
NOTES

"PRODUCTIVE HARMONY:" USING NEPA AND THE ESA TO MITIGATE PESTICIDE FIELD TRIALS

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I. INTRODUCTION

The Congress . . . declares that it is the continuing policy of the Federal Government . . . to use all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony . . . to the end that the Nation may [] fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.¹

Under United States environmental laws, when a federal agency proposes a project that will significantly affect the environment, the agency must analyze all potential adverse impacts.² Where adverse impacts to the environment are unavoidable, mitigation is required.³ Development projects nationwide must be approved by environmental agencies—typically the U.S. Environmental Protection Agency (EPA)—and the sought-after approval often requires mitigation, as development itself frequently entails unavoidable adverse environmental impacts.⁴ For instance, infrastructure projects that adversely affect wetlands and other aquatic resources, such as bridge and highway construction projects, generally must be mitigated to preserve the ecosystem functions of the impacted watershed.⁵ Similarly, projects that may unavoidably harm an endangered or threatened species (or its habitat) must be mitigated—typically with off-site mitigation measures—to offset the harm that may occur at the project site.⁶

Given the wide range of federal activities subject to mitigation requirements—essentially any that produce unavoidable adverse environmental impacts—it may come as a surprise that pesticide use is generally not one of them.⁷ This Note argues that pesticide use,

¹ 42 U.S.C. § 4331(a), (b)(1) (2018).

² 42 U.S.C. § 4332(C)(i)–(v) (2018).

³ *E.g.*, 40 C.F.R. § 230.93(a)(1) (2019); 16 U.S.C. § 1539(a)(2)(A)(ii) (2018).

⁴ *Permit Program Under CWA Section 404*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/cwa-404/permit-program-under-cwa-section-404> (last updated June 17, 2020).

⁵ *Id.*; § 230.93(a)(1), (b)(1).

⁶ FISH & WILDLIFE SERV., U.S. DEP'T OF THE INTERIOR, MEMORANDUM: GUIDANCE FOR THE ESTABLISHMENT, USE, AND OPERATION OF CONSERVATION BANKS (2003).

⁷ *Cf.* 42 U.S.C. § 9607(i) (2018) (no recovery for pesticide clean-up costs implies mitigation is not a concern).

particularly pesticide field trials, should be subject to mitigation requirements. Part II will explore background material on pesticides, focusing on pesticide field trials and pesticide impacts. Part III will discuss the limitations of current solutions and will be followed by a discussion of mitigation as a current solution to similar environmental problems in Part IV. Part V will then propose two mechanisms to require EPA and U.S. Department of Agriculture (USDA) to mitigate pesticide field trials: currently unrecognized applications of the National Environmental Policy Act (NEPA)⁸ and the Endangered Species Act (ESA).⁹

II. PESTICIDE BACKGROUND

A. *Pesticide Field Trials, Generally*

Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), EPA must approve a pesticide's registration before it may be sold or otherwise distributed.¹⁰ EPA may only approve a pesticide registration after determining the product will not cause any "unreasonable adverse effects on the environment,"¹¹ a determination requiring a host of data production.¹² Two classes of data required for registration are the chemical and toxicological data of the pesticide, which are most effectively collected through field testing.¹³ Although laboratory simulations of field conditions may yield adequate data, it is typically necessary to conduct the experiments in a physical field with the requisite commercial application equipment.¹⁴ Naturally, conducting field trials in a realistic environment is the most reliable way to thoroughly understand a pesticide's safety and chemical properties.¹⁵

⁸ 42 U.S.C. §§ 4321–4370 (2018).

⁹ 16 U.S.C. §§ 1531–1544 (2018).

¹⁰ 7 U.S.C. §§ 136–136y (2018); AM. BAR ASS'N SECTION OF ENV'T, ENERGY, & RES., FIFRA: FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT 1 (Lynn L. Bergeson ed., 2000) [hereinafter AM. BAR ASS'N].

¹¹ 7 U.S.C. § 136a(c)(5)(D) (2018).

¹² See § 136a(c)(1), (2)(B).

¹³ *Pesticide Registration Manual: Chapter 12 - Applying for an Experimental Use Permit*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/pesticide-registration/pesticide-registration-manual-chapter-12-applying-experimental-use-permit> (last updated Mar. 27, 2020).

¹⁴ *Id.*

¹⁵ *Id.*

In addition to the data's necessity in the pesticide registration process, EPA also uses field trial data to set food safety standards known as maximum residue limits.¹⁶ By providing EPA with pesticide field trial data, the registrant supplies the agency with a key factor in its analysis of residue data.¹⁷ Specifically, according to EPA's Office of Pesticide Programs, Health Effects Division, the general framework used to set food safety standards is to multiply consumption of the given food by pesticide residue found on that food, which yields a dietary exposure measurement.¹⁸ Then, nationally representative surveys and databases are used to conduct dietary exposure modeling to determine the acceptable risk level of a given pesticide residue,¹⁹ also referred to as the pesticide's tolerance level.²⁰ Field trial data is among the most important sources of pesticide residue data used in determining tolerance levels.²¹ Ultimately, then, field trial data is essential to two categories of environmental compliance: (1) pesticide registration and approval, enabling the chemical's sale and distribution; and (2) food safety standards, the setting of which rely on pesticide residue data generated in the registration process.

While field trials can be conducted entirely by private entities,²² the federal government typically has some level of involvement in the research. Such federal involvement is through agency sponsorship

¹⁶ *EPA Sets Tolerances as Part of the Food Safety Equation, Setting Tolerances for Pesticide Residues in Foods*, U.S. ENVTL. PROT. AGENCY, <https://www.epa.gov/pesticide-tolerances/setting-tolerances-pesticide-residues-foods> (last updated May 13, 2020); see also Org. for Econ. Cooperation & Dev. [OECD], *Guidance Document on Crop Field Trials*, at 23–26, ENV/JM/MONO(2011)50/REV1 (Sept. 7, 2016), [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono\(2011\)50/rev1&doclanguage=en](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono(2011)50/rev1&doclanguage=en).

¹⁷ AARON NIMAN, U.S. ENVTL. PROT. AGENCY, FCID 2003-08, EPA DIETARY EXPOSURE ASSESSMENT OF PESTICIDES: OVERVIEW AND EVALUATION OF UPDATED CONSUMPTION DATA ON COMMODITY INTAKE AND EXPOSURE 8 (2013), <https://www.usda.gov/sites/default/files/documents/MiniSRA%20Niman.pdf>.

¹⁸ *Id.* at 4.

¹⁹ *Id.* at 5.

²⁰ *Id.* at 8; see also *The Basics of Food Tolerances and Maximum Residue Limits*, SAFE FOOD ALLIANCE: TESTING & ANALYSIS (Oct. 4, 2019), <https://safefoodalliance.com/testing-analysis/the-basics-of-food-tolerances-and-maximum-residue-limits/>.

²¹ NIMAN, *supra* note 17.

²² See, e.g., *Agriculture and Food: Field Trials*, SGS, <https://www.sgs.com/en/agriculture-food/seed-and-crop/contract-research-services/field-trials> (last visited Dec. 4, 2020) (detailing field trial services of SGS, a globally recognized inspection, verification, testing and certification company).

of the research,²³ federal land grants,²⁴ and other federal funding of field experiments.²⁵ When an agency sponsors the pesticide trial, it is typically the Agricultural Research Service (ARS), USDA's primary in-house research agency.²⁶ To illustrate the scale of ARS presence in the United States, consider the following statistics about the agency: there are currently approximately ninety-three research facilities in the United States alone,²⁷ fifteen National Programs currently conducting 660 research projects, and a fiscal year budget of over \$1,000,000,000.²⁸ Despite ARS's massive presence, it does not sponsor every pesticide trial and is not the only mechanism of federal involvement in pesticide research.

