id] any good.”²⁶¹ “All

²⁴⁹ Johnathan Hettinger, *EPA Documents Show Dicamba Damage Worse than Previously Thought*, ST. LOUIS POST-DISPATCH (Oct. 30, 2020), <https://perma.cc/SXE8-7RE4>.

²⁵⁰ *Id.*

²⁵¹ EPA MEMO, *supra* note 122, at 9.

²⁵² Emily Unglesbee, *EPA Gets Limited Dicamba Data*, PROGRESSIVE FARMER (Aug. 20, 2019), <https://perma.cc/X3VN-CFKV>.

²⁵³ EPA MEMO, *supra* note 122, at 9.

²⁵⁴ Dan Charles, *Pesticide Police, Overwhelmed by Dicamba Complaints, Ask EPA for Help*, NPR (Feb. 6, 2020), <https://perma.cc/L3K3-W4NK>.

²⁵⁵ *Id.*

²⁵⁶ *See supra* notes 249–250 and accompanying text.

²⁵⁷ Emily Unglesbee, *Dicamba Fatigue*, PROGRESSIVE FARMER (Dec. 9, 2019), <https://perma.cc/4XQG-U2U5>.

²⁵⁸ *Id.*

²⁵⁹ *Id.*

²⁶⁰ Robert D. Waltz, *Analysis of Off-Target Movement of Dicamba Herbicides in Indiana*, OFF. IND. ST. CHEMIST & SEED COMM’R 1 (Oct. 30, 2019), <https://perma.cc/3KG8-YH77>.

²⁶¹ Charles, *supra* note 254.

but one of Missouri's eight pesticide inspectors left their jobs [in [2018–2019]” with “heavy workload and burnout [as] contributing factors.”²⁶² A survey of farmers across sixty counties in Nebraska found that only seven percent of farmers who saw dicamba injury filed an official complaint with the Nebraska Department of Agriculture.²⁶³ Similarly, “[i]n a survey conducted by AAPCO, 19 states reported nearly 1,400 cases of alleged dicamba injury in 2019.”²⁶⁴ The regulators from these states acknowledged that these numbers are likely far lower than the actual cases of injury: “We’re hearing the same thing as other regulators—people are just not reporting,” said Ryan Williams, an Oklahoma pesticide regulator who represented the EPA Region 6 states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas at the meeting. *‘They’re tired of reporting and not getting any results.’*²⁶⁵

The extraordinary costs from dicamba injury fell upon state agencies as well. Indiana regulators investigated 178 injury cases in 2019, another record for the state.²⁶⁶ The Missouri Department of Agriculture added six new positions to address the dicamba backlog, expected to cost over \$600,000 a year.²⁶⁷ “Communication with EPA over dicamba problems hit an all-time low in 2019.”²⁶⁸ For reasons that are unclear, unlike the near weekly conference calls and data reporting of 2018, suddenly very little regular communication between state regulators and EPA occurred in 2019 and whatever meetings or calls were held were not logged.

a. Tree Damage

States have also reported environmental harm beyond crop fields from 2018 to 2020.²⁶⁹ Illinois regulators noticed a decline in tree health and began investigating.²⁷⁰ Nebraska state foresters saw an increase in damage to the state’s trees.²⁷¹ South Dakota State University scientists analyzed samples from injured trees as part of a study on the long-term effects of herbicide injury on trees.²⁷²

²⁶² *Id.*

²⁶³ Rodrigo Werle et al., *Survey of Nebraska Farmers’ Adoption of Dicamba-Resistant Soybean Technology and Dicamba Off-Target Movement*, 32 WEED TECH. 754, 754 (2018).

²⁶⁴ Unglesbee, *supra* note 257.

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ Brendan Crowley, *Hundreds Seeking Dicamba Complaint Resolutions; Regulators Say They Need Help*, JOPLIN GLOBE (Mar. 3, 2020), <https://perma.cc/9LKT-3F32>.

²⁶⁸ Unglesbee, *supra* note 257.

²⁶⁹ *Id.*

²⁷⁰ *Id.*

²⁷¹ *Id.*

²⁷² Johnathan Hettinger, *‘We’ve Got It Everywhere’: Dicamba Damaging Trees Across Midwest and South*, MIDWEST CTR. INVESTIGATIVE REPORTING (June 16, 2020), <https://perma.cc/47L4-WBJ3>.

The damage some places was worse than that from the Emerald Ash Borer, an insect that killed tens of millions of trees across 25 states.²⁷³ “Our No. 1 problem on our trees is herbicide damage,” said Laurie Stepanek, a Nebraska Forest Service specialist.²⁷⁴ According to her, the damage has no boundaries, from cities to forests to nurseries. “We’ve got it everywhere, unfortunately. It’s so widespread and affecting so many trees.”²⁷⁵ Similarly a retired biologist and former nursery owner documented tree injury in Illinois for five straight year.²⁷⁶

Research out of the University of Missouri found that 1/200 of the current dicamba application concentration can injure trees, with apple, red maple, peach, and pin oak being the most sensitive.²⁷⁷ Pecan trees were found to be similarly sensitive,²⁷⁸ and the University of Georgia extension office estimates that synthetic auxins (dicamba, 2,4-D) score an eight out of ten for their potential to contribute to long-term injury to pecan trees.²⁷⁹ Monitoring by the Arkansas Audubon Society identified 243 instances of possible or probable dicamba damage on a wide variety of plants across twenty eastern Arkansas counties in 2019.²⁸⁰ Similar monitoring in 2020 identified 116 instances of probable dicamba damage and four instances of possible dicamba damage.²⁸¹ Eleven monitored sites where damage was documented in 2019 had signs of damage in 2020 as well, indicating that damage to species was occurring in multiple years.²⁸² The most frequently reported species of plant with probable damage was the sycamore tree.²⁸³

Another 2019 monitoring study across twenty-one Illinois counties found that fifty-nine out of the eighty-three locations analyzed had dicamba damage that was rated as moderate, severe, or extreme.²⁸⁴ Trees were the type of plant that most often showed symptoms of damage. Ohio State University extension states that “[f]or woody plants and other perennial species, the potential for long-term or accumulating effects is a concern. Herbicide drift may reduce winter hardiness and long-term vigor, which can result in high replacement costs and years of lost

²⁷³ *Id.*

²⁷⁴ *Id.*

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ Brian R. Dintelmann et al., *Investigations of the Sensitivity of Ornamental, Fruit, and Nut Plant Species to Driftable Rates of 2,4-D and Dicamba*, 34 WEED TECH. 331, 335 (2019).

²⁷⁸ M. Lenny Wells et al., *Simulated Single Drift Events of 2,4-D and Dicamba on Pecan Trees*, 29 HORTTECHNOLOGY 360, 363–64 (2019).

²⁷⁹ LENNY WELLS, U. GA. COOPERATIVE EXTENSION CIRCULAR, HERBICIDE INJURY OF PECAN TREES 6 (Apr. 2019), <https://perma.cc/RU4B-6PQT>.

²⁸⁰ DAN SCHEIMAN, AUDUBON ARK., DICAMBA SYMPTOMOLOGY COMMUNITY SCIENCE MONITORING REPORT 1–2 (Nov. 9, 2020), <https://perma.cc/EN2R-JBFH>.

²⁸¹ *Id.* at 2.

²⁸² *Id.*

²⁸³ *Id.*

²⁸⁴ KIM ERNDT-PITCHER ET AL., PRAIRIE RIVERS NETWORK, 2018 & 2019 TREE AND PLANT HEALTH MONITORING REPORT 9 (July 16, 2020), <https://perma.cc/FF2G-WMZZ>.

revenue waiting for new plants to produce.”²⁸⁵ “More than 60 areas managed by the Illinois Department of Natural Resource, including state parks and nature preserves, reported herbicide damage in 2018 or 2019”.²⁸⁶

b. 2020 Injuries

States continued to struggle with dicamba damage in 2020. For example, Iowa “recorded a record-high 215 investigations into auxin injury (potentially dicamba), up from a confirmed 83 dicamba injury cases in the state in 2019.”²⁸⁷ By July 2020, scientists said weather conditions had made a “perfect storm” leading to drift from June spraying. “*It’s far worse than past years,*” said Meaghan Anderson, a field agronomist for Iowa State University, based in central Iowa.²⁸⁸ “You can tell pretty quickly which soybean fields are not Xtend soybeans in my area, because they are all cupped and puckered up.”²⁸⁹

In 2020, complaints increased in Minnesota as compared to 2018 and 2019 to over 9,000 acres, most related to soybeans, but also involving trees and specialty crops.²⁹⁰ Bayer/Monsanto received more complaints in 2020 from Iowa and Minnesota than in prior years.²⁹¹ In Indiana, “the number of 2020 dicamba complaints still exceeded [the state’s] overall average of 13 annual pesticide investigations before dicamba-tolerant crops were commercialized.”²⁹²

The label remained impossible to follow in real-world farming conditions. For example, data compiled by the University of Minnesota showed that “central Minnesota farmers had fewer than 40 hours when they could legally apply dicamba from June 1 to June 15.”²⁹³ During the ideal two-week window for spraying dicamba in North Central Iowa in 2020, there were *only a total of 40 hours that dicamba could legally be sprayed*, “resulting in large quantities of dicamba being applied in a small time period.”²⁹⁴

²⁸⁵ Cassandra Brown et al., *Frequently Asked Questions*, OHIO STATE UNIV. COLL. FOOD, AGRIC., & ENV’T SCIS., <https://perma.cc/8XZB-AALX>.

²⁸⁶ Hettinger, *supra* note 272.

²⁸⁷ Emily Unglesbee, *EPA Registers Dicamba Again*, PROGRESSIVE FARMER (Oct. 27, 2020), <https://perma.cc/FU27-MAJC>.

²⁸⁸ Emily Unglesbee, *Off-Target, Once Again*, PROGRESSIVE FARMER (July 9, 2020), <https://perma.cc/4REU-PCKU>.

²⁸⁹ *Id.*

²⁹⁰ Gil Gullickson, *Dicamba: Sunrise or Sunset?*, SUCCESSFUL FARMING (Oct. 7, 2020), <https://perma.cc/8VH9-N4NM>.

²⁹¹ *Id.*

²⁹² Emily Unglesbee, *States Mull 2021 Dicamba Limits*, PROGRESSIVE FARMER (Dec. 8, 2020), <https://perma.cc/C453-58K8>.

²⁹³ Gullickson, *supra* note 290.

²⁹⁴ Bob Hartzler & Prashant Jha, *Dicamba 2020: What Went Wrong in Iowa?*, IOWA STATE UNIV. (July 8, 2020), <https://perma.cc/D7PJ-ZK28>.

c. The Ninth Circuit's Decision

In *National Family Farm Coalition v. U.S. Environmental Protection Agency*,²⁹⁵ a suit challenging the 2016 registration, as amended in 2017, the parties completed briefing and the Court heard oral argument in August 2018.²⁹⁶ However, before the Court could issue a decision, EPA continued the registration in October 2018. Because EPA added even more use instructions and reviewed data from the prior season before the 2018 registration continuation, the Court subsequently dismissed petitioners' petition for review as moot and required petitioners to refile, but expedited any such new case.²⁹⁷ Petitioners then filed their petition for review of the October 2018 registration.²⁹⁸ After further briefing, the Court again held oral argument in April 2020 and in June 2020 handed down its opinion.²⁹⁹

Judge William Fletcher authored the opinion for the unanimous three judge panel, joined by Judges Margaret McKeown and Michael Hawkins. The fifty-six-page opinion set forth the Court's painstaking review of the detailed and voluminous administrative record³⁰⁰ before holding that EPA had violated FIFRA six different ways, broken into two subsets of three.³⁰¹ First, EPA had "substantially understated" three risks the agency acknowledged.³⁰² Second, EPA had also "entirely failed to acknowledge three other risks."³⁰³ As to remedy, the Court then fully vacated the registrations.³⁰⁴

First, the Court explained that because the registration was a conditional new use registration, EPA had to make two determinations: a determination that the applicant had submitted satisfactory data and a determination that the registration would not "significantly increase the risk of any unreasonable adverse effect on the environment."³⁰⁵ These made up the overarching controlling legal standard. Both of these findings would need to be supported by substantial evidence when considering the record as a whole.³⁰⁶

²⁹⁵ 747 F. App'x 646 (9th Cir. 2019).

²⁹⁶ *Id.* at 646–47.

²⁹⁷ *Id.* at 648.

²⁹⁸ *NFFC*, 960 F.3d 1120, 1130 (9th Cir. 2020).

²⁹⁹ *Id.* at 1120.

³⁰⁰ *Id.* at 1125–36.

³⁰¹ *Id.* at 1124, 1144.

³⁰² *Id.* at 1124.

³⁰³ *Id.*

³⁰⁴ *Id.* at 1145.

³⁰⁵ *Id.* at 1124 (citing 7 U.S.C. § 136a(e)(7)(B) (2018)); *id.* at 1133 ("We conclude that substantial evidence does not support the EPA's conclusion that both statutory prerequisites were satisfied.")

³⁰⁶ 7 U.S.C. § 136n(b) (2018).

i. Satisfactory Data

The Court began with the first prerequisite, the “satisfactory data” showing. As to the studies of the herbicide products, the Court noted that Monsanto, prior to the 2016 registration, did not permit its formulation nor its volatility to be available for independent study, so the few small field trials were all only done by Monsanto itself.³⁰⁷ Based on these studies, EPA had concluded in 2016 that the dicamba products would “eliminate any offsite exposures and effectively prevent risk potential to people and non-target species” and that the products “created ‘minimal risks, if they existed at all.’”³⁰⁸ However, the Court explained “EPA’s conclusion was incorrect,” as the record evidence of massive drift damage in 2017 and 2018 showed and “EPA later acknowledged.”³⁰⁹ In 2018, Monsanto and EPA added other studies they characterized as “confirmatory,” that is, confirming the data used to support the 2016 registration and its conclusions; but, as the Court underscored, that 2016 data, far from being satisfactory, had instead “of course, resulted in millions of acres of reported dicamba damage.”³¹⁰

In support of its satisfactory data finding EPA also relied on hundreds of telephone reports from farmers to Monsanto of crop injury, for which Monsanto almost entirely “absolved” its product and instead blamed the drift damage on older formulations of dicamba sprayed on adjacent post-emergent corn fields.³¹¹ The Court rejected that argument, concluding that explanation was “not supported by the data,” because those older varieties had been in use for a number of years prior and neither EPA nor Monsanto explained why “*the number of herbicide drift complaints had skyrocketed in 2017 and 2018, after XtendiMax, Engenia, and [a third identical dicamba formulation called] FeXapan were registered for post-emergent use.*”³¹² In fact, record evidence showed that the use of older dicamba formulations on corn had been falling, not rising and “was used on only about 12 percent of corn acreage.”³¹³

Finally, the record data also included research conducted by various universities such as Arkansas, Purdue, Wisconsin-Madison, Michigan State, and Nebraska in 2018 when Monsanto finally permitted them to undertake independent studies of volatility.³¹⁴ However, rather than support EPA’s conclusions, the data showed that the over-the-top dicamba formulations actually “could volatilize and drift, resulting in visual injury to plants.”³¹⁵ Nonetheless, while the Court held that EPA’s

³⁰⁷ *NFFC*, 960 F.3d at 1134.

³⁰⁸ *Id.*

³⁰⁹ *Id.*

³¹⁰ *Id.* at 1134–35.

³¹¹ *Id.* at 1135.

³¹² *Id.* (emphases added).

³¹³ *Id.*

³¹⁴ *Id.*

³¹⁵ *Id.*

data had “several flaws,” the Court concluded that it ultimately did not need to determine whether substantial evidence supported that registration finding because EPA did not support with substantial evidence the second required registration finding, the “not ‘significantly increase the risk of any unreasonable adverse effect on the environment’” finding, for multiple reasons.³¹⁶

ii. Failure to Support Registration with Substantial Evidence

On this registration factor—whether EPA supported its determination that amending the registration to add the new uses “would not significantly increase the risk of any unreasonable adverse effect on the environment”³¹⁷—the Court made six different FIFRA holdings with supporting factual findings, separated into two parts of three each.³¹⁸ As explained above, the core FIFRA legal standard of “unreasonable adverse effect on the environment” is defined to include “any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide.”³¹⁹ First, the Court held that “EPA substantially understated three risks that it acknowledged.”³²⁰ Second, EPA “also entirely failed to acknowledge three other risks.”³²¹

iii. Substantially Understated Risks

As to the first trio of violations—those risks EPA at least acknowledged but failed to support with substantial evidence—first, the Court held that “EPA substantially understated the amount of [dicamba-resistant] seed acreage” that farmers planted, and thus “correspondingly, the amount of dicamba herbicide that had been sprayed on post-emergent crops.”³²² Specifically, the Court held that EPA relied on a Monsanto acreage prediction and that such “reliance was improper” because the record evidence showed Monsanto’s prediction underestimated the actual dicamba-resistant seed acreage and commensurately the amount of dicamba herbicide sprayed by at least twenty-five percent.³²³

Second, the Court held that EPA’s conclusion that state dicamba drift injury reports “could have either under-reported or over-reported the actual amount of damage [wa]s not supported by substantial evidence;” rather, “[t]he record clearly shows that complaints understated the

³¹⁶ *Id.* at 1124, 1135–36.

³¹⁷ 7 U.S.C. § 136a(e)(7)(B) (2018).

³¹⁸ *NFFC*, 960 F.3d at 1124, 1144.

³¹⁹ 7 U.S.C. § 136(bb).

³²⁰ *NFFC*, 960 F.3d at 1124.

³²¹ *Id.*

³²² *Id.*

³²³ *Id.* at 1136.

amount of dicamba damage.”³²⁴ As EPA’s own documents showed, drift injury complaints spiked in 2017 and 2018, and the agency had “no explanation for the spike . . . other than” the new over-the-top products.³²⁵ EPA attempted to “minimize[] the significance of the increase in complaints by crediting a view” that injuries could have been over-reported.³²⁶ While EPA acknowledged that many stakeholders—the Association of American Pesticide Control Officials, university researchers, and some growers—said the complaints were *under-reported*, it claimed that “others” instead believed injuries were being *over-reported*.³²⁷ However, the Court examined the record and found “Monsanto, and only Monsanto, was the ‘others’” on which EPA opaquely relied.³²⁸ Monsanto speculated that the damage was caused by older dicamba or other herbicides used on nearby corn fields, but the Court determined, as explained above, that such corn-based use was decreasing, “and that dicamba damage is easily detected [from other herbicides] by its signature ‘leaf cupping’ on affected plants.”³²⁹

Accordingly, the Court held that “EPA’s purported agnosticism as to whether dicamba damage was over- or under-reported [wa]s contradicted by *overwhelming record evidence* that dicamba damage was substantially *under-reported*.”³³⁰ For example, the Court pointed to the conclusion of Iowa State professor Robert Hartzler, who surveyed university field agronomists in midwest farm states and sent EPA his conclusion that “[w]e know the reported incidences represent a very small fraction of total drift cases as farmers are reluctant to involve regulatory agencies.”³³¹ Similarly, an Indiana state official “estimated that only one out of ten farmers” damaged by dicamba drift “actually filed formal complaints.”³³² And in record documents, EPA even admitted that “[n]ot all reports of crop damage were reported.”³³³ “If complaints to state departments of agriculture were under-reported,” then “the amount of actual dicamba damage was, of course, even greater than what the graph in the EPA’s 2018 decision document” admitted.³³⁴

Third, the Court held that EPA violated FIFRA when it “refused to quantify or estimate the amount of damage caused . . . or even to admit that there was any damage at all.”³³⁵ In the 2018 decision, EPA claimed

³²⁴ *Id.* at 1137.

³²⁵ *Id.*

³²⁶ *Id.*

³²⁷ *Id.*

³²⁸ *Id.* This issue also came up during oral argument, with the Court asking EPA’s attorneys who these “others” were and EPA’s counsel unable to provide any others besides Monsanto. Oral Argument at 20:54–22:56, *NFFC*, 960 F.3d 1120 (2019) (No. 17-70810), <https://perma.cc/TZ6E-LKY5>.

³²⁹ *NFFC*, 960 F.3d at 1137.

³³⁰ *Id.* (emphases added).

³³¹ *Id.* at 1138 (concluding that less than twenty-five percent were reported).

³³² *Id.*

³³³ *Id.*

³³⁴ *Id.*

³³⁵ *Id.*

that non-dicamba-resistant soybean crop damage was merely “potential” and that it did “not have information to quantify” the damages.³³⁶ And with regard to all other damage—to “specialty crops, vegetable, and ornamental, fruit, and shade trees”—EPA referred to them generally as only “alleg[ed] damage” to the “landscape.”³³⁷

The Court held that EPA in fact did have “information from which it could have quantified dicamba damage, even if it could not have calculated with precision the reduction in yield caused by the damage.”³³⁸ In a September 2018 presentation, EPA officials showed that more than 3.6 million acres of soybeans were damaged by dicamba in 2017, and in the registration decision, EPA again used the 3.6 million figure.³³⁹ The same source, Professor Bradley of the University of Missouri, had reported that by mid-July 2018, months before the 2018 decision, already another 1.1 million acres had been damaged.³⁴⁰ In reality, EPA actually “had a great deal of qualitative information about extensive dicamba damage during both 2017 and 2018.”³⁴¹

The Court again found that EPA’s decision was belied by the record evidence: EPA had sufficient information to quantify the damage, including a number of studies, presentations, articles, and other documentation that included acreage totals and significant numbers of complaints.³⁴² Among them, the Court pointed to emails to EPA officials from university weed scientists and state department of agriculture representatives reporting injury to “specialty crops, vegetables, and ornamental, fruit, and shade trees.”³⁴³ The Court recounted numerous transmittals from state experts to EPA on damage, including Dr. Ford Baldwin of Arkansas and Dr. Bradley of Missouri.³⁴⁴ And the Court gave some vivid examples. From the Kansas Department of Agriculture: “we have been over run [sic] with dicamba complaints.”³⁴⁵ From North Dakota State University’s pesticide program specialist: “[w]hat we now know, in 2018, is that minimizing off target movement of dicamba to a reasonable level is NOT possible . . . this level of movement is completely unacceptable.”³⁴⁶ From Tennessee: “wave after wave of dicamba exposure.”³⁴⁷ Professor Larry Steckel of the University of Tennessee stated that the drift crisis “is like nothing I have ever seen before . . . Dicamba drift for the past three years has often travelled a half mile to

³³⁶ *Id.*

³³⁷ *Id.*

³³⁸ *Id.*

³³⁹ *Id.*

³⁴⁰ *Id.*

³⁴¹ *Id.*

³⁴² *Id.*

³⁴³ *Id.*

³⁴⁴ *Id.* at 1138–39.

³⁴⁵ *Id.* at 1139.

³⁴⁶ *Id.*

³⁴⁷ *Id.*

three-quarters of a mile and, all too frequently, well beyond that.”³⁴⁸ Accordingly, the Court held that EPA’s refusal to quantify the amount of damage caused was contrary to FIFRA and not supported by substantial evidence.³⁴⁹

iv. Risks EPA Unlawfully Failed to Acknowledge and Consider

In addition to the ways in which EPA “substantially understated the risks it acknowledged,” the Court identified a second trio of FIFRA violations, risks that EPA “entirely failed to acknowledge,” including risks that EPA “was statutorily required to consider.”³⁵⁰ First, EPA failed to acknowledge and consider problems with users’ inability to follow the label instructions, despite EPA’s heavy reliance on these instructions as mitigation.³⁵¹ “Extensive evidence in the record indicate[d] that there [wa]s a risk of substantial non-compliance with the EPA-mandated label.”³⁵² The product-use instructions are a form of mitigation: that is, EPA’s “no unreasonable adverse effect” determination was predicated on the label being able to be followed.³⁵³ Thus, the inability to follow those directions would result in dicamba drift damage and undermined any such “no unreasonable adverse effect” conclusion.

As an initial matter, the term “label” is a misnomer here “as that term is usually understood.”³⁵⁴ Rather, the dicamba products’ use directions were forty pages long.³⁵⁵ Even those were not static but ever-shifting as discussed in Parts IV.B.2, IV.B.3, IV.B.4, and IV.B.5; they had gone through several iterations (2016 revisions, 2017 revisions, and 2018 revisions).³⁵⁶ They included myriad spray instructions and restrictions, including: time of day; wind speed (between three to ten miles per hour); temperature inversions; whether there was rain coming within twenty-four hours; whether the wind direction was blowing towards “dicamba-sensitive” crops; an in-field downwind spray buffer; spraying equipment ground speed; spraying equipment length and height above ground; the

³⁴⁸ *Id.* (estimating forty percent of Tennessee non-DT soybean acres damaged).

³⁴⁹ *Id.* at 1124–25, 1144.

³⁵⁰ *Id.* at 1139.

³⁵¹ *Id.* at 1140–42.

³⁵² *Id.* at 1139.

³⁵³ *Id.* at 1142; see *EPA Registers Dicamba Formulation for Use on Dicamba Tolerant Corps*, U.S. ENV’T PROT. AGENCY, <https://perma.cc/QK3D-VXYF> (last updated Oct. 20, 2020) (noting that the EPA label contains specific instructions to mitigate the risk of dicamba drift).

³⁵⁴ *NFFC*, 960 F.3d at 1140.

³⁵⁵ *Id.*; see also U.S. ENV’T PROT. AGENCY, DECISION NO. 545700, MASTER LABEL FOR EPA REG. NO. 524-617 REGISTERED USE PESTICIDE: M1768 HERBICIDE (2018) (providing notification of new Master Labeling for M1768 Herbicide that incorporates previous revisions and attaching the forty-page document containing use directions).

³⁵⁶ *NFFC*, 960 F.3d at 1139–40.

number of applications per season and per crop; restricted use certification and training; and others.³⁵⁷

As one might expect, the Court found that the record evidence was “substantial” in showing that “even conscientious applicators had not been able consistently to adhere” to the use directions in real world farming conditions.³⁵⁸ Rather, the record evidence showed that the instructions were “*difficult if not impossible*” to follow.³⁵⁹ The dicamba use label “was probably the most complex label I ha[ve] ever seen in my 40-year career,” according to one agricultural company executive.³⁶⁰ Other users told EPA that “[t]here doesn’t appear to be any way for an applicator to be 100% legal in their application” and “there is *no legal way to spray th[e] field*,” putting applicators in a “no-win situation.”³⁶¹ A state survey of Illinois commercial applicators showed that only sixty-six percent believed they were able to follow the label effectively and included comments like “I believe it is *impossible to make an on-label application* as the label is written.”³⁶² Still, others were more blunt, saying that trying to follow the instructions in real-world farming conditions in their locations such as “blustery west Texas [wa]s *basically a fairy tale. You can’t do it . . . Your fairy godmother has to pull out a wand, tap a pumpkin and turn it into a carriage.*”³⁶³

Nor was the evidence merely experiential. The Court explained that Purdue University professors calculated the difficulty in complying with the label using actual rainfall events in 2018, taking into account the restrictions based on wind speed and temperature inversions and calculated that there were only forty-seven hours during the entire month of June in which spraying the dicamba products would have been legal.³⁶⁴ And of those total monthly hours, there were only two (twenty-four hour) days where, during an eight-hour day, application would have been possible (eleven hours one day, eight hours another); the remaining hours were scattered throughout the rest of the month in smaller stray increments.³⁶⁵ The data underscored that “in the real world” there are not “very many hours” where applicators can be “completely compliant.”³⁶⁶

Further, the Court noted that much of the record evidence naturally dealt with the impossibility of adhering to the earlier 2016 and 2017 use directions despite farmers’ best efforts, but in the fall 2018 registration, EPA added even more directions, such as further reducing the time of day

³⁵⁷ *Id.* at 1140.

³⁵⁸ *Id.*

³⁵⁹ *Id.* at 1124 (emphasis added).

³⁶⁰ *Id.* at 1140 (estimating that over the course of the entire 2017 summer, his operation only had 44 hours of application time that would have been allowed under the label).

³⁶¹ *Id.* (emphasis added).

³⁶² *Id.* at 1141 (emphasis added).

³⁶³ *Id.* (emphasis added).

³⁶⁴ *Id.*

³⁶⁵ *Id.*

³⁶⁶ *Id.*

when applications could occur and total days after planting.³⁶⁷ Thus, the record evidence of substantial non-compliance with the prior label showed that compliance with the 2018 label “w[ould] be even more difficult.”³⁶⁸ Despite this elephant in the room—again, on which EPA had moored its core “no unreasonable adverse effect on the environment” conclusion—“EPA nowhere acknowledged the evidence in the record showing there had been substantial difficulty complying with the mitigation requirements of the earlier labels.”³⁶⁹

Second, the Court explained that “FIFRA requires the EPA to consider, as part of the cost-benefit analysis, ‘any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs’” of the pesticide.³⁷⁰ Yet the Court held that EPA had nonetheless “entirely failed to acknowledge risks of economic and social costs.”³⁷¹ As to economic costs, the Court held that “EPA entirely failed to acknowledge an economic cost that is *virtually certain to result* from the conditional registrations:” namely, anti-competitive, monopolistic effects to the seed and related agricultural markets.³⁷²

As discussed above, the predecessor to the dicamba-resistant crop system was the glyphosate-resistant (or Roundup Ready) crop system, with the seeds and pesticide (Roundup) sold together as a crop system. These crop systems had already become a near monopoly, with ninety percent of soybeans in 2008 being Roundup Ready.³⁷³ It also caused a related agronomic problem: weed resistance.³⁷⁴ As with overusing antibiotics, Roundup overuse generated an epidemic of glyphosate-resistant “superweeds” infesting over 120 million acres of U.S. cropland.³⁷⁵

Then, because of that overuse, as also explained above, the resistant weed problem led to Monsanto’s short-term “solution” to the crisis of its own creation: dicamba-resistant crops. As such, dicamba-resistant crops were quickly “well on their way to the same degree of market dominance.”³⁷⁶ By 2017, dicamba-resistant crops constituted twenty-five percent of soybeans, and by 2018, fifty percent.³⁷⁷ Moreover, the record

³⁶⁷ *Id.*

³⁶⁸ *Id.*

³⁶⁹ *Id.* at 1142.

³⁷⁰ *Id.* (quoting 7 U.S.C. § 136(bb) (2018)) (emphasis removed).

³⁷¹ *Id.*

³⁷² *Id.* (emphasis added).

³⁷³ *Id.*

³⁷⁴ Greg D. Horstmeier, *Dicamba’s PTFE Problem*, PROGRESSIVE FARMER (Aug. 29, 2017), <https://perma.cc/NK8P-47PP>; Center for Food Safety, Comments to EPA on Notice of Receipt of Application to Register New Use of Dicamba on Monsanto’s Dicamba-Resistant MON 87708 Soybean (Sept. 21, 2012), <https://perma.cc/5R5T-AC42>; EPA, 2018 DICAMBA REGISTRATION DECISION, *supra* note 122, at 14, 18.

³⁷⁵ Center for Biological Diversity, Comments on Dicamba: New Use on Herbicide-Tolerant Cotton and Soybean 20–21 (May 31, 2016), <https://perma.cc/45J8-W9RE>; see H. Claire Brown, *Attack of the Superweeds*, N.Y. TIMES (Aug. 18, 2021), <https://perma.cc/W3Q2-PRY3>.

³⁷⁶ *NFFC*, 960 F.3d at 1142.