Federal land grants are another example of agency involvement, and one kind (which also comes with financial grants) is USDA land grants to selected colleges and universities in exchange for agricultural research in coordination with its National Institute of Food and Agriculture (NIFA).²⁹ In fiscal year 2019 alone, NIFA provided agricultural research grants, totaling \$54,459,680, divided between nineteen land grant colleges and universities.³⁰

²³ See *Project Listing*, U.S. DEPT AGRIC: RES., EDUC., & ECON. INFO. SYS., https://portal.nifa.usda.gov/lmd4/projects?report_column_filters=%7B%22Type%22%3A%22%3DUSDA+INHOUSE%22%7D (last visited Dec. 4, 2020), for a database of pesticide research sponsored or conducted fully by USDA Agricultural Research Service facilities, indicated by "ARS" under "Grantee Name" column.

²⁴ See *Land-Grant Colleges and Universities*, U.S. DEPT AGRIC: NAT'L INST. FOOD & AGRIC., <https://nifa.usda.gov/land-grant-colleges-and-universities> (last visited Dec. 3, 2020), for a list of United States educational institutions that collaborate with NIFA through USDA-provided land-grants and institution-conducted agricultural research.

²⁵ See *Project Listing*, U.S. DEPT AGRIC: RES., EDUC., & ECON. INFO. SYS., https://portal.nifa.usda.gov/lmd4/projects?report_column_filters=%7B%22Type%22%3A%22GRANT%22%7D (last visited Dec. 4, 2020), for a database of pesticide research funded by USDA through various types of agricultural research grants, including small business grants, competitive grants, and "other" grants, indicated under the "Type" column.

²⁶ *About ARS*, U.S. DEPT AGRIC: AGRIC. RES. SERV., <https://www.ars.usda.gov/about-ars/> (last updated May 29, 2020).

²⁷ *Find A Location*, U.S. DEPT AGRIC: AGRIC. RES. SERV., <https://www.ars.usda.gov/people-locations/find-a-location/> (last updated Dec. 3, 2020).

²⁸ *About ARS*, *supra* note 26.

²⁹ *Agricultural Research at 1890 Land-Grant Institutions*, U.S. DEPT AGRIC: NAT'L INST. FOOD & AGRIC., <https://nifa.usda.gov/program/agricultural-research-1890-land-grant-institutions> (last visited Dec. 4, 2020).

³⁰ *Agricultural Research at 1890 Land-Grant Institutions: 2020 Request for Applications*, U.S. DEPT AGRIC: NAT'L INST. OF FOOD & AGRIC. app. A (2019),

A third mechanism of federal agency involvement is federal funding of field experiments from other sources. For example, the Regional Conservation Partnership Program (RCPP) in the Farm Bill³¹ provides federal funding from USDA's National Resources Conservation Service (NRCS) in the form of contracts and conservation easements to producers and landowners engaging in "projects that demonstrate innovative solutions to conservation challenges."³² Project eligibility turns on the single restriction of adding value to the "ability to address on-farm, watershed, and regional natural resource" issues,³³ a requirement that can be met with field research of increased sustainability or less harmful pesticides. The most recent installment of RCPP, introduced by the 2018 Farm Bill, is RCPP Alternative Funding Arrangement (AFA) competitive grants.³⁴ The primary difference is AFA funding, rather than being disbursed to the producer or landowner through contracts and conservation easements, is disbursed to regional partners, who are then responsible for providing it to the participant.³⁵ Because the primary purpose of AFA grants includes the same agricultural goal of traditional RCPP funding—to encourage conservation practices, systems, or approaches on farmland³⁶—field trials for new and potentially less harmful or higher yield pesticides qualify for the program.

Although many pesticide field trials involve one of these three mechanisms of federal involvement, some are conducted by private entities, lacking federal involvement almost entirely.³⁷ Nevertheless, EPA must approve all field trial data for FIFRA-compliant pesticide

<https://nifa.usda.gov/sites/default/files/resources/fy-2020-agricultural-research-at-1890-land-grant-institutions-rfa-20190814.pdf>.

³¹ Agriculture Improvement Act (Farm Bill) of 2018, Pub. L. No. 115-334, 132 Stat. 4490 (codified as amended in scattered sections of 2, 5, 7, 12, 15–16, 18–22, 25, 31, 33–34, 39–40, 42–43, 47 U.S.C.).

³² NAT. RES. CONSERVATION SERV., U.S. DEP'T AGRIC., USDA-NRCS-NHQ-RCPP-20-GEN0010751, *Notice of Funding Opportunity for NRCS's Regional Conservation Partnership Program (RCPP)—RCPP Alternative Funding Arrangement for Federal Fiscal Year (FY) 2020*, GRANTS.GOV, <https://www.grants.gov/web/grants/view-opportunity.html?oplid=325380> (last updated Apr. 20, 2020) [hereinafter *Notice of Funding Opportunity*].

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.*

³⁶ *Id.*

³⁷ See, e.g., *Agriculture and Food: Field Trials*, *supra* note 22.

registration.³⁸ Because federal registration and approval occurs regardless of the level of agency involvement in the field trials, this Note will later propose that such registration and approval qualifies as "federal action," requiring agency mitigation even when field trials are conducted by private entities.³⁹

B. Impacts of Pesticides, Generally

Pesticides impact all aspects of life, from human health to wildlife and global food scarcity.⁴⁰ Positive effects of pesticide use on crops include increased crop yield and a lower carbon footprint, which leads to a decrease in global food scarcity and a higher economic return.⁴¹ Negative effects of crop pesticide use, however, include: nutrient pollution, causing a host of detrimental effects to human health, the environment, and the economy;⁴² detectable residues in food, causing significant health problems, particularly for children;⁴³ and pesticide drift, harming endangered species and nearby crops, causing substantial economic losses.⁴⁴ While both positive and negative impacts result from crop pesticide use, each impact stems from a field trial enabling the given chemical to be registered under FIFRA and

³⁸ See *supra* Part II.A.

³⁹ See *infra* Part V.A.1.

⁴⁰ Daniel L. Moeller, *Superfund, Pesticide Regulation, and Spray Drift: Rethinking the Federal Pesticide Regulatory Framework to Provide Alternative Remedies for Pesticide Damage*, 104 IOWA L. REV. 1523, 1529–30 (2019).

⁴¹ Ann Jaworski, *Encouraging Climate Adaptation Through Reform of Federal Crop Insurance Subsidies*, 91 N.Y.U. L. REV. 1684, 1689 (2016); Moeller, *supra* note 40, at 1528.

⁴² *Nutrient Pollution: The Effects*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/nutrientpollution/effects> (last updated Feb. 4, 2019).