³⁷⁷ *Id.*

evidence showed that farmers felt *compelled* by the increased planting of dicamba-resistant crops and the accompanying and increasing off-field drift damage to change from conventional soybeans to dicamba-resistant soybeans as a defensive measure, known as “defensive adoption.”³⁷⁸ Seed company executives wrote to EPA in 2017 and 2018, warning them about this anticompetitive economic cost.³⁷⁹ Professors and weed scientists from North Dakota, Tennessee, and Arkansas told EPA similarly.³⁸⁰ Dr. Baldwin told EPA:

Dicamba has a chemistry problem that likely cannot be fixed, or at least no evidence has been provided that it can be successfully applied . . . renewing the cotton and soybean registrations will leave the industry no choice but to plant 100% of the soybean acreage [with] this technology.³⁸¹

Accordingly, the Court held that the over-the-top registrations “create[] a substantial [] risk that DT soybeans, and possibly DT cotton, will achieve a monopoly or near-monopoly.”³⁸² This “anti-competitive effect of the registrations would impose a clear economic cost,” but EPA failed to even identify it, let alone take it into account.³⁸³

Third and finally, the Court held that “EPA also entirely failed to acknowledge [the] social cost that [farming communities] had already been experienc[ing] and was likely to increase.”³⁸⁴ FIFRA expressly required EPA to take into account not just economic and environmental costs, but also “social” costs,³⁸⁵ and there was “extensive evidence” that the “dicamba herbicides ha[d] torn apart the social fabric of many farming communities.”³⁸⁶ Letters to EPA from stakeholders told them of the high, unprecedented cost, “pitting neighbor against neighbor . . . [f]armers threatening other farmers.”³⁸⁷ Responses to an Illinois survey included: “[i]n 43 years of business I have never seen a more divisive product among neighbors both farm and non-farm.”³⁸⁸ An Arkansas farmer was shot and

³⁷⁸ *Id.*; see also *FAQs About Monsanto’s Dicamba-Resistant Crops and Xtendimax*, CENTER FOR FOOD SAFETY (Feb. 12, 2018), <https://perma.cc/27XU-AMPU>.

³⁷⁹ See *NFFC*, 960 F.3d at 1142 (“Even more alarming is the number of my customers who have told me they will plant all Xtend varieties, instead of my [conventional] seed, as a defensive measure against damage from [drift].” “[O]ver and over again from our farmer customers” we are hearing “I guess I will have to plant dicamba resistant soybeans next year to avoid the off target injury. I cannot afford to keep getting my soybeans damaged from dicamba.”).

³⁸⁰ *Id.* at 1138–39.

³⁸¹ *Id.* at 1143.

³⁸² *Id.*

³⁸³ *Id.*

³⁸⁴ *Id.*

³⁸⁵ 7 U.S.C. § 136(bb) (2018).

³⁸⁶ *NFFC*, 960 F.3d at 1143.

³⁸⁷ *Id.*

³⁸⁸ *Id.* (“This technology cannot continue as is if we ever wish to raise a susceptible crop or maintain healthy relationships with our residential and environmental neighbors.”).

killed in an argument over dicamba drift damage. Not just farmers but homeowners and gardeners suffered damage as well: severe damage to trees, ornamental plants, shrubs, and vegetables.³⁸⁹ Accordingly, the Court held that the “severe strain on social relations in farming communities” where the dicamba products were being sprayed was a “clear social cost” and that EPA had failed to identify or account for it.³⁹⁰

v. Summary of Holdings and Remedy

For all these reasons and considering the record as a whole, the Court then concluded that substantial evidence did not support the new use registration decision.³⁹¹ While EPA had found two benefits from the uses, it had “failed to perform a proper analysis of the risks and resulting costs of those uses.”³⁹²

First, EPA “substantially understated the costs it acknowledged.”³⁹³ These included the total acreage planted with dicamba-resistant soybeans and the resulting use of dicamba.³⁹⁴ EPA relied on a Monsanto prediction when the record evidence before EPA showed the actual acreage “was much higher” and the combined “soybean and cotton acreage was higher still.”³⁹⁵ “Further, the EPA recognized that there had been an enormous increase in dicamba [drift] complaints in 2017 and 2018, but it purported [not to know] whether those complaints under-reported or over-reported the amount of dicamba damage.”³⁹⁶ “In fact, record evidence show[ed] the complaints substantially under-reported the actual amount of damage.”³⁹⁷ Finally, the Court held that EPA “substantially understated the amount of dicamba damage,” characterizing it as only “potential” or “alleged” and “claiming there was insufficient data from which to estimate the amount of damage.”³⁹⁸ The record evidence, however, showed that dicamba drift damage from the 2017 and 2018 over-the-top new use registrations had caused “*enormous and unprecedented* damage.”³⁹⁹

Second, EPA entirely failed to acknowledge and consider other costs.⁴⁰⁰ EPA entirely failed to account for “the substantial degree of non-compliance” with the label mitigation, given the impossibility of following it in real-world farming conditions and what that would mean for

³⁸⁹ *Id.* (“These are 100-year old oaks . . . We’re senior citizens and we don’t have the time left in our lives to plant new trees and watch them get even halfway to maturity.”).

³⁹⁰ *Id.*

³⁹¹ *Id.* at 1144; *see also id.* at 1124.

³⁹² *Id.* at 1144.

³⁹³ *Id.*

³⁹⁴ *Id.* at 1136–37.

³⁹⁵ *Id.*

³⁹⁶ *Id.*

³⁹⁷ *Id.*

³⁹⁸ *Id.*

³⁹⁹ *Id.* (emphasis added).

⁴⁰⁰ *Id.*

increased drift damage.⁴⁰¹ That is, “EPA based its registration decision on the premise that the label’s mitigation” would be followed and thus “limit off-field” drift, when the evidence was that label instructions were “difficult if not impossible to follow.”⁴⁰² Further, EPA “failed to recognize” and consider the economic costs of drift damage, coercing farmers to defensively adopt dicamba-resistant crops, and the anti-competitive, monopolistic results on the soybean and cotton industries.⁴⁰³ Finally, EPA failed to recognize and consider “the enormous social cost to farming communities” of the new use registrations, where the products “had turned farmer against farmer, and neighbor against neighbor.”⁴⁰⁴

Finally, turning to remedy and applying the Ninth Circuit’s criteria for vacatur, the Court vacated the registrations.⁴⁰⁵ EPA and Monsanto had argued for leaving the registrations in effect, which the Court rejected.⁴⁰⁶ “EPA made multiple errors,” and its “fundamental flaws” were “substantial.”⁴⁰⁷ The Court found it “exceedingly ‘unlikely’” that EPA could (lawfully) issue the same registration again for the new uses.⁴⁰⁸ The Court carefully weighed the practical effects of the decision on farmers’ current use and any difficulty finding alternative pesticide options, noting that it was “aware of the adverse impact on growers who had already purchased” the products and that “[t]hey had been placed in th[e] situation through no fault of their own,” but concluded that the absence of substantial evidence to support the registrations compelled vacatur.⁴⁰⁹ To ensure its decision became effective immediately, the Court took the rare step of issuing the mandate concurrent with the decision.⁴¹⁰

vi. Postscript

Several fairly extraordinary things happened next over the course of just a few weeks after the Court handed down its ruling. First, EPA issued an administrative order prohibiting any further sale but

⁴⁰¹ *Id.*

⁴⁰² *Id.* at 1124.

⁴⁰³ *Id.* at 1144.

⁴⁰⁴ *Id.* (emphasis added).

⁴⁰⁵ *Id.* at 1144–45.

⁴⁰⁶ *Id.* at 1144.

⁴⁰⁷ *Id.* at 1145.

⁴⁰⁸ *Id.*

⁴⁰⁹ *Id.* The petitioners had also raised a half dozen arguments as to how and why the registration violated the Endangered Species Act (ESA), creating risks to hundreds of species within the footprint of the registration approval. However, because the Court already completely vacated the registrations based on the FIFRA violations, it found it unnecessary to reach petitioners’ ESA arguments. *Id.* at 1125. For a brief discussion of EPA’s duties under the ESA when it registers pesticides, see discussion *infra* Part V.D.i.

⁴¹⁰ See *NFFC*, 960 F.3d at 1145 (“The mandate shall issue forthwith.”). Normally the mandate does not issue for several weeks in order to give parties a chance to seek rehearing. See generally FED. R. APP. P. 41 (providing the rules for mandate, specifically contents, issuance and effective date, and stays); 9TH CIR. R. 41-2.

nonetheless allowing the continuing use of existing, already purchased stocks of the products for another two months.⁴¹¹ Given the expedited context and ongoing summer spraying, the petitioners then filed an emergency motion for the Court to enforce its vacatur, which the respondents (EPA, Monsanto, BASF, and DuPont) opposed.⁴¹²

Further, in its June 3 decision, the Court had agreed with petitioners that the scope of the case encompassed all three dicamba products covered by the registration decision, not just Monsanto's product, and vacated all three.⁴¹³ Monsanto had previously been the only intervenor; BASF and DuPont now moved to intervene,⁴¹⁴ and BASF filed its own emergency motion, to recall and stay the court's issuance of the mandate.⁴¹⁵ After the Court granted the very belated motions to intervene but denied both emergency motions,⁴¹⁶ each of the Intervenor's filed

⁴¹¹ U.S. ENV'T PROT. AGENCY, *Final Cancellation Order for Three Dicamba Products* (June 8, 2020), <https://perma.cc/44KP-WS6M>.

⁴¹² Petitioners' Emergency Motion to Enforce this Court's Vacatur and to Hold EPA in Contempt, Nat'l Fam. Farm Coal. v. Env't Prot. Agency, No. 19-70115 (9th Cir. June 11, 2020), ECF No. 127-1; EPA's Response to Petitioners' Emergency Motion to Enforce this Court's Vacatur and to Hold EPA in Contempt, Nat'l Fam. Farm Coal., No. 19-70115 (9th Cir. June 16, 2020), ECF No. 144; BASF Corp.'s Opposition to Petitioners' Emergency Motion to Enforce Vacatur and Cross-Motion to Recall and Stay Mandate, Nat'l Fam. Farm Coal., No. 19-70115 (9th Cir. June 16, 2020), ECF No. 145; Intervenor-Respondent Monsanto Co.'s Opposition to Petitioners' Emergency Motion to Enforce this Court's Vacatur and to Hold EPA in Contempt, Nat'l Fam. Farm Coal., No. 19-70115 (9th Cir. June 16, 2020), ECF No. 146.

⁴¹³ *NFFC*, 960 F.3d at 1120, 1131–32, 1145.

⁴¹⁴ E.I. du Pont de Nemours & Co.'s Emergency Motion to Intervene Under Federal Rule of Appellate Procedure 15(d) & Circuit Rule 27-3, *NFFC*, No. 19-70115 (9th Cir. June 12, 2020), ECF No. 129-1; BASF Corp.'s Emergency Motion to Intervene under Federal Rule of Appellate Procedure 15(d) & Ninth Circuit Rule 27-3, *NFFC*, No. 19-70115 (9th Cir. June 12, 2020), ECF No. 130-1. The American Farm Bureau, Croplife, and several crop associations also filed late amicus briefs during this window. Brief of Amici Curiae American Farm Bureau Federation et al. in Support of the Petitions for Rehearing En Banc, *NFFC*, No. 19-70115 (9th Cir. July 30, 2020), ECF No. 176-2; Brief of Amicus Curiae Croplife America in Support of Intervenor-Respondents' Petitions for Rehearing En Banc, *NFFC*, No. 19-70115 (9th Cir. July 30, 2020), ECF No. 175-2.

⁴¹⁵ See BASF Corp.'s Opposition to Petitioners' Emergency Motion to Enforce Vacatur and Cross-Motion to Recall and Stay Mandate, *supra* note 412 (stating BASF's contention that the mandate should be recalled).

⁴¹⁶ Order, *NFFC*, No. 19-70115 (9th Cir. June 12, 2020) (order granting emergency motion to intervene); Order, *NFFC*, No. 19-70115, (9th Cir. June 19, 2020) (order denying motion to enforce vacatur and hold respondent in contempt); Order, *NFFC*, No. 19-70115 (9th Cir. June 25, 2020) (order denying cross motion to recall and stay mandate).

separate petitions for rehearing *en banc*,⁴¹⁷ all of which were subsequently denied.⁴¹⁸

Finally, after the case was final and the next round of litigation was already well underway,⁴¹⁹ in May 2021, EPA's Inspector General (IG) released a detailed report finding that its 2018 decision to extend dicamba registrations did not follow certain required operating procedures, such as conducting internal peer reviews of scientific documents, and that senior-level staff intentionally excluded the conclusions of staff scientists.⁴²⁰ This report followed and expanded upon the agency's March 2021 memo on its scientific integrity policy, which re-committed EPA to scientific integrity and gave several examples in the recent past where the agency now acknowledged politics had overruled science. One of those examples was the 2018 dicamba approval.⁴²¹ However even though the 2020 dicamba decision was made barely 5 months after the Court's vacatur, by the same prior EPA administration that made the 2018 decision, in a transparently political manner in time and manner,⁴²² neither the scientific integrity memo nor the IG report similarly criticized it.

vii. *Dicamba 3*

While that round is now complete, the dicamba litigation is far from over. On July 2, 2020, less than one month after the Ninth Circuit held the prior registrations of these products unlawful for multiple violations of FIFRA and vacated them, Bayer and BASF submitted registration applications for the same products (XtendiMax and Engenia) for use on cotton and soybeans.⁴²³ EPA responded by assigning fifty staff members to work on the 2020 Registration Actions in a rush to issue them before Election Day.⁴²⁴ On October 27, 2020, just six days before the presidential

⁴¹⁷ Petition for Rehearing En Banc, *NFFC*, No. 19-70115 (9th Cir. July 20, 2020), ECF No. 170; E.I. du Pont de Nemours & Co.'s Petition for Rehearing En Banc, *NFFC*, No. 19-70115 (9th Cir. July 20, 2020), ECF No. 172; Intervenor-Respondent Monsanto Co.'s Petition for Rehearing En Banc, *NFFC*, No. 19-70115 (9th Cir. July 20, 2020), ECF No. 173-1. These were followed by more amicus briefs by the same parties. Brief of *Amicus Curiae* Croplife America in Support of Intervenor-Respondents' Petitions for Rehearing *En Banc*, *supra* note 414; Brief of *Amici Curiae* American Farm Bureau Federation et al. in Support of the Petitions for Rehearing En Banc, *supra* note 414.

⁴¹⁸ Order, *NFFC*, No. 19-70115, 2020 U.S. App. LEXIS 26061, at *1-2 (9th Cir. Aug. 17, 2020) (order denying petition for rehearing en banc); Order, *NFFC*, No. 19-70115 (9th Cir. Aug. 17, 2020) (issuing formal mandate of the Court).

⁴¹⁹ See discussion *infra* Part IV.B.6.c.vii.

⁴²⁰ U.S. ENV'T PROT. AGENCY, *EPA Deviated from Typical Procedures in Its 2018 Dicamba Pesticide Registration Decision* (May 24, 2021), <https://perma.cc/7LYQ-UCX8>.

⁴²¹ U.S. ENV'T PROT. AGENCY, *Message from the Administrator*, <https://perma.cc/T29N-AQBC> (last visited Aug. 9, 2021).

⁴²² See discussion *infra* Part IV.B.6.c.vii.

⁴²³ Complaint for Declaratory and Equitable Relief at 58, *Ctr. for Biological Diversity v. U.S. Env't Prot. Agency*, No. 4:20-cv-00555-DCB (D. Ariz. Dec. 23, 2020), ECF No. 1.

⁴²⁴ *Id.*

election and without providing an opportunity for public notice and comment, EPA again registered the same products that had been vacated fewer than five months prior.⁴²⁵ EPA made the announcement not in Washington, D.C. but during an event on a farm in Georgia, to a crowd including the American Farm Bureau Federation president Zippy Duvall, the National Cotton Council of America Chairman Kent Fountain, two Georgia congressmen, and the Georgia Commissioner of Agriculture.⁴²⁶ While the prior approvals had been limited to two-year registrations and conditional, this time, despite everything that had occurred to this point, EPA *unconditionally* registered the products and issued the registrations for the next *five* years.⁴²⁷

Just as the prior 2016 and 2018 decisions allowed, the 2020 decision allows for use of these dicamba products in 34 states, totaling over 100 million acres of U.S. farmland.⁴²⁸ EPA mainly based the new decision on past studies, previously available to EPA for its prior 2016 and 2018 registration decisions, while relying “on only a handful of further assessments of the risks to human health and the environment put together in fewer than four months following Bayer and BASF’s applications on July 2.”⁴²⁹ Although EPA claimed in the decision to have addressed and complied with the Court’s opinion, in reality, a great many of the deficiencies identified by the Court remain unaddressed.⁴³⁰

In December 2020, the same four nonprofits challenged this registration, litigation which is ongoing.⁴³¹

⁴²⁵ *Id.* at 58–59; see EPA MEMO, *supra* note 122, at 3 (discussing how EPA decided to register the same products despite the Ninth Circuit decision).