⁴³ OFFICE OF CHILDREN'S HEALTH PROT. ET AL., U.S. ENVTL. PROT. AGENCY, EPA 240-R-00-006, AMERICA'S CHILDREN AND THE ENVIRONMENT: A FIRST VIEW OF AVAILABLE MEASURES 28–29 (2000), <https://www.epa.gov/sites/production/files/2014-05/documents/ace-report.pdf> [hereinafter ACE REPORT 1]; see also OFFICE OF CHILDREN'S HEALTH PROT. ET AL., U.S. ENVTL. PROT. AGENCY, EPA 240-R-03-001, AMERICA'S CHILDREN AND THE ENVIRONMENT: MEASURES OF CONTAMINANTS, BODY BURDENS, AND ILLNESSES 40–41 (2d. ed. 2003), https://www.epa.gov/sites/production/files/2014-05/documents/acereport2_21final.pdf [hereinafter ACE REPORT 2]; U.S. ENVTL. PROT. AGENCY, 100K19004, AMERICA'S CHILDREN AND THE ENVIRONMENT 23–27 (2019), <https://www.epa.gov/sites/production/files/2019-10/documents/ace2019-v17s.pdf> [hereinafter 2019 UPDATE TO ACE REPORT 3].

⁴⁴ Moeller, *supra* note 40, at 1530–31; Ctr. for Food Safety, *'Dangerous Drift-Prone Pesticide' Threatens Millions of Acres, Hundreds of Endangered Species: Farmers and Conservationists Sue EPA, Monsanto*, ECOWATCH (Feb. 12, 2018, 2:11 PM), <https://www.ecowatch.com/pesticide-drift-lawsuit-xtendimax-2534117304.html>.

legally sold in the United States, which is why this Note argues field trials should be mitigated.

Beginning with positive effects of crop pesticides, since the earliest federal regulation of pesticides in 1910,⁴⁵ significant increases in food production have resulted from the use of chemicals on crops.⁴⁶ Specifically, pesticide use allowed average food production per 100 acres to double between 1950 and 2013.⁴⁷ This increased crop yield was, and still is, a necessary advancement to address food insecurities resulting from a continuously increasing population and, simultaneously, decreasing land available for crop production.⁴⁸

In addition to positively impacting food security, increased yield provides an economic benefit to both producers and consumers: first, increased production yields a higher economic return to farmers selling their product at the market; and second, increased production results in lower food prices for consumers.⁴⁹ Increased yield also results in a lower carbon footprint. Specifically, producing a given quantity of product from a higher-yield crop will require less water, land, and overall energy (a lower carbon footprint) compared to that which is required to produce the same quantity from a lower-yield crop on the same farm.⁵⁰ Ultimately, crop pesticide use has been an adaptation strategy to population growth and food scarcity, allowing for increased production on smaller pieces of land, creating a higher economic return, and resulting in a comparatively lower carbon footprint.

Unfortunately, the benefits of pesticide-induced increases in yield come with consequences to human health, the environment, and the economy. The three major hazards that will be discussed are nutrient pollution, detectable residues in food, and pesticide drift. First, arguably the most impactful consequence of pesticide use is nutrient pollution,

⁴⁵ AM. BAR ASS'N, *supra* note 10.

⁴⁶ Hembree Brandon, *Doing a World of Good: Benefits of Pesticides*, FARMPROGRESS (May 3, 2002), <https://www.farmprogress.com/management/doing-world-good-benefits-pesticides>.

⁴⁷ Moeller, *supra* note 40, at 1528.

⁴⁸ *See, e.g., id.* at 1529 (pointing out that pesticide use in India allowed successful plantings and harvests of cabbage in an area previously inhospitable to the vegetable).

⁴⁹ *Id.* at 1528.

⁵⁰ Jaworski, *supra* note 41, at 1688.

or excess nitrogen and phosphorous, in waterways.⁵¹ While both nitrogen and phosphorous are naturally occurring elements in aquatic ecosystems that are necessary for the maintenance of algae and plants (which serve as habitat and food sources for a host of aquatic wildlife), excess levels can lead to potentially toxic algal blooms that significantly impact human health, the environment, and the economy.⁵² One substantial cause of nutrient pollution is runoff from farms.⁵³ Despite fertilizers serving as the primary source of farm-caused nutrient pollution,⁵⁴ some pesticides, specifically organophosphates, contain nitrogen and phosphorous and contribute to nutrient pollution because of their ingredients and ability to break down more rapidly than other pesticides.⁵⁵

Harms caused by nutrient pollution can be significant. Physical contact with polluted water or consumption of contaminated fish or shellfish can expose humans to toxic algal blooms caused by nutrient pollution.⁵⁶ Effects of exposure to such toxicity can include rashes, stomach or liver illness, respiratory problems, and even adverse neurological effects.⁵⁷ Toxic algal blooms similarly impact, and often kill, aquatic animals.⁵⁸ Even if a bloom is non-toxic, however, the algae can clog fish gills and block sunlight from reaching the ecosystem, eventually killing most of the organisms below the surface.⁵⁹ When an algal bloom entirely suffocates an aquatic ecosystem, the area is deemed a "dead zone," because aquatic life cannot survive there.⁶⁰ Unsurprisingly, perhaps, dead zones can have significant effects on

⁵¹ *Nutrient Pollution: The Issue*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/nutrientpollution/issue> (last updated Feb. 4, 2019).

⁵² *Id.*

⁵³ *Nutrient Pollution: Sources and Solutions*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/nutrientpollution/sources-and-solutions> (last updated Feb. 4, 2019).

⁵⁴ *See id.*

⁵⁵ *Application Note: Automated, One-Step SPE and Concentration of Nitrogen and Phosphorous Containing Pesticides in Water*, FLUID MGMT. SYS., <http://fms-inc.com/wp-content/uploads/2018/06/Automated-One-Step-SPE-and-Concentration-of-Nitrogen-and-Phosphorus-Containing-Pesticides-in-Water.pdf> (last visited Dec. 4, 2020).

⁵⁶ *Nutrient Pollution: The Issue*, *supra* note 51.

⁵⁷ *Nutrient Pollution: The Effects: Human Health*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/nutrientpollution/effects-human-health> (last updated Apr. 15, 2019).

⁵⁸ *Nutrient Pollution: The Effects: Environment*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/nutrientpollution/effects-environment> (last updated Apr. 15, 2019).

⁵⁹ *Id.*

⁶⁰ *Id.*

the economy, particularly because the largest events usually occur downstream from highly productive agricultural zones in waters of high fish and shellfish productivity.⁶¹ For example, the Mississippi River Basin drains thirty-one agriculturally productive states, resulting in an annual summer dead zone in the Gulf of Mexico that measured 5,840 square miles in 2013⁶² and increased to 6,952 square miles in 2019.⁶³ Economic losses from algal blooms are significant, with national annual losses estimated at \$1,000,000,000 in the tourism industry, plus an additional "tens of millions" in losses to the commercial fishing and shellfish industries.⁶⁴

A second major consequence of pesticide use is detectable residues in food. Because children are the most susceptible to pesticide residues in food, the resulting health impacts are most prevalent in children.⁶⁵ Data from USDA's Pesticide Data Program between the years of 1994 and 1996 showed that, of nineteen foods frequently eaten by children, twenty-five percent tested positive for carcinogenic pesticides, and thirty-four percent for neurotoxic pesticides.⁶⁶ When the data was analyzed in 2001 for organophosphates alone, which are particularly toxic to the nervous system and make up half of all U.S. insecticides,⁶⁷ almost twenty percent of sampled foods tested positive.⁶⁸ As a result of the high levels of detectable chemical residues, EPA tightened restrictions, specifically on organophosphates.⁶⁹ Despite EPA's restrictions and resulting decreases in detectable residues,⁷⁰ however, childhood cancer cases increased from 154–161 cases per million children between 1992 and 1994, to 185–191 cases per million children between 2014 and 2016.⁷¹ In addition to cancer, other health effects

⁶¹ *Nutrient Pollution: The Effects: Economy*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/nutrientpollution/effects-economy> (last updated Feb. 4, 2019).

⁶² *Nutrient Pollution: The Effects: Environment*, *supra* note 58.

⁶³ Miss. River/Gulf of Mex. Hypoxia Task Force, *Northern Gulf of Mexico Hypoxic Zone*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/ms-htf/northern-gulf-mexico-hypoxic-zone> (last updated Aug. 17, 2020).

⁶⁴ *Nutrient Pollution: The Effects: Economy*, *supra* note 61.

⁶⁵ See ACE REPORT 2, *supra* note 43, at 40, III.

⁶⁶ ACE REPORT 1, *supra* note 43, at 29.

⁶⁷ ACE REPORT 2, *supra* note 43, at 40.

⁶⁸ *Id.* at 41.

⁶⁹ 2019 UPDATE TO ACE REPORT 3, *supra* note 43, at 14.

⁷⁰ *Id.* at 14–15.

⁷¹ *Id.* at 26–27.

from residual pesticides in food include effects on the reproductive, immune, and nervous systems.⁷²

A third major consequence of pesticide use is pesticide drift, which can harm endangered species and nearby crops, resulting in substantial economic losses.⁷³ Drift can occur in two ways: (1) particle drift, when liquid spray droplets are carried by the wind; or (2) vapor drift, when liquid spray evaporates, is transported by the air and deposited on other, "non-target" organisms.⁷⁴ The often fatal damage caused by drift can take weeks or years to appear.⁷⁵ An example of the potential damage pesticide drift can cause is shown by a recent, devastating innovation in the agrochemical industry—Monsanto's "XtendiMax" pesticide.⁷⁶

XtendiMax is Monsanto's version of dicamba, an age-old weed killer known to be extremely prone to drifting.⁷⁷ What sets XtendiMax apart from other dicamba-based pesticides is that it includes Monsanto's VaporGrip technology, allegedly decreasing its ability to drift.⁷⁸ However, one of Monsanto's errors was the time gap between its release of XtendiMax and its previous introduction of "Xtend" soybean and cotton seeds, the first crop seeds genetically engineered to be dicamba-resistant, meaning the growing plants could be sprayed directly with dicamba.⁷⁹ During that time gap, farmers growing dicamba-resistant crops had to use regular, highly drift-prone dicamba during the growing season, until Monsanto unveiled its less drift-prone XtendiMax.⁸⁰ Additionally, neighboring farmers growing non-resistant crops complained that even XtendiMax, once released, was drifting onto and damaging their crops.⁸¹ Two significant consequences occurred from dicamba drift during the 2017 crop season, the first season of

⁷² *Food Safety: Pesticide Residue*, WORLD HEALTH ORG. (May 16, 2016), <https://www.who.int/news-room/q-a-detail/pesticide-residues-in-food>.

⁷³ See Ctr. for Food Safety, *supra* note 44.

⁷⁴ Tanner Delvalle, *Herbicide Drift and Drift Related Damage*, PENNSTATE EXTENSION, <https://extension.psu.edu/herbicide-drift-and-drift-related-damage> (last updated Aug. 22, 2017).

⁷⁵ *Id.*

⁷⁶ Ctr. for Food Safety, *supra* note 44.

⁷⁷ *Id.*

⁷⁸ Terry Turner, *Dicamba Lawsuits*, CONSUMERNOTICE.ORG, <https://www.consumernotice.org/legal/dicamba-lawsuits/> (last updated July 17, 2020).

⁷⁹ See *id.*

⁸⁰ *Id.*

⁸¹ *Id.*

XtendiMax use: harm to nearby endangered species, and damage to non-resistant crops.⁸²

During the "unprecedented disaster" of the 2017 crop season, XtendiMax drift caused potentially devastating harms to pollinator species, and to "hundreds of endangered animal and plant species."⁸³ During XtendiMax's approval process, EPA concluded approval "might harm an extraordinary number" of protected animals in "dozens" of states.⁸⁴ Despite its own conclusion, however, EPA approved XtendiMax without consulting with federal wildlife agencies as required by the ESA, putting "hundreds" of endangered species at risk, including whooping cranes, grey wolves, and Indiana bats, to name a few.⁸⁵

In addition to harming endangered species, the 2017 dicamba drift caused unprecedented damage to non-resistant crops.⁸⁶ Over 3,000,000 acres of soybeans—each acre worth approximately \$25,000⁸⁷—plus countless fruit and vegetable crops were damaged or destroyed.⁸⁸ Other claims of damage from dicamba drift include a single-farm-loss of \$1,500,000 in peach sales, and a six-farm operation claiming a loss in excess of \$5,000,000.⁸⁹ By March 2019, the unprecedented scale of dicamba drift damage resulted in the "dicamba lawsuits," consolidated litigation that includes thirty-seven lawsuits over the damage.⁹⁰

III. CURRENT SOLUTIONS ARE LIMITED

Currently available solutions to the problem of pesticide consequences include common law legal claims against the individual pesticide company, against EPA as the approving agency, or both, sometimes leading to settlement or litigation.⁹¹ Claims of statutory violation

⁸² Ctr. for Food Safety, *supra* note 44.

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ See Sam Mehmet, *Court Overturns EPA Approval of Herbicide Due to "Understated Risk,"* NEW FOOD MAG. (June 4, 2020), <https://www.newfoodmagazine.com/news/111711/court-overturns-epa-approval-of-herbicide-due-to-understated-risk/>.

⁸⁷ Moeller, *supra* note 40, at 153; *Pesticide Drift Resource Page*, IOWA FARMERS UNION (2019), <https://iowafarmersunion.org/policy/pesticide-drift/>.

⁸⁸ Ctr. for Food Safety, *supra* note 44.

⁸⁹ Turner, *supra* note 78.

⁹⁰ *Id.*

⁹¹ See *id.*

under some of the most common federal environmental statutes against EPA or the individual company are often fruitless because of prior court interpretations or specific statutory provisions.

For example, under the National Environmental Policy Act of 1969, all federal agencies must submit detailed statements considering environmental costs and benefits of any proposed "major federal actions significantly affecting the quality of the human environment."⁹² It may seem that approving a pesticide under FIFRA would universally qualify for this requirement. Some courts, however, have recognized a "functional equivalence" doctrine, most commonly in the context of statutes EPA enforces, under which the court typically finds EPA "need not comply with NEPA despite the absence of any express statutory exemption."⁹³ As discussed below, this inconsistently recognized doctrine of functional equivalence misinterprets NEPA as exempting EPA from its statutory duties; NEPA *is* a potential mechanism for the requirement of pesticide field trial mitigation.⁹⁴

Next, under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), EPA or other government entities may recover costs incurred to clean up contamination from parties deemed potentially responsible for a facility's release, or substantial threat of release, of a hazardous substance.⁹⁵ Despite pesticide labels almost invariably announcing the chemical as a "hazardous" substance,⁹⁶ a statutory exclusion in CERCLA itself bars recovery of costs incurred for pesticide clean-up.⁹⁷ The pesticide exclusion prohibits CERCLA recovery "for any response costs or damages resulting from the application of a pesticide product registered" under FIFRA.⁹⁸ Thus, CERCLA is not an available mechanism to require pesticide field trial mitigation.