⁴²⁶ Complaint for Declaratory and Equitable Relief, *supra* note 423, at 59; *Administrator Wheeler Meets with Agricultural Stakeholders in Florida, Georgia*, U.S. ENV’T PROTECTION AGENCY (Oct. 27, 2020), <https://perma.cc/6RYR-DJJN>.

⁴²⁷ Complaint for Declaratory and Equitable Relief, *supra* note 423, at 59.

⁴²⁸ *Id.*

⁴²⁹ *Id.*

⁴³⁰ *Id.* at 60.

⁴³¹ The Arizona district court plaintiffs are the same as the prior petitioners: Center for Biological Diversity, National Family Farm Coalition, Center for Food Safety, and Pesticide Action Network North America. Complaint for Declaratory and Equitable Relief, *supra* note 423. However, despite EPA’s decision being another “new use” registration for the products, unlike in 2016, EPA did *not* hold public notice and comment on its 2020 decision. See EPA MEMO, *supra* note 122, at 7 (stating how the new use 2016 registration went through public comment). FIFRA divides judicial review between appellate courts for those decisions following a “hearing,” which courts have interpreted to include notice and comment rulemaking, *United Farm Workers of America v. Env’t Prot. Agency*, 592 F.3d 1080, 1082–83 (9th Cir. 2010), and those not following a hearing, which go to district court. See 7 U.S.C. § 136n (2018) (discussing when district court review is appropriate in the context of administrative procedure). Due to this lack of clarity caused by EPA, the nonprofits filed in both district court and the Ninth Circuit directly. *Petition for Review, Nat’l Fam. Farm Coal. v. Env’t Prot. Agency*, No. 20-73750 (9th Cir. Dec. 21, 2020), ECF No. 1–6.

V. PULLING BACK AND GOING FORWARD

Critics have long derided EPA's implementation of its FIFRA authority to oversee pesticides as weak and inadequate, resulting in significant adverse impacts to farmers, public health, and the environment.⁴³² While a legislative overhaul is needed and fully warranted,⁴³³ the recent dicamba decision, coupled with some other recent important pesticide litigation, reveal that EPA's oversight failings may well be more political than statutory or regulatory in nature.⁴³⁴ As such, these new precedents and ongoing litigation may help force long-needed agency improvements in environmental protection, breathing some new and direly needed life back into FIFRA oversight.

A. *The Dicamba Decision: Lessons Learned*

The dicamba decision—holding unlawful and vacating the dominant pesticide being sprayed over two major commodity crops across millions of acres—reverberated across the country in national news.⁴³⁵ The impact of the case could also be measured in Monsanto/Bayer's allegations of catastrophic economic losses to U.S. agriculture from the pesticides' absence or lost sales,⁴³⁶ or the nearly immediate reaction of the Trump administration in trying to undermine the Court's decision predicated on hyperbolic claims of threats to “the global food supply,”⁴³⁷ or in the intensive weeks of further emergency litigation briefing immediately

⁴³² See, e.g., discussion *supra* Part III.C.

⁴³³ See Protect America's Children from Toxic Pesticides Act, S. 4406, 116th Cong. § 2 (2020) (stating Congress' findings about deficiencies in use and registration of pesticides in the U.S.); Johnathan Hettinger, *New Pesticide Regulations Would Fix 'Broken and Outdated' System at the EPA, Sponsors Say*, MIDWEST CTR. FOR INVESTIGATIVE REPORTING (Aug. 26, 2020), <https://perma.cc/E7AF-3KFL> (explaining how pesticide regulations would fix a broken and outdated system).

⁴³⁴ See, e.g., *NFFC*, 960 F.3d 1120, 1136–38 (9th Cir. 2020) (finding that EPA understated the risks and refused to acknowledge significant damage caused by dicamba herbicides).

⁴³⁵ Joel Rosenblatt, *Bayer Faces More Weedkiller Woes as U.S. Court Bans Dicamba*, BLOOMBERG (June 3, 2020), <https://perma.cc/5U2V-3DY6>; Jesse Newman, *Court Overturns EPA Approval of Bayer's Dicamba Spray*, WALL ST. J. (June 4, 2020), <https://perma.cc/2AA5-9VT5>; Associated Press, *Federal Court Rejects EPA Approval of Widely Used Herbicide*, US NEWS (June 4, 2020), <https://perma.cc/VV3T-Y5VN>; Bob Egelko, *Federal Court in SF Tells EPA to Revoke Approval of Widely Used Herbicide*, S.F. CHRON. (June 3, 2020), <https://perma.cc/D6DY-5R2R>; Carey Gilliam, *Court Overturns EPA Approval of Popular Herbicide Made by Monsanto*, GUARDIAN (June 4, 2020), <https://perma.cc/8Y6M-JGDA>; Mikkel Pates, *Appeals Court Outlaws Use of Dicamba*, AGWEEK (June 4, 2020), <https://perma.cc/JBA2-43HD>.

⁴³⁶ Brief for Intervenor-Respondent Monsanto Co. Redacted at 67, *NFFC*, 960 F.3d 1120 (9th Cir. 2020) (No. 19-70115), 2019 WL 5858350, at *58 (“[C]rop losses [c]ould be catastrophic.”); Brief of *Amicus Curiae* Croplife America in Support of Respondent United States Environmental Protection Agency's Response to Petitioners' Emergency Motion at 12–13, *NFFC*, 960 F.3d 1120 (9th Cir. 2020) (No. 19–70115), ECF No. 147-2 (“This uncertainty would wreak havoc on the agricultural market.”).

⁴³⁷ *EPA Offers Clarity to Farmers in Light of Recent Court Vacatur of Dicamba Registrations*, U.S. ENV'T PROTECTION AGENCY (June 8, 2020), <https://perma.cc/85DL-TSXB>.

following the decision's issuance.⁴³⁸ But it can also be measured in precedential terms, where it seeded important new ground in its holdings. Faculty at UC Berkeley and UCLA law schools deemed the decision one of "The Ninth Circuit's 10 Most Important Environmental Decisions of 2020."⁴³⁹

First, FIFRA's statutory rubric speaks in terms of benefits and costs, the risks, or the adverse impacts of the decision.⁴⁴⁰ Yet, very few if any cases have previously fleshed out exactly what types of "costs" EPA must consider, analyze, and balance against a pesticide's alleged benefits. Pesticide drift has an economic as well as environmental component; EPA must grapple with both in future registration decisions. This includes a duty not just to consider but to quantify such damages when it had record evidence permitting such calculation.⁴⁴¹ Another "clear economic cost" that EPA must take into account when it considers approving future registrations is the creation of anti-competitive monopolies in seed and pesticide markets, and the loss of choice for farmers in what they want to grow and how they want to farm.⁴⁴² Furthermore, in addition to economic and environmental costs, despite the statute's express language mandating that "social" costs also be weighed,⁴⁴³ never before had EPA been called to task for its failure to consider such costs in a registration; the agency must consider and weigh the broader potential adverse impacts on rural communities from its pesticide decisions.⁴⁴⁴ Finally, for all aspects of its decision, EPA cannot ignore record evidence contrary to its conclusions.⁴⁴⁵

Second, the heart of FIFRA's registration scheme is the pesticide label.⁴⁴⁶ Unlike other statutes like the Clean Water Act or Clean Air Act, oversight is not by permit or restrictions on actual use, but by label statements.⁴⁴⁷ The label is the law, and following it is the sole obligation FIFRA places on pesticide users.⁴⁴⁸ Particularly in these circumstances, the efficacy of regulation depends entirely on the label restrictions being meaningful; otherwise, oversight is simply a paper exercise, not real. For example, EPA could determine it found "no unreasonable adverse effects

⁴³⁸ See generally *NFFC*, 960 F.3d 1120 (9th Cir. 2020) (No. 19–70115), ECF Nos. 127–169 (briefing between June 3 and June 25).

⁴³⁹ Richard Frank, *The Ninth Circuit's 10 Most Important Environmental Law Decisions of 2020*, LEGAL PLANET (Dec. 31, 2020), <https://perma.cc/V3FE-R9Y4>.

⁴⁴⁰ *NFFC*, 960 F.3d 1120, 1136 (9th Cir. 2020).

⁴⁴¹ *Id.* at 1138.

⁴⁴² *Id.* at 1142–43.

⁴⁴³ 7 U.S.C. § 136(bb) (2018).

⁴⁴⁴ *NFFC*, 960 F.3d at 1143–44.

⁴⁴⁵ Administrative Procedure Act, 5 U.S.C. §§ 551–559, 701–706, 1305, 3105, 3344, 4301, 5335, 5372, 7521 (2018) ("The reviewing court shall hold unlawful agency action, findings, and conclusions found to be—(A) arbitrary, capricious an abuse of discretion, or otherwise not in accordance with the law; . . . (E) unsupported by substantial evidence . . . ; or (F) unwarranted by the facts . . .").

⁴⁴⁶ See *supra* note 65 and accompanying text.

⁴⁴⁷ See *supra* note 65 and accompanying text.

⁴⁴⁸ See *supra* note 65 and accompanying text.

on the environment” if farmers sprayed a pesticide so long as “unicorns are present in the field,” knowing full well that unicorns are imaginary but still meet its statutory obligations.⁴⁴⁹ Yet in approving “over-the-top” uses on pesticides, EPA has basically done the equivalent.⁴⁵⁰ EPA relied on a forty-page long byzantine “label” without ever actually analyzing if farmers could actually follow those labels in real-world farming conditions.⁴⁵¹ Even though farmers—from windy west Texas, to the heat and humidity (and frequent temperature inversions) of Missouri, to the flat lands and high temperatures of the delta regions of Arkansas and Tennessee—repeatedly told them the contrary.⁴⁵² These use limitations are mitigation, without which unreasonable adverse effects on the environment may occur, based on EPA’s own conclusions.⁴⁵³ Thus, the agency must support them with substantial evidence if it is to register pesticides based on them, and that includes analyzing whether it is feasible to follow them in the weather and geography in which it is approving pesticide uses.

These precedential impacts of the decision are also illustrated by litigation positions pursued by EPA in subsequent cases. In other words, *NFFC* confirmed responsibilities the agency has made a habit of ignoring, and now must confront in other contexts. For example, at the time this Article is being written, EPA is seeking partial voluntary remand from the Ninth Circuit in a challenge to its glyphosate interim registration decision, requesting more time to “reconsider” whether *NFFC* affects its analysis regarding ecological costs.⁴⁵⁴ And EPA previously (unsuccessfully) sought a similar course of action in a petition for review of another pesticide, sulfoxaflor, in part based on its admission that it was not in compliance with the *NFFC* decision.⁴⁵⁵ Finally, in an action seeking judicial review of another trio of pesticide interim decisions,⁴⁵⁶ the parties agreed to seek a stay, again in part because of EPA’s need to rethink its position in light of the *NFFC* decision.⁴⁵⁷ In short, the agency now recognizes those decisions suffer from the same or similar flaws and are indefensible; however in each case rather than admitting legal error and vacating the registration, EPA is asking for a mulligan, to “reconsider” the issues. But the motions reveal the truth, regardless of how EPA

⁴⁴⁹ See 7 U.S.C. § 136a(c)(5) (2018) (stating the rules around approval of registration).

⁴⁵⁰ See *NFFC*, 960 F.3d 1120, 1140–41 (9th Cir. 2020) (explaining the difficulty in meeting all the conditions required on the label which, under FIFRA, must be met for there to be no unreasonable adverse effects on the environment).

⁴⁵¹ *Id.* at 1140–42.

⁴⁵² *Id.*

⁴⁵³ *Id.* at 1142.

⁴⁵⁴ Motion for Partial Remand Without Vacatur at 15, *Nat. Res. Def. Council v. U.S. Env’t Prot. Agency*, Nos. 20-70787, 20-70801 (9th Cir. May 18, 2021).

⁴⁵⁵ Motion for Voluntary Remand Without Vacatur at 6, *Ctr. For Food Safety*, No. 19-72109 (9th Cir. Oct. 26, 2020), No. 51-1; Order re Mot. Remand Denied, *Ctr. For Food Safety*, No. 19-72109 (9th Cir. Jan. 12, 2021), No. 67; see *infra* note 525 and accompanying text.

⁴⁵⁶ Atrazine, propazine, and simazine.

⁴⁵⁷ Joint Motion to Hold Case in Abeyance for Additional 30 days, *Rural Coalition v. U.S. Env’t Prot. Agency*, No. 20-73220 (9th Cir. June 15, 2021), No. 22.

couches it: What had passed muster before no longer will, and they know it.

B. Putting NFFC in Context

The *NFFC* decision is part of a body of recent decisions sowing new seeds in FIFRA's substantial evidence standard of review and the requirement that EPA find no unreasonable adverse effect on the environment prior to registering a pesticide. These other cases, summarized below, have strengthened what EPA is required to show in support of its decision to register a pesticide use under FIFRA's various registration standards, but have also left open new questions that await adjudication in other ongoing or future cases.

1. Pollinator Stewardship Council v. EPA (Pollinator I)

While the Court in *NFFC* only addressed the sufficiency of the data before EPA in issuing the dicamba conditional registration in dicta, in *Pollinator Stewardship Council v. U.S. Environmental Protection Agency (Pollinator I)*,⁴⁵⁸ the Ninth Circuit examined EPA's duties to abide by the agency's existing data requirements for unconditional registrations.⁴⁵⁹ In that case, beekeepers had challenged EPA's decision to unconditionally register a new insecticide, sulfoxaflor, even though the screening-level studies EPA had received from the pesticide registrant Dow (now Corteva) showed that the insecticide was "highly toxic to bees,"⁴⁶⁰ and even though the additional, higher-tiered data Dow submitted had so many flaws that EPA found Dow's results inconclusive as to sulfoxaflor's harms to bees.⁴⁶¹

The Court struck down the registration as unlawful.⁴⁶² In so holding, the Court explained that, under EPA's own framework for assessing pesticide risks to bees and other pollinators, the pesticide registrant must first submit screening-level studies, referred to as Tier 1 studies, to identify whether potential risks to bees exist.⁴⁶³ If the screening-level data found potential risks exist, the framework then requires further field studies, referred to as Tiers 2–3 studies, to better assess the pesticide's risks to bee colonies in the real world.⁴⁶⁴ The court found that EPA admitted that the screening-level Tier 1 sulfoxaflor data triggered the need for further studies, and Dow thus submitted three additional Tier 2

⁴⁵⁸ 806 F.3d 520 (9th Cir. 2015).

⁴⁵⁹ *Id.* at 528, 530.

⁴⁶⁰ *Id.* at 522.

⁴⁶¹ *Id.* at 526–28.

⁴⁶² *Id.* at 522.

⁴⁶³ *Id.* at 524.

⁴⁶⁴ *Id.* at 525 (“[W]hereas the Tier 1 analysis focuses on the effects of the insecticides on individual bees, Tier 2 and Tier 3 analyses attempt to measure the effect on the colony as a whole.”).

studies.⁴⁶⁵ Yet, EPA itself admitted that the additional Tier 2 studies, which suffered from various flaws and limitations, were “inconclusive” as to the effect of sulfoxaflor on colony health.⁴⁶⁶ Instead of requiring additional Tier 2 studies to evaluate sulfoxaflor’s risks to bees, EPA instead unconditionally registered sulfoxaflor use at a lower application rate than the registrant had sought, and with various proposed limitations.⁴⁶⁷

The Court rejected EPA’s attempt to unconditionally register sulfoxaflor on those terms, finding that “[t]he record does not indicate the EPA had ever received any additional data on the effect of such measures.”⁴⁶⁸ The Court explained that once the requirements for additional data set by EPA were triggered, EPA lacked the discretion to proceed with registration without such additional data to support the registration decision.⁴⁶⁹ Instead, “EPA’s basis for unconditionally registering sulfoxaflor in the absence of sufficient data documenting the risk to bees does not hold up under its own rationale,” and thus, the Court vacated the pesticide registration,⁴⁷⁰ holding that EPA’s decision to move forward with unconditionally registering the insecticide without the data called for by EPA’s own testing framework violated FIFRA.⁴⁷¹

2. Natural Resources Defense Council/Center for Food Safety v. EPA (Nanosilver)

The Ninth Circuit’s decision in *Natural Resources Defense Council v. U.S. Environmental Protection Agency (Nanosilver)*,⁴⁷² marked the first instance in which courts have examined and reigned in EPA’s abuse of its conditional registration authority.⁴⁷³ In that case, environmental and consumer protection groups challenged EPA’s conditional registration of an antimicrobial pesticide (NSPW), containing the new active ingredient nanosilver.⁴⁷⁴ EPA approved “NSPW [a]s a materials preservative [to be] incorporated into plastic and textile products” to suppress the growth of harmful organisms such as bacteria and mold.⁴⁷⁵ While EPA had long registered silver as an antimicrobial pesticide, the new active ingredient nanosilver had a much smaller particle size, and as the Ninth Circuit

⁴⁶⁵ *Id.* at 525–27.

⁴⁶⁶ *Id.* at 526.

⁴⁶⁷ *Id.* at 526–27.

⁴⁶⁸ *Id.* at 527–28; *see id.* at 529 (noting that the data submitted by the registrant “did not support approval of sulfoxaflor at either the proposed maximum rate . . . or the reduced maximum rate”).

⁴⁶⁹ *Id.* at 531–32; *id.* at 531 (“We have previously held that we cannot allow the EPA to avoid its own regulations when actual measurements trigger risk concerns.”) (citing *Natural Res. Def. Council v. EPA*, 735 F.3d 873, 883–84 (9th Cir. 2013)).

⁴⁷⁰ *Id.* at 532–33.

⁴⁷¹ *Id.* at 532.

⁴⁷² 857 F.3d 1030 (9th Cir. 2017).

⁴⁷³ *See* discussion *infra* Part III.C.

⁴⁷⁴ *Nanosilver*, 857 F.3d at 1034.

⁴⁷⁵ *Id.*

observed, this resulted in the new chemical “hav[ing] significantly different properties than conventional silver.”⁴⁷⁶

Because of these different properties and the lack of nano-specific data, EPA conditionally registered NSPW under 7 U.S.C. § 136a(c)(7)(C), the conditional registration provision for new active ingredients.⁴⁷⁷ To conditionally register the new active ingredient, EPA must conclude, among other things that—despite lacking sufficient data for EPA to make the no “unreasonable adverse effect” finding necessary for unconditional registration⁴⁷⁸—the registration of the new antimicrobial active ingredient would nonetheless be “in the public interest.”⁴⁷⁹ In its registration decision, EPA stated that conditionally registering nanosilver would be “in the public interest” because NSPW, which had a lower application rate and was less mobile than conventional-silver pesticides, “ha[d] the ‘potential’ to reduce the amount of silver released into the environment.”⁴⁸⁰

On review, the Ninth Circuit found that EPA failed to substantiate its public interest finding that NSPW had the “potential” to reduce the amount of silver that is released in the environment.⁴⁸¹ The court found that EPA’s public interest finding rested on two assumptions: 1) “that current users of conventional-silver pesticides will replace those pesticides with NSPW,” and 2) “that NSPW will not be incorporated into new products to the extent that such incorporation would actually *increase* the amount of silver released into the environment,” neither of which was supported by *any* evidence in the record.⁴⁸² The court also found that if either assumptions turns out to be incorrect, rather than serving any public interest, “NSPW may *increase* the amount of silver released into the environment and *contravene the identified public interest*.”⁴⁸³

In holding that EPA’s public interest finding lacked substantial evidence, the Court held, after discussing the legislative history of FIFRA’s conditional registration provisions, that the public-interest finding prerequisite for conditional registrations of new pesticide active ingredients “is an additional, ‘more stringent test’ that distinguishes conditional registration [of new active ingredients] from unconditional registration.”⁴⁸⁴ While acknowledging that under FIFRA’s substantial evidence standard, EPA need not “support a public-interest finding with ‘scientific certainty,’” the Court held that EPA was required to *at least* support the finding “with ‘substantial evidence when considered on the

⁴⁷⁶ *Id.*

⁴⁷⁷ *Id.* at 1035.

⁴⁷⁸ 7 U.S.C. § 136a(c)(5) (2018).

⁴⁷⁹ *Id.* § 136a(c)(7)(C); *see* discussion *infra* Part III.B.

⁴⁸⁰ *Nanosilver*, 857 F.3d at 1038.

⁴⁸¹ *Id.* at 1040.

⁴⁸² *Id.* at 1039–41.

⁴⁸³ *Id.* at 1040 (second emphasis added).

⁴⁸⁴ *Id.* at 1042 (quoting 123 CONG. REC. 25,706 (1977)).

record as a whole.”⁴⁸⁵ Additionally, the Court rejected EPA’s argument that EPA could collect data to substantiate its public interest finding after granting conditional registration, holding that FIFRA plainly requires EPA to make the public interest finding “before granting conditional registration.”⁴⁸⁶ The Court explained that it was not enough for EPA to simply say that a new “pesticide has the ‘potential’ to be in the public interest—especially where the pesticide also has the ‘potential’ to contravene the public interest.”⁴⁸⁷ Rather, because EPA’s public interest finding of nanosilver was “only supported by bare assumptions,” EPA had failed to support the issuance of the conditional registration under FIFRA.⁴⁸⁸

The *Nanosilver* decision is precedential in clarifying that the public interest requirement for conditional registrations of new pesticide active ingredients is an additional, more stringent test that EPA must support with substantial evidence. Crucially, the Court rejected EPA’s “bare assumptions” that nanosilver would bring about a public benefit by replacing older, more toxic pesticide counterparts, a rationale that EPA has often relied on in its registration of newer pesticide active ingredients, without any data or evidence to suggest that pesticide users would actually switch over to the new, often more expensive, patented pesticide formulations.⁴⁸⁹ Post-*Nanosilver*, EPA is required to substantiate that conclusion with substantial evidence in the record.

3. National Family Farm Coalition v. EPA (Enlist Duo)

Pollinator I and *Nanosilver* both emphasize the need for EPA to substantiate its pesticide registration decisions with sufficient evidence before the agency in approving new pesticides, whether conditionally or unconditionally. On the other hand, the Ninth Circuit’s recent decision in *National Family Farm Coalition v. U.S. Environmental Protection Agency (Enlist Duo)*,⁴⁹⁰ examined a different category of pesticide approvals, referred to as “me-too” registrations, which are pesticide uses similar to previously-registered uses of similar or identical pesticides.⁴⁹¹ In *Enlist Duo*, the Ninth Circuit faced a challenge to a me-too product registration sold by the brand name Enlist Duo, which contains 2,4-D and glyphosate, two pesticide ingredients that had both been previously registered.⁴⁹² Like dicamba in *NFFC*, Enlist Duo was specifically designed as a companion to corn, soy, and cotton crops that had been genetically

⁴⁸⁵ *Id.* at 1041 (quoting 7 U.S.C. § 136n(b) (2012)).

⁴⁸⁶ *Id.* at 1041–42.

⁴⁸⁷ *Id.* at 1042.

⁴⁸⁸ *Id.*

⁴⁸⁹ *Id.* at 1038.

⁴⁹⁰ 966 F.3d 893 (9th Cir. 2020).

⁴⁹¹ *Id.* at 913; see *Pesticide Registration Manual: Chapter 2 – Registering a Pesticide Product*, U.S. ENV’T PROTECTION AGENCY, <https://perma.cc/QKN7-YB6E> (defining “identically/substantially similar” pesticide products) (last visited July 31, 2021).

⁴⁹² *Enlist Duo*, 966 F.3d at 904–05, 913.

engineered to withstand its application, allowing 2,4-D to be sprayed later in the season, over the top of the growing crops.⁴⁹³ As noted by the Ninth Circuit, Enlist Duo pesticide thus changed the use pattern of 2,4-D, but not that of glyphosate, which was already approved for later-season spraying on those crops.⁴⁹⁴

Environmental and farmer groups challenged the registration on multiple grounds under FIFRA, as well as the ESA, as discussed in Parts V.C and V.D. On review of the FIFRA claims, the panel largely upheld EPA's conditional registration of the me-too pesticide.⁴⁹⁵ First, the panel held that the conditional registration standard for a me-too pesticide, which requires EPA to find that "the registration would not 'significantly increase the risk of any unreasonable adverse effect on the environment,'"⁴⁹⁶ is a lower standard than the no "unreasonable adverse effect" finding required for unconditional registration because the scope of EPA's review is limited to "only . . . evidence that bears on whether the new or additional use changes EPA's original conclusion that the pesticide or active ingredient will 'not generally cause unreasonable adverse effects.'"⁴⁹⁷ Nonetheless, the Court held that even under that standard, the me-too registration was unlawful because EPA admitted that it failed to assess how the destruction of milkweed in treated fields by Enlist Duo may affect the iconic monarch butterfly, whose population has been threatened by the loss of milkweed habitat in large part due to the prevalence of agricultural pesticide use.⁴⁹⁸

Although EPA argued in litigation that milkweed on crop fields would be destroyed by some other pesticide even without the Enlist Duo pesticide registration, the Court rejected this post-hoc litigation position.⁴⁹⁹ Significantly, the Court went on to explain that, even if EPA

⁴⁹³ *See id.* at 904 (The petitioners in *Enlist Duo* challenged the registration under both FIFRA and the ESA, but this Article focuses on the Court's review of the FIFRA challenges).

⁴⁹⁴ *Id.* at 905.

⁴⁹⁵ *Id.* at 914.

⁴⁹⁶ *Id.* at 913 (quoting 7 U.S.C. § 136a(c)(7)(A) (2018)).

⁴⁹⁷ *Id.* at 916. Moreover, the Court found that EPA actually registered Enlist Duo according to the unconditional registration standard, finding that the pesticide would not result in unreasonable adverse effects on the environment. *See id.* at 914 ("[T]he documents indicate EPA applied the broader 'cause any unreasonable adverse effects' standard for unconditional registrations."). However, this holding also sheds light on the *NFFC* decision for dicamba, since there the Court also addressed the not 'significantly increase the risk of any unreasonable adverse effect on the environment' standard, albeit for conditional new use registrations. *NFFC*, 960 F.3d 1120, 1124 (9th Cir. 2020). In that case the panel held that EPA did not meet even this narrower and slightly easier (according to the *Enlist Duo* panel) registration standard.

⁴⁹⁸ *Enlist Duo*, 966 F.3d at 917; *see Monarch Butterfly*, U.S. FISH & WILDLIFE SERV., <https://perma.cc/M6TR-YBYG> (last visited July 31, 2021) (determining that the monarch butterfly warranted protection under the ESA but declined to take action in light of other higher priorities and finding that "[p]esticide use can destroy the milkweed monarchs need to survive").

⁴⁹⁹ *Enlist Duo*, 966 F.3d at 917 ("Despite the intuitive appeal of EPA's argument, we must reject it. EPA did not assert this rationale as a reason for declining to assess the destruction of milkweed on target fields, so neither can we.").

had offered the justification as part of its registration decision, “it would likely be premised on legal error.”⁵⁰⁰ This is because, according to the panel, that the milkweed would likely be destroyed by other pesticides merely goes to “suggest[] that registering Enlist Duo may not be ‘unreasonable’ under FIFRA,” but “says nothing about whether an effect would be ‘adverse.’”⁵⁰¹ The Court emphasized that “EPA was required, under FIFRA, to determine whether any effect was ‘adverse’ before determining whether any effect on the environment was, on the whole, ‘unreasonable.’”⁵⁰² While the court’s clarification on this last point is dicta, it nonetheless has significant import in the context of judicial review of EPA’s administration of me-too pesticides going forward, since the very nature of me-too registration means that there are always other pre-existing pesticides that would carry the same risks as the proposed me-too pesticide. Under the rationale articulated by the Court in *Enlist Duo*, EPA still needs to examine such risks, and determine whether or not they are adverse, then proceed to evaluate whether the level of risks presented by the me-too registration would be unreasonable to the environment as a whole.

The *Enlist Duo* decision also raises another aspect of EPA’s pesticide registration authority, the registration review process, which is front and center in two ongoing cases before the Ninth Circuit described below.⁵⁰³ As mandated by FIFRA, under registration review, EPA conducts periodic reviews of registered pesticides.⁵⁰⁴ After holding that EPA only needed to examine the increased risk caused the new 2,4-D use pattern, the Court went on to explain that “[t]his does not mean, of course, that new data about glyphosate will go unconsidered.”⁵⁰⁵ Rather, the Court pointed to the registration review process under FIFRA as the appropriate forum for EPA to analyze such risks, explaining that that “process serves as a backstop to ensure that pesticides do not remain registered once new data has shown them to be harmful to humans or the environment.”⁵⁰⁶ Based on the same rationale, the Court also rejected one of petitioners’ arguments that EPA was required to consider the synergistic effects of the future potential of mixing Enlist Duo with glufosinate, another pesticide, in a common agricultural practice where different pesticides are mixed in the field before application, because any such arguments can be presented during the ongoing registration review processes for 2,4-D and glyphosate.⁵⁰⁷

⁵⁰⁰ *Id.*

⁵⁰¹ *Id.* (quoting 7 U.S.C. § 136a(c)(5), (7) (2018)).

⁵⁰² *Id.*

⁵⁰³ See *infra* Part V.C.

⁵⁰⁴ 7 U.S.C. § 136a(g)(1)(A)(i) (2018).

⁵⁰⁵ *Enlist Duo*, 966 F.3d at 918.

⁵⁰⁶ *Id.*

⁵⁰⁷ *Id.* at 921.

C. The Next Chapter: Ongoing FIFRA Battlegrounds

Taken together, *NFFC*, *Nanosilver*, *Pollinator I*, and *Enlist Duo* show that, in spite of the historical deference that courts have afforded agencies on scientific and technical matters such as a pesticide registration,⁵⁰⁸ FIFRA's "substantial evidence" standard is a "searching and careful" standard of judicial review.⁵⁰⁹ These cases teach that FIFRA's registration standard requires that EPA substantiate its assumptions and assessments with substantial record evidence.⁵¹⁰ The rulings in *NFFC* and *Enlist Duo* further add to that, and put the substantial evidence standard of review in the context of FIFRA's "unreasonable adverse effect" substantive requirement.⁵¹¹ They clarify that, at a minimum, EPA must assess all risks—environmental, economic, and social.⁵¹² They also instruct that where EPA entirely fails to consider certain risks or substantially understate known risks, the resulting registration lacks substantial evidence and violates FIFRA.⁵¹³ Similarly, where EPA relies on mitigation like use restrictions, it must grapple with record evidence and support the efficacy and practicability of those measures.⁵¹⁴

That said, these cases do not fully address the level of detail EPA must provide to substantiate its pesticide registration action to quantify risks, or to support its conclusion that the risks are not unreasonable. Nor do the cases address EPA's duties in the registration review context for older pesticides. Instead, these questions may be addressed in the next generation of ongoing cases concerning many of the same pesticides previously reviewed by the courts.

As mentioned previously, the ongoing sequel to the *NFFC* decision will examine whether EPA's latest dicamba registration sufficiently cures the deficiencies in EPA's prior risk assessment, and the court's holding

⁵⁰⁸ See, e.g., *Pollinator I*, 806 F.3d 520, 533 (9th Cir. 2015). (Smith, J., concurring) ("[A] court's deference must be at its highest when examining factual disputes that 'implicate substantial agency expertise.'") (quoting *Marsh v. Or. Nat. Res. Def. Council*, 490 U.S. 360, 376–77 (1988)); see *Lands Council v. McNair*, 537 F.3d 981, 994 (9th Cir. 2008) (en banc) (noting the special court deference "when questions of scientific methodology are involved").

⁵⁰⁹ *Pollinator I*, 806 F.3d at 533.

⁵¹⁰ See, e.g., *id.* (explaining that "FIFRA has its own standard of review" and that pesticide registration must be "supported by substantial evidence when considered on the record as a whole").