Finally, under the Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA), it is unlawful to discharge a

⁹² National Environmental Policy Act of 1969 § 102(C), 42 U.S.C. § 4332(C) (2018).

⁹³ CRAIG. N. JOHNSTON ET AL., LEGAL PROTECTION OF THE ENVIRONMENT 115 (4th ed. 2018).

⁹⁴ See *infra* Part V.A.1.

⁹⁵ JOHNSTON ET AL., *supra* note 93, at 676.

⁹⁶ Moeller, *supra* note 40, at 1529.

⁹⁷ 42 U.S.C. § 9607(i) (2018).

⁹⁸ *Id.*

pollutant without a permit.⁹⁹ The most common CWA permit is the National Pollutant Discharge Elimination System, or NPDES, permit, which allows discharges into navigable waters.¹⁰⁰ While FIFRA-registered chemical and biological pesticides that may leave a residue in navigable waters are subject to this permit requirement,¹⁰¹ it is an inadequate mechanism for mitigation because NPDES permit conditions do not include mitigation components.¹⁰² Section 404 of the CWA, however, does require mitigation.¹⁰³ Specifically, section 404 permits allow the discharge of dredged or fill material into navigable waters.¹⁰⁴ Under section 404 permit requirements, adverse impacts to aquatic resources—including wetlands and streams—must be "avoided and minimized to the extent practicable," and when the impacts are unavoidable, compensatory mitigation is required to replace the loss of aquatic resource functions within the project's watershed.¹⁰⁵ Although the negative impacts of pesticides on aquatic resources are unavoidable, section 404 and its attendant mitigation requirement are not applicable to pesticides because they are not "dredged or fill material," and as a result their application during field trials is not an "activity associated with a discharge of" such materials.¹⁰⁶

⁹⁹ 33 U.S.C. § 1311(a) (2018).

¹⁰⁰ 33 U.S.C. § 1342(a) (2018).

¹⁰¹ *Nat'l Cotton Council of Am. v. U.S. Env'tl. Prot. Agency*, 553 F.3d 927, 940 (6th Cir. 2009) (vacating an EPA regulation exempting "residuals" of FIFRA-registered pesticides from NPDES requirements). Ultimately, the Sixth Circuit ruled any residual nature of a pesticide in question is not relevant, and the applicator must acquire an NPDES permit to apply a chemical or biological pesticide that may end up in water, even if only a residual amount. *Id.*; see also *National Pollutant Discharge Elimination System (NPDES): Pesticide Permitting*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/npdes/pesticide-permitting> (last updated Aug. 4, 2020).

¹⁰² See *National Pollutant Discharge Elimination System (NPDES): NPDES Permit Basics*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/npdes/npdes-permit-basics> (last updated Aug. 3, 2020).

¹⁰³ Compensatory Mitigation for Losses of Aquatic Resources, 40 C.F.R. § 230.91 (2019).

¹⁰⁴ 33 U.S.C. § 1344(a) (2018).

¹⁰⁵ U.S. ENVTL. PROT. AGENCY, EPA-843-F-08-002, WETLANDS COMPENSATORY MITIGATION, https://www.epa.gov/sites/production/files/2015-08/documents/compensatory_mitigation_fact-sheet.pdf (last visited Dec. 4, 2020) [hereinafter WETLANDS COMPENSATORY MITIGATION].

¹⁰⁶ 40 C.F.R. § 232.2 (2019) ("Dredged material means material that is excavated or dredged from waters of the United States. . . . [T]he term fill material means material placed in waters of the United States where the material has the effect of: (i) Replacing any portion of a water of the United States with dry land; or (ii) Changing the bottom elevation of any portion of a water of the United States. . . . Examples of such fill material include, but are not limited to: rock, sand, soil, clay, plastics, construction debris,

Despite the inadequacies of NEPA, CERCLA, and the CWA for pesticide-related mitigation and liability, common law claims are available in some circumstances. While negligence actions may be available in severe cases against EPA,¹⁰⁷ the action more likely to be successful is a product liability claim against the individual pesticide company.¹⁰⁸ One example of a successful product liability action against a pesticide company is the recent, unprecedented jury verdict against two pesticide producers, Monsanto and BASF, for damage to a peach orchard caused by dicamba drift, totaling \$15,000,000 in actual damages and an additional \$250,000,000 in punitive damages.¹⁰⁹

In *Bader Farms, Inc.*, plaintiff Bader owned Bader Farms in Missouri, a 1,000-acre peach orchard which, prior to 2016, supplied more than half the state's peaches from nearly 110,000 trees that produced 6,000,000 pounds of peaches annually, with sales averaging \$4,300,000.¹¹⁰ In 2015, however, Bader began noticing damage to his peach trees after neighboring farms started spraying Monsanto- and BASF-produced dicamba on their crops.¹¹¹ Within one year, the damage spread to 700 acres of Bader's peach orchard, severely affecting 20,000 trees.¹¹² In the product liability lawsuit, Bader claimed that both Monsanto and BASF knowingly released "defective, unsafe dicamba-based herbicides without proper testing and training."¹¹³ Specifically, Bader's complaint alleged that because they knew their dicamba products would drift, both companies (1) "conspired to withhold accurate and complete data" from federal and state agencies to avoid delaying the approval processes; and (2) "failed to adequately train farmers and

wood chips, overburden from mining or other excavation activities, and materials used to create any structure or infrastructure in the waters of the United States. . . . The term fill material does not include trash or garbage.").

¹⁰⁷ See Ctr. for Food Safety, *supra* note 44.

¹⁰⁸ See Turner, *supra* note 78.

¹⁰⁹ Bader Farms, Inc. v. Monsanto Co., No. 1:16-cv-00299-SNLJ, 2020 WL 1503395, at *1 (E.D. Mo. Feb. 28, 2020); see also Johnathan Hettinger, *For Dicamba Lawsuits, Bader Verdict Is Just the Beginning*, MIDWEST CTR. FOR INVESTIGATIVE REPORTING: DICAMBA ON TRIAL (Feb. 20, 2020), <https://investigatamidwest.org/2020/02/20/for-dicamba-lawsuits-bader-verdict-is-just-the-beginning/>.

¹¹⁰ Turner, *supra* note 78.

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ 3d Amended Complaint at 13, Bader Farms, Inc. v. Monsanto Co., No. 1:16-cv-00299-SNLJ (E.D. Mo. Apr. 5, 2019).

applicators" on proper use.¹¹⁴ Bader additionally alleged that Monsanto individually "willfully refused" to allow proper testing by university researchers.¹¹⁵

Ultimately, the court upheld the jury verdict of \$15,000,000 in actual damages and \$250,000,000 in punitive damages, to be shared between Monsanto and BASF as a joint venture in a conspiracy, for their negligent design or failure to warn of the drift risk associated with their dicamba products.¹¹⁶ Since the jury verdict in *Bader Farms, Inc.*, Monsanto and BASF released new, allegedly less volatile formulations of their dicamba herbicides.¹¹⁷ However, the companies currently face at least 130 lawsuits over the products, and since 2017, at least 5,000 farmers have filed dicamba-related complaints with state agencies.¹¹⁸

Despite inadequate statutory mechanisms and traditionally unsuccessful common law claims, the *Bader Farms, Inc.* verdict may pave the way for a shifting landscape of product liability claims. While increased success of product liability actions would provide a beneficial avenue of recovery against pesticide companies, this Note will propose statutory mechanisms that can prevent the harms from occurring and hold federal agencies accountable when such harms do occur.