⁵¹¹ See *Enlist Duo*, 966 F.3d at 917 (finding that EPA did not violate FIFRA because "there is no such increase in the risk of unreasonable adverse effects because substantial evidence supports EPA's conclusion that neither the initial 2014 registration of *Enlist Duo*—nor the subsequent approvals for new uses—will increase the overall use of glyphosate").

⁵¹² *Id.* at 913.

⁵¹³ See, e.g., *id.* at 917 ("Given the record evidence suggesting monarch butterflies may be adversely affected by 2,4-D on target fields, EPA, was required, under FIFRA, to determine whether any effect was 'adverse' . . . EPA's failure to do so means that its decision was lacking in substantial evidence on this issue.")

⁵¹⁴ *Id.* at 917–18.

therein will be crucial to further define EPA's duties in conducting the risk-benefit assessment under FIFRA.

Sulfoxaflor, the bee-killing insecticide at issue in *Pollinator I*, is also having its second act. In 2019, EPA reapproved many of the sulfoxaflor uses vacated by the *Pollinator I* decision—uses on crops utilized by bees and pollinators therefore have the potential to harm them.⁵¹⁵ The beekeeper petitioners in *Pollinator I* and other environmental organizations petitioned for review, challenging the 2019 sulfoxaflor use approvals under both FIFRA as well as the ESA.⁵¹⁶ Specific to the FIFRA context, the *Pollinator II* case picks up where *Pollinator I* left off, and the petitions for review seek judicial review of the sufficiency of the additional Tier 2 studies that EPA relied upon in issuing the 2019 registration decision.⁵¹⁷ The *Pollinator II* petitioners also rely on the Ninth Circuit's ruling in *NFFC* to argue that EPA underestimated the risks of sulfoxaflor to non-honey bees, as well as the risks sulfoxaflor has on the environment as compared to alternative insecticides.⁵¹⁸

Two other ongoing FIFRA petitions for review bring into question EPA's FIFRA duties in the registration review context. As discussed in Part V.B.iii, the Court in *Enlist Duo* rejected the petitioners' challenge to EPA's determination concerning the glyphosate component of Enlist Duo because, according to the court, any unreasonable adverse effects of glyphosate use would be addressed in EPA's registration review of that pesticide.⁵¹⁹ EPA issued an interim registration review decision—deemed “interim” because a final registration decision is still forthcoming—for glyphosate in January of 2020, after more than a decade of registration review that it started in 2009, and despite admitting that the agency still lacked data necessary to make a final decision.⁵²⁰ Environmental and farmworker groups⁵²¹ petitioned for review to the Ninth Circuit based on

⁵¹⁵ See U.S. ENV'T PROT. AGENCY, DECISION MEMORANDUM SUPPORTING THE REGISTRATION DECISION FOR NEW USES OF THE ACTIVE INGREDIENT SULFOXAFLOR ON ALFALFA, CACAO, CITRUS, CORN, COTTON, CUCURBITS, GRAINS, PINEAPPLE, SORGHUM, SOYBEANS, STRAWBERRIES AND TREE PLANTATIONS AND AMENDMENTS TO THE LABELS 2–3 (July 12, 2019) (discussing EPA granting use of sulfoxaflor and Pollinator Stewardship Council's petition for review of the registration).

⁵¹⁶ Petition for Review at 1–2, *Pollinator Stewardship Council v. U.S. Env't Prot. Agency*, No. 19-72280 (9th Cir. Sept. 6, 2019); *Ctr. for Food Safety v. U.S. Env't Prot. Agency*, No. 19-72109 (9th Cir. Aug. 20, 2019) (collectively, the *Pollinator II* cases) [hereinafter *Petition for Review*]. Significantly, a little over a year after petitioners filed the *Pollinator II* petitions for review, in a motion to the Court, EPA admitted that it had failed to comply with its consultation duties under the ESA prior to approving sulfoxaflor use.

⁵¹⁷ See *Petition for Review*, *supra* note 516, at 1–2, 11–12 (citing the Tier II studies in attachments to assess the risk to honeybees).

⁵¹⁸ Petitioners' Opening Brief at 41, *Pollinator II*, No. 19-72280 (9th Cir. Aug. 31, 2020).

⁵¹⁹ *Enlist Duo*, 966 F.3d 893, 918 (9th Cir. 2020) (citing 7 U.S.C. § 136a(g) (2018)).

⁵²⁰ See U.S. ENV'T PROT. AGENCY, GLYPHOSATE: INTERIM REGISTRATION REVIEW DECISION, EPA-HQ-OPP-2009-0361, at 20 (Jan. 22, 2020) (referencing that the agency decision depended on the result of the ESA assessment).

⁵²¹ Petitioners are Rural Coalition, Organización en California de Líderes Campesinas, Farmworker Association of Florida, Beyond Pesticides, and Center for Food Safety.

EPA's failure to comply with FIFRA and the ESA.⁵²² EPA issued a similar interim registration decision concerning another pesticide, atrazine, a toxic herbicide that EPA itself had classified for "restricted use"⁵²³ given its unreasonable adverse effects on the environment, again because EPA openly admits it still lacked all the requisite data to make a final registration review determination.⁵²⁴ In both instances, EPA also issued the interim registration decisions without completing the consultation required under the ESA.⁵²⁵ The Ninth Circuit's decisions in these two interim registration challenges would thus determine with more precision what is required of EPA under FIFRA and the ESA when undertaking pesticide registration review.

D. Pesticide Litigation Outside of FIFRA

It is worth noting two other litigation battlegrounds, outside of the FIFRA context, that have profound impacts on how pesticides are regulated and used in U.S. agriculture. First, as discussed in Part II, because pesticides indiscriminately harm not only the targeted pests, but other living organisms, pesticides have been identified as one of the major contributing factors in the significant decline of our nation's federally protected endangered and threatened species. Yet, as the cases amply demonstrate, EPA has continued to disregard the potential harm of pesticide exposure to federally protected species in its administration of FIFRA, in violation of the ESA.⁵²⁶ Second, the vast amount of crop and health damage suffered by farmers and pesticide users have led those users to look to private courses of action such as product liability claims, to hold the agrochemical conglomerates accountable.⁵²⁷ While these cases are outside of the main focus of this Article, we briefly summarize their import below.

⁵²² Petition for Review at 2, *Rural Coalition v. U.S. Env't Prot. Agency*, No. 20-70801 (9th Cir. Mar. 20, 2020).

⁵²³ 7 U.S.C. § 136a(d)(1)(C) (2018) ("restricted pesticides" are so classified because EPA determined that their use "may generally cause, without additional regulatory restrictions, unreasonable adverse effects on the environment, including injury to the applicator").

⁵²⁴ Petition for Review at 2, *Rural Coalition v. U.S. Env't Prot. Agency*, No. 20-73220 (9th Cir. filed Oct. 30, 2020).

⁵²⁵ *Id.* at 3, 122–23.

⁵²⁶ *See, e.g.*, *Wash. Toxics Coal. v. Env't Prot. Agency*, 413 F.3d 1024, 1028–29 (9th Cir. 2005) (failure to consult before registering fifty-four pesticides); *Ellis v. Housenger*, 252 F. Supp. 3d 800, 820 (N.D. Cal. 2017) (sixty-eight pesticide approvals unlawfully issued without ESA consultation).

⁵²⁷ *Bader Farms Inc. v. Monsanto*, No. 1:16-CV-00299-SNLJ, 2020 WL 1503395, at *1 (E.D. Mo. Feb. 28, 2020); *Hardeman v. Monsanto Co.*, 216 F. Supp. 3d 1037 (N.D. Cal. 2016), *aff'd*, 997 F.3d 941 (9th Cir. 2021).

1. Endangered Species Act

The ESA is “the most comprehensive legislation for the preservation of endangered species ever enacted by any nation.”⁵²⁸ Congress “ma[de] it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities.”⁵²⁹ Section 7(a)(2) of the ESA reflects Congress’s intent “to give endangered species priority over the ‘primary missions’ of federal agencies.”⁵³⁰ It mandates that “[e]ach Federal agency shall . . . insure” its action—including any pesticide registration action—is not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of habitat of such species.”⁵³¹ Accordingly, Section 7 of the ESA establishes a process requiring EPA to evaluate a pesticide’s effects “in consultation with and with the assistance of the” agencies Congress designated as having expertise in determining effects on endangered species: U.S. Fish and Wildlife Service and National Marine Fisheries Service (the Expert Agencies).⁵³² The consultation process to assess a pesticide’s effects is integral to “insuring” EPA implements the ESA’s substantive protections for imperiled species.⁵³³ The first step in the Section 7(a)(2) process requires EPA to determine whether the registration “may affect” any listed species or designated critical habitat.⁵³⁴ If it *may*, EPA then *must* consult.⁵³⁵

Courts have repeatedly affirmed that compliance with the ESA’s consultation mandates is an indispensable part of EPA’s pesticide registration process.⁵³⁶ Nevertheless, EPA has continued to evade its ESA consultation duties in registering pesticides, failing to engage in consultation even after finding “may affect” in its risk assessment of a pesticide registration, only to concede later in litigation of its legal violation.⁵³⁷ Even after such admissions in court, rather than committing to cure its ESA violation as expeditiously as possible, EPA instead throws its hands in the air, and points to the ever-growing backlog of ESA

⁵²⁸ *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1977).

⁵²⁹ *Id.* at 194.

⁵³⁰ *Id.* at 185.

⁵³¹ 16 U.S.C. § 1536(a)(2) (2018); 50 C.F.R. § 402.02 (2019); *see* 16 U.S.C. § 1532(5)(A) (2018) (defining the term critical habitat); *see* *Sierra Club v. Marsh*, 816 F.2d 1376, 1385 (9th Cir. 1987) (stating that ESA’s mandate is “rigorous”).

⁵³² 16 U.S.C. § 1536(a)(2); 50 C.F.R. §§ 402.14(a), 402.01(b) (2019).

⁵³³ *Thomas v. Peterson*, 753 F.2d 754, 764 (9th Cir. 1985), *abrogated on other grounds by* *Cottonwood Env’t Law Ctr. v. U.S. Forest Serv.*, 789 F.3d 1075 (9th Cir. 2015).

⁵³⁴ 50 C.F.R. § 402.14(a) (2019).

⁵³⁵ *Id.*

⁵³⁶ *Wash. Toxics Coal. v. U.S. Env’t Prot. Agency*, 413 F.3d 1024, 1032 (9th Cir. 2005) (“[EPA] cannot escape its obligation to comply with the ESA merely because it is bound to comply with [FIFRA].”).

⁵³⁷ *See, e.g., Ellis v. Housenger*, 252 F. Supp. 3d 800, 820 (N.D. Cal. 2017) (discussing how EPA did not make a “no effect” determination); *see also, e.g., Ctr. for Biological Diversity v. U.S. Env’t Prot. Agency*, 861 F.3d 174, 188 (D.C. Cir. 2017) (discussing how EPA did not make a “no effect” determination).

consultations on older pesticides that the agency has yet to complete.⁵³⁸ To give just one example of several, in *Ellis v. Housenger*,⁵³⁹ a district court in the Northern District of California held that EPA violated the ESA when it issued pesticide registrations for several bee-harming pesticides where EPA conceded in summary judgment that “it has not consulted [the Expert] [A]genc[ies] nor made a ‘no effect’ determination.”⁵⁴⁰

As a result, these ESA violations often end up being resolved through a lengthy settlement process, often involving EPA and the pesticide registrants, whereby the plaintiffs try to stop or reduce use of the challenged pesticide while negotiating a reasonable timeline for EPA to belatedly comply with the ESA.⁵⁴¹ As a result, EPA and the registrants agreed to remove some of the pesticide products from the market while EPA engages in making an effects determination within the timeframe set by the parties via settlement.⁵⁴² Similarly, in the ongoing *Pollinator II* litigation, more than a year after the petitioners sought review of EPA’s sulfoxaflor registration decision, EPA admitted that it had failed to abide by the ESA’s consultation mandates, but stated that it would not be able to even make the initial ESA effects determination for another seven years due to its backlog of ESA violations.⁵⁴³

Nor is the backlog of ESA consultations for preexisting pesticides shrinking. In issuing interim registration decisions on glyphosate and

⁵³⁸ See Motion for Voluntary Remand Without Vacatur at 10–11, *Ctr. for Food Safety v. U.S. Env’t Prot. Agency*, No. 19-72109 (9th Cir. Oct. 26, 2020), ECF 51-1 (describing EPA’s ESA “backlog” and “noncompliance”).

⁵³⁹ 252 F. Supp. 3d 800 (N.D. Cal. 2017).

⁵⁴⁰ *Id.* at 820; *Wash. Toxics Coal.*, 413 F.3d at 1028; see *Ctr. for Biological Diversity*, 861 F.3d at 188 (“EPA has therefore violated section 7(a)(2) of the ESA by registering [a pesticide] before making an effects determination or consulting.”); *Defs. of Wildlife v. U.S. Env’t Prot. Agency*, 882 F.2d 1294, 1303 (8th Cir. 1989); Stipulated Partial Settlement Agreement at 3, *Nat. Res. Def. Council v. U.S. Env’t Prot. Agency*, No. 1:17-cv-02034-TSC (D.D.C. Jan. 28, 2021); Stipulated Injunction and Order at 33, *Ctr. for Biological Diversity v. Johnson*, No. 02-01580-JSW (N.D. Cal. Oct. 20, 2006); Order Entering Stipulated Partial Settlement Agreement at 2, *Ctr. for Biological Diversity v. U.S. Env’t Prot. Agency*, No. 3:11-cv-293-JCS (N.D. Cal. Oct. 22, 2019); Order Granting in Part and Denying in Part Plaintiffs’ Motion For Summary Judgment at 38, *Ellis v. Housenger*, No. 3:13-cv-01266-MMC (N.D. Cal. May 8, 2017); *Endangered Species Litigation and Associated Pesticide Limitations*, U.S. ENV’T PROTECTION AGENCY, <https://perma.cc/GX4U-2WG8> (last updated Sept. 16, 2006).

⁵⁴¹ See Daniela Arellano, *Court Settlement: EPA Must Evaluate Impacts of Harmful Pesticide on Imperiled Species*, NAT. RES. DEF. COUNCIL (Jan. 28, 2021), <https://perma.cc/S73F-CNEX> (describing an agreement setting a deadline for EPA to conduct its ESA analysis of a pesticide); Declaration of Brett Hartl in Support of Plaintiffs’ Remedy Reply at 4, 9–11, *Ellis v. Keigwin*, No. 3:13-cv-01266 (N.D. Cal. Mar. 16, 2018), ECF No. 325; Appendix to Motion for Voluntary Remand Without Vacatur at 10, 16–17, *Ctr. For Food Safety*, No. 19-72109 (9th Cir. Oct. 26, 2021), No. 51-2.

⁵⁴² See Stipulated Injunction and Order, *Ctr. for Biological Diversity v. Johnson*, No. 02-01580-JSW (N.D. Cal. Oct. 20, 2006) (showing the agreement between two parties to limit the use of a random product).

⁵⁴³ Motion for Voluntary Remand Without Vacatur at 6, *Ctr. For Food Safety*, No. 19-72109 (9th Cir. Oct. 26, 2020), No. 51-1; Appendix to Motion for Voluntary Remand Without Vacatur at 17, *Ctr. For Food Safety*, No. 19-72109 (9th Cir. Oct. 26, 2021), No. 51-2.

atrazine,⁵⁴⁴ EPA confessed that it had not made ESA determinations concerning either pesticide, but nonetheless issued the interim registration decisions to allow the pesticide uses to continue without any ESA compliance on the decision.⁵⁴⁵ Whether that decision violates the ESA is one of the issues that will be adjudicated by the Ninth Circuit in the ongoing glyphosate interim registration challenge.