IV. CURRENT SOLUTION TO SIMILAR PROBLEMS: MITIGATION

Mitigation is the act of making impacts less severe.¹¹⁹ While Congress can require mitigation in the language of a statute, the controlling agency can also require mitigation in regulations.¹²⁰ Agencies can satisfy mitigation requirements by changing the implementation of a project to avoid or minimize impacts, or by offsetting unavoidable impacts of the project with compensatory mitigation.¹²¹

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *Bader Farms, Inc. v. Monsanto Co.*, No. 1:16-cv-00299-SNLJ, 2020 WL 1503395, at *1–3 (E.D. Mo. Feb. 28, 2020).

¹¹⁷ Hettinger, *supra* note 109.

¹¹⁸ *Id.*

¹¹⁹ *Mitigate*, BLACK'S LAW DICTIONARY (5th pocket ed. 2016).

¹²⁰ *See* 40 C.F.R. § 230.93 (2019).

¹²¹ *See* WETLANDS COMPENSATORY MITIGATION, *supra* note 105.

A. Mitigation Under the CWA

The CWA requires a section 404 permittee to engage in compensatory mitigation to offset adverse impacts of projects that are otherwise unavoidable.¹²² EPA defines "compensatory mitigation" to include four options: (1) enhancement, (2) establishment, (3) restoration, (4) "and/or in certain circumstances" preservation of aquatic resources.¹²³ Additional guidance from EPA clarifies that when section 404 permits require compensatory mitigation, there are three ways to satisfy the requirement: (1) permittee-responsible mitigation, (2) mitigation banks, or (3) in-lieu fee programs.¹²⁴ Although all three mechanisms are available to permittees, EPA prefers mitigation banks (according to its regulations), followed by in-lieu fee programs, then permittee-responsible mitigation.¹²⁵

Mitigation banks are off-site areas (meaning the mitigation does not occur in the same site as the permitted activity, though it must be in the same watershed) operated by a separate entity, from which the section 404 permittee purchases credits to offset its project impacts.¹²⁶ The regulatory definition of a mitigation bank is:

[A] site, or suite of sites, where resources (e.g., wetlands, streams, riparian areas) are restored, established, enhanced, and/or preserved for the purpose of providing compensatory mitigation for impacts authorized by [404] permits. In general, a mitigation bank sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the mitigation bank sponsor.¹²⁷

In-lieu fee programs also mitigate off-site, but unlike banking programs, the mitigation may occur after the permitted impacts.¹²⁸ Essentially, in an in-lieu fee program, the permittee pays a third-party government or non-profit entity to take on its obligation.¹²⁹ Typically, the third party collects fees from various permittees until it can

¹²² *Id.*

¹²³ 40 C.F.R. § 230.92 (2019).

¹²⁴ *Id.*

¹²⁵ *Background About Compensatory Mitigation Requirements Under CWA Section 404*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/cwa-404/background-about-compensatory-mitigation-requirements-under-cwa-section-404> (last updated July 16, 2020).

¹²⁶ *See* WETLANDS COMPENSATORY MITIGATION, *supra* note 105.

¹²⁷ 40 C.F.R. § 230.92.

¹²⁸ *See* WETLANDS COMPENSATORY MITIGATION, *supra* note 105.

¹²⁹ *Id.*

eventually build and maintain a mitigation site.¹³⁰ Permittee-responsible mitigation differs in that it can be on- or off-site, and the permittee (or its contractor or other agent) performs the mitigation and retains responsibility for its success.¹³¹ Ultimately, EPA prefers mitigation banks because of consistency and compliance difficulties that may arise with in-lieu fee programs and permittee-responsible mitigation.

Mitigation banking requirements are straightforward: the bank must be in the same watershed as the project, and the credits purchased must reflect the same wetland functions impacted by the project as those the bank restores.¹³² Because the bank must be in the same watershed, the second requirement ensures the functions impaired by the permitted activity are restored at another site within the same watershed, so that, cumulatively, the watershed is not impaired.

Regulatory encouragement of mitigation banking has been successful in increasing its implementation as the preferred way to comply with CWA mandates to offset otherwise unavoidable impacts to watershed functions.¹³³ For instance, as of 2018, there were 1,328 ongoing mitigation banking projects at approved sites in the United States, covering a total of 67,763,700 acres.¹³⁴ These acres represent compliance with regulations that acknowledge and serve the Congressional intent of the CWA—to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."¹³⁵

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² *Id.*

¹³³ See *Using GIS-Modeling to Address a State Wetland Mitigation Banking Policy*, JOHNSON ENGINEERING: NEWS & COMMUNITY (June 29, 2015), <https://johnsonengineering.com/blog/using-gis-modeling-to-address-a-state-wetland-mitigation-banking-policy>; Vikram Jhavar, *Understanding the Basics of Mitigation Banking*, INVESTOPEDIA, <https://www.investopedia.com/articles/dictionary/031615/understanding-basics-mitigation-banking.asp> (last updated Feb. 27, 2020) (discussing the history of the expanded practice of mitigation banking).

¹³⁴ *Ecosystem Markets Map*, FOREST TRENDS ASS'N, <https://www.forest-trends.org/project-list/#s> (last visited Dec. 4, 2020). Additionally, see *Mapping Ecosystem Markets: About the Data*, FOREST TRENDS ASS'N, <https://www.forest-trends.org/about-our-project-data/> (last visited Dec. 4, 2020), for information about the data (e.g., compilation of the data was completed in 2017).

¹³⁵ 33 U.S.C. § 1251(a) (2018).

B. Mitigation Under the ESA

Unlike the CWA, which mandates specific acts of mitigation to comply with section 404 permit requirements, the ESA takes a voluntary approach in terms of specific mitigation methods.¹³⁶ One reason for the difference in addressing environmental risk may be the differing expertise and institutional cultures of the implementing agencies.¹³⁷ While EPA is responsible for implementing the CWA, ESA implementation is split between the Department of Interior's U.S. Fish and Wildlife Service (USFWS), which has jurisdiction over terrestrial species and exclusively freshwater fish, and the Department of Commerce's National Marine Fisheries Service (NMFS), which has jurisdiction over marine species and fish species that live in both fresh and saltwater.¹³⁸

The ESA prohibits, among other activities, "takes" of endangered or threatened animals,¹³⁹ and defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt" any such conduct.¹⁴⁰ However, a major exception to the take prohibition is the incidental take permit, which allows a taking where it is an unavoidable side effect of, or incidental to, an otherwise lawful activity.¹⁴¹ To apply for an incidental take permit, an applicant must submit a Habitat Conservation Plan (HCP) detailing anticipated impacts to the species, what it intends to do to "minimize and mitigate" those impacts, how it will fund minimization and mitigation, and available alternatives.¹⁴² So long as the relevant agency determines the applicant will fund the HCP and, "to the maximum extent practicable," will minimize and mitigate impacts of the incidental taking, it will approve the HCP after public notice and opportunity for comment.¹⁴³ While the ESA does not mandate specific acts of mitigation, the agency can

¹³⁶ See FISH & WILDLIFE SERV., U.S. DEPT OF THE INTERIOR, *supra* note 6, at 2–4.