To address continuing disagreements over the consultation process, EPA and the Expert Agencies requested that the National Academy of Sciences (Academy) evaluate the best scientific approach for assessing the effects of registrations on endangered species. The resulting 2013 report by the Academy⁵⁴⁶ pointed out that EPA's FIFRA risk assessment matrix is “*not scientifically defensible* for assessing the risks to” federally protected species.⁵⁴⁷ This conclusion is understandable, since FIFRA and the ESA have completely different risk thresholds. As discussed *supra* Part III.A, under FIFRA, EPA is tasked with evaluating whether a potential pesticide risk rises to the level of “unreasonable effect.”⁵⁴⁸ On the other hand, the ESA’s “may affect” standard is extremely low: “[A]ctions that have *any chance of affecting* listed species or critical habitat—even if it is later determined that the actions are ‘not likely’ to do so—*require* at least some consultation under the ESA.”⁵⁴⁹ The Academy’s report made clear that *any* potential exposure to a pesticide is a “may affect” trigger under the ESA, and called for EPA to adopt a more probabilistic approach in assessing pesticide risks to federally protected species.⁵⁵⁰ According to the Academy, if there is any spatial overlap between a pesticide’s potential use and the habitats of listed species, EPA should at least informally consult the Expert Agencies.⁵⁵¹ Following the Academy’s report, EPA and the Expert Agencies jointly published a guidance document outlining how they would conduct pesticide consultations going forward.⁵⁵² Consistent with the report, the guidance

⁵⁴⁴ See discussion *supra* Part V.C.

⁵⁴⁵ U.S. ENV’T PROT. AGENCY, GLYPHOSATE: INTERIM REGISTRATION REVIEW DECISION, EPA-HQ-OPP-2009-0361, at 33 (Jan. 22, 2020); U.S. ENV’T PROT. AGENCY, EPA-HQ-OPP-2013-0266, ATRAZINE: INTERIM REGISTRATION REVIEW DECISION 6 (Sept. 14, 2020).

⁵⁴⁶ NAT’L RESEARCH COUNCIL ET AL., ASSESSING RISKS TO ENDANGERED AND THREATENED SPECIES FROM PESTICIDES (Nat’l Academies Press 2013), <https://perma.cc/7LV2-8TDT>.

⁵⁴⁷ *Id.* at 15 (emphasis added).

⁵⁴⁸ See discussion *supra* Part III.A.

⁵⁴⁹ *Karuk Tribe of Cal. v. U.S. Forest Serv.*, 681 F.3d 1006, 1027 (9th Cir. 2012) (emphases added).

⁵⁵⁰ NAT’L RESEARCH COUNCIL ET AL., *supra* note 546 at 31 (tbl. 2–1), 148–50, 152.

⁵⁵¹ *Id.* at 9.

⁵⁵² U.S. ENV’T PROT. AGENCY, INTERIM APPROACHES FOR NATIONAL-LEVEL PESTICIDE ENDANGERED SPECIES ACT ASSESSMENTS BASED ON THE RECOMMENDATIONS OF THE NATIONAL ACADEMY OF SCIENCES APRIL 2013 REPORT 1 (2017), <https://perma.cc/JC55-G6VC>. EPA subsequently issued an updated guidance, which again affirmed the same three-step process. See U.S. ENV’T PROT. AGENCY, REVISED METHOD FOR NATIONAL LEVEL LISTED SPECIES: BIOLOGICAL EVALUATIONS OF CONVENTIONAL PESTICIDES 9–10 (Mar. 12, 2020), <https://perma.cc/C8AN-FNL3> (describing the three-step consultation process).

document provides that to comply with the ESA in registering pesticides, EPA must conclude that a pesticide “may affect” any species or critical habitat if it finds species or habitats that overlap with the “potential [pesticide] use sites” and “area of potential effects in and around use sites.”⁵⁵³ And when there is a “may affect,” EPA must at least engage in informal consultation—to assess in conjunction with and requiring the concurrence of the Expert Agencies—the degree of impacts on protected species, and if necessary beyond that, formally consulting the Expert Agencies to implement protective measures and minimize impacts.⁵⁵⁴

While the *NFFC* decision on dicamba did not reach the petitioners’ very similar ESA claims, the *Enlist Duo* decision⁵⁵⁵ did examine EPA’s ESA consultation duties in light of the Academy’s recommendations and EPA’s subsequent adoption of them. As in *NFFC*, the *Enlist Duo* case involves a situation where EPA unilaterally concluded that there was “no effect” on endangered species by relying on its much-criticized FIFRA risk assessment framework to conclude that endangered and threatened species would not be exposed to the pesticide at levels sufficient to, under EPA’s FIFRA framework, have an “effect.”⁵⁵⁶ Petitioners challenged the “no effect” finding by EPA, in addition to FIFRA claims discussed *supra* Part IV.A.iii. The petitioners argued the ESA consultation duty was triggered because EPA’s own preliminary FIFRA assessment had found that the pesticide Enlist Duo “may affect” hundreds of endangered species, but EPA subsequently reached a “no effect” finding after unilaterally adopting mitigation measures, such as downwind buffer and other use restrictions, that the agency claimed would eliminate effects on species.⁵⁵⁷ The petitioners also argued that EPA’s reliance on its FIFRA risk assessment matrix, which was rejected by the Academy’s report, violated the ESA’s mandate that agencies “use the best scientific and commercial data available.”⁵⁵⁸

While conceding that EPA’s FIFRA matrix was criticized by the Academy, the majority in *Enlist Duo* upheld EPA’s “no effect” finding.⁵⁵⁹ The Court stated that the Academy recognized that transition from EPA’s FIFRA matrix to the probabilistic approach, if recommended, would require new data to be generated, and upheld EPA’s decision to continue utilizing its current FIFRA risk assessment matrix, explaining that the best scientific data requirement “does not require the agency to conduct

⁵⁵³ INTERIM APPROACHES FOR NATIONAL-LEVEL PESTICIDE ENDANGERED SPECIES ACT ASSESSMENTS BASED ON THE RECOMMENDATIONS OF THE NATIONAL ACADEMY OF SCIENCES APRIL 2013 REPORT, *supra* note 552, at 4–5.

⁵⁵⁴ *Id.* at 1–2, 7.

⁵⁵⁵ See discussion *supra* Part IV.A.

⁵⁵⁶ Petitioners’ Opening Brief at 31–32, *Enlist Duo*, 966 F.3d 893 (9th Cir. 2020) (17-70810), 2018 WL 1902226, at *20–21.

⁵⁵⁷ *Enlist Duo*, 966 F.3d 893, 924 (9th Cir. 2020).

⁵⁵⁸ *Id.* at 925.

⁵⁵⁹ *Id.* at 923–26.

new tests or make decisions on data that does not yet exist.”⁵⁶⁰ In so holding, the Court relied on the fact that EPA had begun implementing the new approach in selected pesticide registration reviews and concluded that EPA’s utilization of its inappropriate FIFRA matrix “is [a scientific judgment] we do not expect to reoccur given EPA’s commitment to gather the data necessary to implement [the Academy’s approach] going forward.”⁵⁶¹

Crucially, Judge Watford dissented from the plurality panel’s ESA ruling, explaining he would have held that EPA had violated the ESA’s “best scientific data available” mandate when it assessed Enlist Duo’s risks to endangered species using its unreliable FIFRA matrix.⁵⁶² His dissent points out that the *Enlist Duo* holding could set a dangerous precedent that effectively incentivizes agencies not to implement the necessary scientific method to obtain the necessary data, directly contradicting Congress’s intent to require federal agencies to use the best scientific data available in assessing risks to endangered species.⁵⁶³

For now, it remains to be seen what will come of these mixed decisions. On the one hand, courts have held EPA accountable when the agency entirely fails to make any effects determination prior to registering a pesticide.⁵⁶⁴ On the other hand, under *Enlist Duo*, for at least a short time until EPA generates the necessary data to apply the National Academy of Sciences’ methodology, EPA can continue to rely on its FIFRA risk assessment matrix to find “no effect,” despite recognition by scientists and the Court that the FIFRA matrix is not scientifically defensible for protecting endangered species. Fortunately, as the *Enlist Duo* decision recognized, the agency already possesses much of the data necessary to conduct the probabilistic assessment called for by the Academy.⁵⁶⁵ The existence of such data should make it difficult, if not impossible, for EPA to rely on FIFRA’s risk-benefit standard to evade the ESA mandate to prioritize protection of endangered species above all else.⁵⁶⁶

⁵⁶⁰ *Id.* at 926 (quoting *Ctr. for Biological Diversity v. U.S. Fish & Wildlife Serv.*, 807 F.3d 1031, 1047 (9th Cir. 2015)).

⁵⁶¹ *Id.*

⁵⁶² *Id.* at 933 (Watford, J., dissenting).

⁵⁶³ *Id.* Petitioners in *Enlist Duo* sought rehearing en banc based in part on the rationale articulated in Judge Watford’s dissent, but the Ninth Circuit denied the rehearing request. Order at 2, *Enlist Duo*, 966 F.3d 893 (No. 17-70810), 2020 U.S. App. LEXIS 36274, at *2 (9th Cir. Nov. 18, 2020).

⁵⁶⁴ See *supra* note 540 and accompanying text.

⁵⁶⁵ See, e.g., *Enlist Duo*, 966 F.3d at 926 (explaining that, moving forward, “EPA and the consultation agencies agreed that they would implement [the Academy]’s proposed approach in stages”).

⁵⁶⁶ *Ctr. for Food Safety et al. Petitioners’ Opening Brief* at 35–36, *Ctr. for Food Safety v. U.S. Env’t Prot. Agency*, Nos. 17-72109 (9th Cir. Feb. 16, 2021), ECF No. 71.

2. State Product Liability Claims

Another important part of this story is federal pesticide regulation's interaction with state law regulation of pesticides and state law-based claims like product liability. FIFRA's scheme is one of cooperative federalism, leaving ample room for state action in both forms.⁵⁶⁷ While the EPA label is preemptive, states (and even local governments, if not preempted by their given states)⁵⁶⁸ can regulate the use of pesticides.⁵⁶⁹ This strong presumption against preemption reflects the historical role that states had in pesticide regulation and extends to state-based causes of action, such as defective product claims.⁵⁷⁰

As one might imagine, the dicamba drift crisis spawned hundreds if not thousands of farmer plaintiffs suing for damages. In the first, *Bader Farms v. Monsanto Co.*,⁵⁷¹ Bader Farms, a Missouri peach orchard, experienced significant drift damage from neighboring crop fields.⁵⁷² In early 2020, a jury found in Bader's favor on all counts, awarding \$15 million in actual damages and \$250 million in punitive damages.⁵⁷³ It found Monsanto and BASF liable for the negligent design of their products and failure to warn.⁵⁷⁴ It also found that the companies conspired to create an "ecological disaster" of off-target pesticide movement and damage to increase profits.⁵⁷⁵ Contrary to their arguments in the *NFFC* litigation and EPA's registration decision bases, approximately 180 discovery documents showed that Monsanto knew its

⁵⁶⁷ Angelo, *supra* note 50, at 141–42.

⁵⁶⁸ See *Wis. Pub. Intervenor v. Mortier*, 501 U.S. 597, 600–02 (1991) (holding that FIFRA does not preempt the regulation of pesticides by local governments).

⁵⁶⁹ *Bates v. Dow Agrosiences LLC*, 544 U.S. 431, 434, 441–44 (2005) (establishing that a state rule is preempted only if it meets two conditions: 1) it is a requirement "for labeling or packaging," and 2) that labeling or packaging requirement is "in addition to or different from those required under [the FIFRA] subchapter" (emphasis omitted)).

⁵⁷⁰ *Id.* at 449 (noting that states' statuses as separate sovereignties lend against preemption of causes of action under state law).

⁵⁷¹ 431 F. Supp. 3d 1084 (E.M. Mo. 2019); Third Amended Complaint at 4, *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 5, 2019), ECF No. 168; Complaint at 22–23, 35–36, 43, *MW Harper Farming v. Monsanto Co.*, No. 1:18-md-02820-SNLJ (E.D. Mo. June 5, 2020), ECF No. 549 (discussing the case brought by Bader Farms); Conditional Transfer Order (CTO–13) at 1–2, In re: Dicamba Herbicides Litigation, No. 1:18-md-02820-SNLJ (E.D. Mo. June 16, 2020), ECF No. 550 (consolidating *MW Harper Farming v. Monsanto Co.* with multiple other cases against Monsanto).

⁵⁷² Johnathan Hettinger, *Jury Orders Monsanto, BASF to Pay Peach Farmer \$250 Million in Punitive Damages*, MIDWEST CTR. FOR INVESTIGATIVE REPORTING (Feb. 15, 2020), <https://perma.cc/R6XY-NGD6>.

⁵⁷³ *Id.*; *Bader Farms*, No. 1:16-CV-00299-SNLJ, 2020 WL 1503395, at *1 (E.D. Mo. Feb. 28, 2020).

⁵⁷⁴ *Bader Farms*, No. 1:16-CV-00299-SNLJ, 2020 WL 1503395, at *1.

⁵⁷⁵ See *id.* (explaining that "the jury found that the defendants were acting in a joint venture and in a conspiracy"); Corinne Ruff, *Monsanto, BASF Will Pay \$250 Million in Punitive Damages in First Dicamba Trial*, ST. LOUIS PUB. RADIO (Feb. 15, 2020), <https://perma.cc/T4F9-QK8M>.

product would move off-field and cause harm.⁵⁷⁶ Monsanto projected thousands of drift incidents and prohibited testing of dicamba's drift properties to more easily obtain EPA registration.⁵⁷⁷ Also, contrary to their arguments in the *NFFC* litigation, documents conceded to drift occurring despite label-compliant application and drift-caused yield loss.⁵⁷⁸ And the jury rejected Monsanto's defense that damage was because of farmer misapplication, not its pesticide.⁵⁷⁹

Consolidated cases of hundreds, if not thousands, of other farmers followed.⁵⁸⁰ In December of 2020, Bayer entered into a settlement with damaged soybean farmers for \$300 million.⁵⁸¹ Growers with non-soybean crop or plant injury in the multi-district litigation are in the process of settling their claims separately at the time of writing.⁵⁸² However several

⁵⁷⁶ See Johnathan Hettinger, *Reporter's Notebook: Five Key Takeaways From Trial of Peach Farmer's Lawsuit vs. Bayer, BASF*, MIDWEST CTR. FOR INVESTIGATIVE REPORTING (Feb. 14, 2020), <https://perma.cc/552B-F2GH> ("While BASF was telling farmers there would be no yield impacts from dicamba drift in 2017, the company was privately telling pesticide applicators that any drift they caused could cause yield loss, according to a training document for employees investigating dicamba drift complaints."); Carey Gillam, *Revealed: Monsanto Predicted Crop System Would Damage US Farms*, GUARDIAN (Mar. 30, 2020), <https://perma.cc/V7UZ-GC9Z> ("Monsanto and BASF sought to keep most of the discovery documents they turned over in the dicamba litigation designated confidential. Roughly 180 have been unsealed and were cited at the Bader trial."). While damage included the 2015/2016 season from older dicamba formulations, it dramatically increased in 2017, see Hettinger, *supra* 576, after EPA's approval of the Monsanto and BASF pesticides at issue here. EPA, 2018 DICAMBA REGISTRATION DECISION, *supra* note 122, at 4–5 tbl.2.

⁵⁷⁷ See Hettinger, *supra* note 576 ("In 2015, Monsanto decided to 'pull back' on testing to allow dicamba to have a 'clean slate' because federal regulators were paying attention to the new weed killer's potential to contaminate other fields, according to an email from Dr. Tina Bhakta, who, in her role as global chemistry expansion lead for Monsanto, was responsible for obtaining EPA registration for the weed killer.").

⁵⁷⁸ See *id.* (noting that documents presented in court indicated that even if labels were followed, there was risk of drift, despite "Monsanto and BASF officials testif[ying] that the new versions of dicamba do not cause any 'adverse' effects when used according to the label").

⁵⁷⁹ See Gillam, *supra* note 576 (explaining that the jury assessed punitive damages against Monsanto and BASF despite the companies' assertions that the "products are safe and effective when used correctly").