¹³⁷ NAT'L RESEARCH COUNCIL, *ASSESSING RISKS TO ENDANGERED AND THREATENED SPECIES FROM PESTICIDES* 3, 35 (2013).

¹³⁸ JOHNSTON ET AL., *supra* note 93, at 760.

¹³⁹ 16 U.S.C. § 1538(a)(1)(B)–(C) (2018); *ESA Basics: 40 Years of Conserving Endangered Species*, U.S. FISH & WILDLIFE SERV. (Feb. 2017), https://www.fws.gov/endangered/esa-library/pdf/ESA_basics.pdf.

¹⁴⁰ 16 U.S.C. § 1532(19) (2018).

¹⁴¹ 16 U.S.C. § 1539(a)(1)(B) (2018).

¹⁴² *ESA Basics: 40 Years of Conserving Endangered Species*, *supra* note 139; 16 U.S.C. § 1539(a)(2)(A)(i)–(iii).

¹⁴³ 16 U.S.C. § 1539(a)(2)(B)(ii)–(iii), (c).

withdraw an incidental take permit if it discovers the permittee ceased compliance with the HCP, including its plans for minimizing and mitigating impacts.¹⁴⁴

The primary suggested method to comply with ESA mitigation is compensatory conservation banking, which the USFWS officially encouraged in its first guidance memo addressing the subject in 2003.¹⁴⁵ In that memo, USFWS described the use of conservation banks as a potential method of mitigation under HCPs to comply with the incidental take permit requirements.¹⁴⁶ Similar to wetland mitigation banking in the CWA context, conservation banking operates through off-site, approved conservation banks that sell credits to permittees who need to offset their impacts, in exchange for maintaining land that contributes to the conservation of the particular species addressed in the HCP.¹⁴⁷ Although the ESA does not require conservation banking, and this type of banking is not as established as wetland mitigation banking under the CWA, it is still a successful mechanism of mitigation; for example, as of January 2020, the USFWS approved more than 130 conservation banks in the United States, covering 160,000 acres of habitat for over 70 threatened or endangered species.¹⁴⁸

C. Mitigation Under NEPA

Mitigation under NEPA is unlike mitigation under both the CWA and the ESA because it is essentially a procedural requirement in that, generally, it must merely be considered.¹⁴⁹ NEPA requires federal agencies to submit an Environmental Impact Statement (EIS) considering adverse impacts of, and available alternatives to, any proposed "major federal actions significantly affecting the quality of the human environment."¹⁵⁰ The Council on Environmental Quality (CEQ), responsible for implementing NEPA, issued regulations clarifying that

¹⁴⁴ See 16 U.S.C. § 1539(a)(2)(C).

¹⁴⁵ FISH & WILDLIFE SERV., U.S. DEPT OF THE INTERIOR, *supra* note 6, at 4, 8, 15.

¹⁴⁶ *Id.*

¹⁴⁷ *Id.* at 2.

¹⁴⁸ *For Landowners / Conservation Banking*, U.S. FISH & WILDLIFE SERV.: ENDANGERED SPECIES, <https://www.fws.gov/endangered/landowners/conservation-banking.html> (last updated Jan. 30, 2020).

¹⁴⁹ KATHLEEN C. SCHRODER & TIMOTHY R. CANON II, ROCKY MOUNTAIN MINERAL LAW FOUND., *MITIGATION & NEPA: HOW DOES A PROCEDURAL REQUIREMENT IMPACT AGENCY DECISIONS?* *11-1 (2017), Westlaw 2017 NO. 5 RMMLF-INST 11.

¹⁵⁰ 42 U.S.C. § 4332(C) (2018).

mitigation must be considered as part of the "available alternatives" consideration.¹⁵¹ According to CEQ regulations, the alternatives section "is the heart of the environmental impact statement," and must separately "address mitigation measures not already included in the proposed action" section.¹⁵² Mitigation measures proposed in the EIS may take one of the following forms:

- (a) [a]voiding the impact altogether by not taking a certain action or parts of an action,
- (b) [m]inimizing impacts by limiting the degree or magnitude of the action and its implementation,
- (c) [r]ectifying the impact by repairing, rehabilitating, or restoring the affected environment,
- (d) [r]educing or eliminating the impact over time by preservation and maintenance operations during the life of the action, [or]
- (e) [c]ompensating for the impact by replacing or providing substitute resources or environments.¹⁵³

The U.S. Supreme Court reiterated the importance of a thorough consideration of mitigation in *Robertson v. Methow Valley Citizens Council*, where it reasoned that such consideration is essential to informed decision-making, precisely what NEPA requires.¹⁵⁴ Despite the importance of consideration, however, the Court emphasized NEPA's reliance on procedural mechanisms rather than substantive standards, and ultimately rejected a lower court's holding that NEPA requires agencies to create comprehensive mitigation plans.¹⁵⁵

Ultimately, between the CWA, the ESA, and NEPA, only the CWA mandates specific actions to comply with its mitigation requirements. Because regulations interpreting both the CWA and the ESA emphasize banking as a primary mitigation measure, however, banking should be used to mitigate pesticide field trials under the ESA. Additionally, aspects of NEPA's consideration requirements show EPA and USDA should mitigate pesticide field trials, even under NEPA.

¹⁵¹ 40 C.F.R. § 1502.14(f) (2019).

¹⁵² *Id.*; Part 1502—Environmental Impact Statement, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/r9esnepa/CEQNEPAREgs/1502.pdf> (last visited Dec. 4, 2020).

¹⁵³ 40 C.F.R. § 1508.20(a)–(e) (2019).

¹⁵⁴ 490 U.S. 332, 351–52 (1989).

¹⁵⁵ *Id.* at 352–53.

V. POTENTIAL SOLUTIONS: REQUIRING FIELD TRIAL MITIGATION

EPA and USDA should mitigate pesticide field trials to offset the potentially devastating impacts of pesticide use post FIFRA registration. While some argue that requiring permits for pesticide use in addition to FIFRA registration is enough,¹⁵⁶ environmental permits are not synonymous with pre-impact mitigation requirements.¹⁵⁷ Ideally, mitigation (or permits, for that matter) would be unnecessary because EPA approval of FIFRA registration *should* mean the agency thoroughly considered impacts and determined the pesticide will not cause any "unreasonable adverse effects on human health or the environment."¹⁵⁸ However, this is not the case, given the amount of litigation determining EPA did not comply with its statutory duty when registering a given pesticide.¹⁵⁹ Additional evidence arose after the slurry of dicamba lawsuits following the 2017 crop season previously discussed, when EPA, despite a massive amount of proof of unreasonable adverse impacts to the environment—including to endangered species and economically valuable crops—renewed registrations for three dicamba herbicides.¹⁶⁰

¹⁵⁶ *E.g.*, Rebecca E. Leintz, Note, *Is FIFRA Enough Regulation? Failure to Obtain an NPDES Permit for Pesticide Applications May Violate the Clean Water Act*, 79 CHL-KENT L. REV. 317 (2004). Leintz's argument for an NPDES permit requirement for certain pesticide applications was prior to *National Cotton Council of America v. United States Environmental Protection Agency*, where the court interpreted the CWA to support that very requirement. 553 F.3d 927, 940 (6th Cir. 2009). EPA later clarified the NPDES permit requirement, reiterating the Sixth Circuit's ruling. *National Pollutant Discharge Elimination System (NPDES): Pesticide Permitting*, *supra* note 101.