⁵⁸⁰ See Conditional Transfer Order (CTO–13), *supra* note 571, at 1–2; Johnathan Hettinger, *For Dicamba Lawsuits, Bader Verdict is Just the Beginning*, MIDWEST CTR. FOR INVESTIGATIVE REPORTING (Feb. 20, 2020), <https://perma.cc/W2CK-LHBM> ("The companies face at least 130 lawsuits over dicamba. Many of those seek to be class-action lawsuits that would represent the thousands of farmers – largely growers of non-resistant soybeans but also specialty crop farmers – whose fields have allegedly been damaged.").

⁵⁸¹ Emily Unglesbee, *Dicamba Settlement is a Go*, PROGRESSIVE FARMER (Dec. 17, 2020), <https://perma.cc/3YUZ-GHLT>; see also Emily Unglesbee, *Dicamba Injury Payments*, PROGRESSIVE FARMER (June 26, 2020), <https://perma.cc/5DUT-6MJ8> ("Bayer agreed to pay up to \$300 million to soybean producers who suffered yield losses to dicamba damage at any time from 2015 through 2020.").

⁵⁸² See Unglesbee, *Dicamba Injury Payments*, *supra* note 581 ("Another \$100 million in the settlement will go toward settling non-soybean injury claims, as well as paying other costs incurred during litigation, such as attorney's fees, bringing the total settlement to \$400 million.").

new dicamba drift damage lawsuits on more recent harm were filed in summer 2021.⁵⁸³

The dicamba class action settlement was part of a proposed glyphosate class action settlement by Bayer,⁵⁸⁴ attempting to clean up several of its Monsanto liabilities at once. There are currently also thousands of lawsuits against Monsanto/Bayer, by more than 100,000 plaintiffs, alleging cancer from glyphosate exposure.⁵⁸⁵ Monsanto has lost all three bellwether trials.⁵⁸⁶ These cases involve people who used glyphosate at home or at work, with each plaintiff later developing non-Hodgkin lymphoma. Following extensive jury trials, these plaintiffs were awarded over \$2 billion in compensatory and punitive damages combined because glyphosate was a “substantial factor” in causing their cancers, and Monsanto failed to warn that its glyphosate-based pesticides could cause cancer.⁵⁸⁷ To settle the remaining non-Hodgkin lymphoma cases, Bayer agreed to a proposed massive \$10 billion settlement, one of the largest settlements ever in U.S. civil litigation.⁵⁸⁸ The proposed settlement did cover at least 30,000 claims from plaintiffs who did not join the settlement.⁵⁸⁹ Additionally, Bayer would not agree to include a warning about increased risk of cancer on any glyphosate product

⁵⁸³ Emily Unglesbee, *New Dicamba Lawsuits*, PROGRESSIVE FARMER (June 4, 2021), <https://perma.cc/6XKE-UGDQ>.

⁵⁸⁴ See *id.* (“Some more details are emerging on Bayer’s \$400 million settlement for dicamba injury claims, announced Wednesday amid a larger \$1 billion settlement mostly focused on glyphosate litigation.”).

⁵⁸⁵ Carey Gillam, *Bayer Backs Away From Plan to Contain Future Roundup Cancer Claims*, U.S. RIGHT TO KNOW: MONSANTO ROUNDUP & DICAMBA TRIAL TRACKER (July 8, 2020), <https://perma.cc/UN7G-ZBJT> (“More than 100,000 people in the United States claim exposure to Monsanto’s glyphosate-based Roundup herbicides caused them to develop non-Hodgkin lymphoma (NHL) and that Monsanto long knew about and covered up the cancer risks.”).

⁵⁸⁶ Order Denying Monsanto Company’s Motion for Judgment Notwithstanding the Verdict and Conditionally Denying Monsanto’s Motion for New Trial at 2, 4, *Johnson v. Monsanto Co.*, No. CGC-16-550128 (Cal. Super. Ct. Oct. 22, 2018); see Pretrial Order No. 164: Amended Judgment at 1, *Hardeman v. Monsanto Co.*, No. 16-md-02741-VC (N.D. Cal. July 17, 2019), ECF No. 4602 (outlining compensatory and punitive damages); Amended Order (1) Denying Motions of Defendant for JNOV and (2) Conditionally Granting Motions of Defendant for New Trial at 1, *Pilliod v. Monsanto Co.*, No. RG17-862702 (Cal. Super. Ct. July 26, 2019).

⁵⁸⁷ Carey Gillam, *Monsanto Ordered to Pay \$2 Billion to Cancer Victims*, U.S. RIGHT TO KNOW: MONSANTO ROUNDUP & DICAMBA TRIAL TRACKER (May 13, 2019), <https://perma.cc/3LD8-N9BT> (“[A] California jury ordered Monsanto to pay just over \$2 billion in punitive and compensatory damages to a married couple who both developed non-Hodgkin lymphoma they say was caused by their many years of using Roundup products.”); Carey Gillam, *Closing Arguments Today, Jurors to Deliberate Damages for Cancer Caused by Roundup*, U.S. RIGHT TO KNOW: MONSANTO ROUNDUP & DICAMBA TRIAL TRACKER (Mar. 26, 2019), <https://perma.cc/2W7R-59EL> (explaining that the “month-long trial . . . recorded a first phase jury verdict finding Roundup was a ‘substantial factor’ in causing Hardeman’s non-Hodgkin lymphoma”).

⁵⁸⁸ Patricia Cohen, *Roundup Maker to Pay \$10 Billion to Settle Cancer Suits*, N.Y. TIMES (June 24, 2020), <https://perma.cc/6JZY-FEQ8>.

⁵⁸⁹ *Id.*

labels.⁵⁹⁰ The overseeing district court judge heavily criticized the first iteration in summer 2020 for, among other things, attempting to bind not just current but also future plaintiffs, and it was subsequently scuttled;⁵⁹¹ the parties filed a second version in early February 2021, but it is also under fire as creating a dangerous precedent.⁵⁹² Sure enough, the district court judge rejected Bayer's proposal, calling it "clearly unreasonable."⁵⁹³ Now, Bayer has committed to removing glyphosate ingredients from the U.S. residential market.⁵⁹⁴ This leaves in place supply for agricultural uses.

In the meantime, the Ninth Circuit recently affirmed on appeal one of those bellwether cases, *Hardeman v. Monsanto Co.*⁵⁹⁵ At the district court, Mr. Hardeman won an \$80 million verdict, with the jury finding that the weedkiller was a "substantial factor" in causing his non-Hodgkin lymphoma and that Monsanto should be held liable for its failure to warn that Roundup may cause cancer.⁵⁹⁶ The Ninth Circuit held that FIFRA does not preempt failure-to-warn claims because FIFRA itself states that "[i]n no event shall registration of an article be construed as a defense" against a FIFRA violation and that registration under FIFRA only serves as evidence that labeling and packaging comply with the statute.⁵⁹⁷ The Court found that, according to *Bates v. Dow Agrosciences*,⁵⁹⁸ Hardeman's state failure-to-warn claims were "equivalent to" and "fully consistent with" FIFRA and therefore not expressly preempted.⁵⁹⁹ Absent a grant of certiorari and reversal by the Supreme Court of well-established preemption doctrine including *Bates*, this groundbreaking decision confirms that people harmed by future pesticide exposures will have a course of action against pesticide manufacturers for failing to adequately warn users of the risks involved with handling these chemicals.

More generally, the robust dicamba crop damage and glyphosate cancer class action litigation illustrate the important regulatory backstop role that state-law claims can play, theoretically providing strong economic liability incentives to companies not to cut health and safety corners. But they also underscore the *inherent* weakness in those types of litigation: they are always necessarily *ex post facto* and mainly financial, and thus cannot address irreparable types of injuries, like environmental

⁵⁹⁰ *Id.*

⁵⁹¹ Carey Gilliam, *Bayer Backs Away from Plan to Contain Future Roundup Cancer Claims*, U.S. RIGHT TO KNOW (July 8, 2020), <https://perma.cc/64ML-BD88>.

⁵⁹² Carey Gilliam, *Bayer's Plan for Settling Future Roundup Cancer Claims Faces Broad Opposition*, U.S. RIGHT TO KNOW (Feb. 26, 2021) <https://perma.cc/55HG-T7C5>.

⁵⁹³ Tom Hals, *Bayer to Rethink Roundup in U.S. Residential Market After Judge Nixes \$2 Bln Settlement*, REUTERS (May 27, 2021), <https://perma.cc/FX9W-U2KZ>.

⁵⁹⁴ Tim Loh & Jef Feeley, *Bayer's Roundup Costs Could Top \$16 Billion as Provisions Mount*, BLOOMBERG (July 29, 2021), <https://perma.cc/T3RK-JK42>.

⁵⁹⁵ 216 F. Supp. 3d 1037 (N.D. Cal. 2016), *aff'd*, 997 F.3d 941 (9th Cir. 2021).

⁵⁹⁶ Julia Jacobs, *Monsanto Ordered to Pay \$80 Million in Roundup Cancer Case*, N.Y. TIMES (Mar. 27, 2019), <https://perma.cc/ZH2Y-QZDB>.

⁵⁹⁷ *Hardeman*, 997 F.3d at 950; 7 U.S.C. § 136a(f)(2) (2018).

⁵⁹⁸ 544 U.S. 431, 432 (2005).

⁵⁹⁹ *Hardeman*, 997 F.3d at 958 (citing 544 U.S. at 449).

and health harms, *before* they happen. No amount of money can cure Mr. Hardeman's cancer. And no amount of money can make up for the loss of an endangered plant or pollinator from pesticide drift, or a farmer's fundamental right to choose what seeds she plants.

Accordingly, most relevant here, the robust state-law based action taking place reveals the regulation weaknesses at the center of this Article: they are needed in part because of how significantly EPA has failed at its job and how weak the registration approval process is. Pesticides that cause the problems at issue in the glyphosate and dicamba class action litigation should never have been approved in the first place, at least not in the form and manner they were, but they were so approved. As such, their very existence and necessity reiterates the urgent need for regulatory reform and improvements.

VI. CONCLUSION

For far too long, EPA has constricted its FIFRA mandate and shirked its ESA duties, approving pesticides in manners that have not protected public health or the environment. When challenged, EPA has sought refuge in the pesticides' scientific complexity and the reflexive tendency of courts to defer to agencies. However, the recent cases discussed in this Article have collectively breathed some much needed life back into FIFRA's "no unreasonable adverse effect" registration standard, as well as given new teeth to the substantial evidence standard of judicial review. With the caveat that nothing short of legislative and regulatory overhaul is needed, at a minimum these cases have winnowed some of the oversight loopholes and shored up some of the regulatory weaknesses that previously allowed EPA to greenlight pesticides without actually ascertaining that their use would not result in "unreasonable adverse effects on the environment" by "taking into account the economic, social, and environmental costs and benefits" of the pesticide use, as FIFRA mandates.⁶⁰⁰

To that end, it is illuminating to close by overlaying *NFFC* and the other decisions and their various holdings with Part II's discussion of EPA registration weaknesses. One such major loophole is conditional registrations.⁶⁰¹ Taken together, the Ninth Circuit's recent holdings in *Nanosilver*, *NFFC*, and *Enlist Duo* set a higher bar—than the previous non-existent one—that EPA must clear to conditionally register pesticides. *Nanosilver* gives meaning for the first time to the statutory "public interest finding" requirement for conditional registrations of new active ingredients,⁶⁰² clarifying that the public interest finding is an additional determination and instructing that EPA must support any

⁶⁰⁰ 7 U.S.C. § 136(bb).

⁶⁰¹ See U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 89, at 37 (discussing EPA's over-use of conditional registrations).

⁶⁰² See 7 U.S.C. § 136a(c)(7)(C) (permitting the grant of a conditional registration if "use of the pesticide is in the public interest").

such public interest determinations with record evidence.⁶⁰³ Further, *Enlist Duo* clarified that the no “significant increase” to “the risk of [any] unreasonable adverse effects” on the environment test for conditional registrations of me-too pesticides and new uses of previously-registered pesticides is a different and somewhat narrower standard than the “no unreasonable adverse effect on the environment” test for unconditional registration.⁶⁰⁴ Yet concurrently, the *NFFC* decision demonstrated the breadth of the types of effects that EPA *still* must consider, analyze, and support with substantial evidence, and that EPA can fail to do so, *even under that less stringent standard*.⁶⁰⁵

An additional fundamental flaw has been EPA’s failure to grapple with, or even acknowledge, the true costs or risks of registrations.⁶⁰⁶ In that regard, the *NFFC* precedent fleshes out the risk side of the FIFRA’s risk-benefit analysis and underlines that the textual mandate to EPA for “unreasonable adverse effect on the environment” includes not just environmental effects, but also social and economic ones. These economic effects include the economic costs to individual farmers suffering crop damage from pesticide drift and the broader anti-competitive market costs resulting from the approval of pesticide use on patented GE seeds. It also includes the social effect of pesticide use on rural and farming communities. EPA must examine these effects, must quantify them when there is record evidence for so doing, and must support its conclusion about whether they are reasonable in conjunction with the purported benefits of the pesticide registration, with substantial evidence in the record.

The same goes for EPA’s lapses when it comes to environmental and human health costs, data, and adverse effects of pesticides.⁶⁰⁷ *Pollinator I* and *Enlist Duo* both emphasize EPA’s duties to examine adverse effects to non-target species—honey bees in the case of *Pollinator I* and monarch butterflies in the case of *Enlist Duo*—and support the agency’s conclusion with substantial evidence. The *Nanosilver* decision addresses human health effects, requiring EPA to examine critically the risks to the public at large before it conditionally approves new pesticide active ingredients.

One singular weakness of registration has been EPA’s reliance on regulation through label instructions rather than use limitations.⁶⁰⁸ The *NFFC* decision for the first time requires EPA to support with substantial evidence the efficacy and practicability of its labels and consider whether or not farmers can follow them in real-world farming conditions. It will

⁶⁰³ *Nanosilver*, 857 F.3d 1030, 1042 (9th Cir. 2017).

⁶⁰⁴ *Enlist Duo*, 966 F.3d 893, 914 (9th Cir. 2020).

⁶⁰⁵ *NFFC*, 960 F.3d 1120, 1142 (9th Cir. 2020).

⁶⁰⁶ See U.S. GOV’T ACCOUNTABILITY OFFICE, *supra* note 89, at 32 (explaining how several respondents expressed concern over new use of the pesticide without complete data or full rigorous review and how EPA might miss problems caused by the new use).

⁶⁰⁷ *Id.*

⁶⁰⁸ See discussion *supra* Part IV.B.6.c.iv (EPA’s reliance on label instructions makes actual regulation difficult because label instructions have been confusing for farmers to follow and comply with).

no longer be enough for EPA to make a finding of “no unreasonable adverse effects” predicated on mitigation the agency assumes but has not assessed and supported.

Another huge problem has been the conflict and inconsistency between EPA’s registration of pesticides under FIFRA and its duties under the ESA.⁶⁰⁹ EPA’s methodology and approach for common species is not scientifically defensible for endangered species, nor does EPA have the expertise alone to assess harms to them.⁶¹⁰ However, a growing body of cases have established EPA can no longer flout its ESA duties for pesticide decisions, must comply with both statutes in making such decisions, and must use ESA metrics, not FIFRA metrics, for ESA decisions.⁶¹¹

Finally, EPA has escaped accountability and transparency for many of its regulatory shortcomings, hiding in the weeds of agency deference. Judge Smith’s concurrence in *Pollinator Stewardship I* specifically addressed the rigor of substantial evidence review. The *NFFC* decision provided a meticulous review of the administrative record, holding repeatedly where EPA’s decision was flatly contrary to the evidence before the Court. Even in the *Enlist Duo* decision largely upholding the registration, the panel carefully reviewed and rejected the agency’s argument regarding impacts on monarch butterflies. All of these cases show the growing strength of substantial evidence judicial review.

Much, much more is needed, including programmatic legislative and regulatory action. And in the interim, there is plenty still up in the air. But the judicial winds seem to have shifted, blowing a gathering storm of long-overdue and urgently needed improvements, for the betterment of health and environmental protection. EPA would do well to catch the drift.

⁶⁰⁹ See discussion *supra* Part V.D (discussing EPA’s failure to meet its ESA duties when registering pesticides under FIFRA).

⁶¹⁰ See discussion *supra* Part V.D.

⁶¹¹ See *supra* notes 536–540 and accompanying text.