¹⁵⁷ Compare *National Pollutant Discharge Elimination System (NPDES): NPDES Permit Basics*, *supra* note 102 (mitigation is not built into CWA NPDES permit requirements), with 40 C.F.R. § 230.91(a)(1) (2019) (mitigation is required to comply with CWA Section 404 permits).

¹⁵⁸ 7 U.S.C. § 136a(c)(5)(D) (2018).

¹⁵⁹ *E.g.*, *Ctr. for Biological Diversity v. Env'tl. Prot. Agency*, 861 F.3d 174 (D.C. Cir. 2017) (holding EPA violated the ESA by approving a pesticide registration without complying with ESA consultation procedures); *Ctr. for Biological Diversity v. Env'tl. Prot. Agency*, 847 F.3d 1075 (9th Cir. 2017) (holding EPA violated the ESA by approving the re-registration of multiple pesticides without consultation); *Pollinator Stewardship Council v. U.S. Env'tl. Prot. Agency*, 806 F.3d 520 (9th Cir. 2015) (holding EPA violated FIFRA by approving a pesticide despite evidence of high toxicity to honey bees, which constituted an "unreasonable adverse effect on the environment").

¹⁶⁰ *Nat'l Family Farm Coal. v. U.S. Env'tl. Prot. Agency*, 960 F.3d 1120, 1128–29 (9th Cir. 2020).

Because EPA can circumvent its statutory duty under FIFRA, albeit with consequences if a court agrees it was a direct violation, the agency should mitigate the impacts of pesticides caused by such FIFRA violations. The most viable mechanisms to require EPA and USDA to mitigate pesticide field trials have gone unrecognized under NEPA and the ESA. Further, because the NEPA and ESA requirements discussed here should apply to pesticide use in general, the requirements also apply to, and should be imposed on, pesticide field trials, since field trials ultimately make FIFRA registration and broad use of pesticides possible.

A. Pesticide Field Trials: NEPA Mitigation

Generally, most federal projects are subject to NEPA requirements; specifically, agencies that propose projects that are (1) major (2) federal actions (3) significantly affecting the quality of the human environment, are required to submit an EIS for that project.¹⁶¹ The typical process an agency pursues to determine if it needs to submit an EIS begins with conducting an Environmental Assessment (EA).¹⁶² If the EA determines there will be no significant effects on the environment, the agency concludes an EIS is not required, and instead issues a Finding of No Significant Impact (FONSI),¹⁶³ which is usually the action challenged during NEPA litigation.¹⁶⁴

CEQ regulations clarify that the term *major* "reinforces," but has no meaning independent of, the significance prong.¹⁶⁵ For an action to satisfy the significance prong, it must "significantly affect" the environment through both comparative and cumulative analyses of impacts, where comparative analyses compare impacts of existing

¹⁶¹ 42 U.S.C. § 4332(C) (2018).

¹⁶² JOHNSTON ET AL., *supra* note 93, at 120.

¹⁶³ *Id.* at 121.

¹⁶⁴ *E.g.*, Ga. River Network v. U.S. Army Corps of Eng'rs, 334 F. Supp. 2d 1329 (N.D. Ga. 2003) (plaintiffs challenging Corps' FONSI for reservoir construction project); Methow Forest Watch v. U.S. Forest Serv., 383 F. Supp. 2d 1263 (D. Or. 2005) (plaintiffs challenging FONSI issued by USFS for snowmobile and helicopter special use permits); Save Strawberry Canyon v. U.S. Dep't of Energy, 830 F. Supp. 2d 737 (N.D. Cal. 2011) (plaintiff challenging FONSI issued by DOE for research facility construction project); Standing Rock Sioux Tribe v. U.S. Army Corps of Eng'rs, No. 16-1534, 2020 WL 1441923 (D.D.C. Mar. 25, 2020) (plaintiffs challenging Corps' FONSI for portion of Dakota Access Pipeline to be constructed under Missouri River).

¹⁶⁵ 40 C.F.R. § 1508.18 (2019).

site uses to impacts of the proposed project, and cumulative analyses combine impacts from other sources within the area to the proposed project's impacts.¹⁶⁶ Pesticide use certainly causes significant impacts to the human environment on both comparative and cumulative scales.¹⁶⁷ Because "major" serves to reinforce the significance prong and pesticide use causes the required comparative and cumulative adverse impacts, pesticide use is a major action of significance, leaving only the question of whether pesticide use is a federal action.

In the context of pesticide field trials, the "federal action" prong may be the most contested one. While legislative proposals and mere adoption of policies or regulations constitute federal action, so, too, do more involved federal activities, including "projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies."¹⁶⁸ Essentially, then, to be "federal" under NEPA, the action must either be controlled, funded, or permitted by a federal agency. Three potential avenues for pesticide field trials to meet the "federal" requirement are: (1) EPA approval, (2) direct USDA trial sponsorship, and (3) federal funding of field experiments.

1. EPA Approval

The first potential avenue for pesticide field trials to satisfy NEPA's "federal" prong is EPA approval. EPA approval occurs twice during the early stages of most pesticides' commercial lives: approval of FIFRA registration, allowing its sale in the United States,¹⁶⁹ and approval of an Experimental Use Permit (EUP), which is required for most field trials testing new crop pesticides.¹⁷⁰

First, the potential for FIFRA registration to be subject to NEPA was addressed in the early days of NEPA, and has not since been directly revisited or reinforced.¹⁷¹ In 1970, Public Law 91-190 became section 103 of NEPA, which requires all federal agencies to make

¹⁶⁶ *Grand Canyon Tr. v. Fed. Aviation Admin.*, 290 F.3d 339, 340–41, 347 (D.C. Cir. 2002) (holding agencies are required to take a "hard look" at both comparative *and* cumulative impacts during EA process).

¹⁶⁷ See *supra* Part II.B.

¹⁶⁸ 40 C.F.R. § 1508.18(a)–(b).

¹⁶⁹ 7 U.S.C. § 136a(c)(5)(D).

¹⁷⁰ 40 C.F.R. § 172.3(a) (2019).

¹⁷¹ Note that as of October 2020, EPA does not list approval of pesticide registration as a categorical exclusion from NEPA. 40 C.F.R. § 6.204 (2019).

consistent with NEPA any statutes, regulations, or other policies and procedures, such that each agency "bring[s] their authority and policies into conformity with the intent, purposes, and procedures" of NEPA.¹⁷² This section would seem to require that EPA approve FIFRA registrations in a manner consistent and compliant with NEPA. However, just a year later, EPA's Office of the General Counsel (OGC) published a question and answer document which stated FIFRA registration is not subject to NEPA because the environmental balancing required by NEPA is "built into EPA's decision-making process" when it approves a pesticide registration.¹⁷³ Then, however, in 1973, a federal district court found EPA's cancellation of most DDT registrations to be a major federal action subject to NEPA requirements.¹⁷⁴ In 1986, the Ninth Circuit affirmed a lower court's holding that EPA is not required to comply with NEPA when approving pesticide registrations under FIFRA.¹⁷⁵ Since 1986, no other circuit has definitively answered this question, nor has the Supreme Court.

Ultimately, pesticide registration should be—and arguably, is—subject to NEPA. Section 103 expressly requires all federal agencies to bring their authority into conformity with NEPA, and the subsequent EPA OGC interpretation is simply idealistic and not reflective of reality.¹⁷⁶ In fact, FIFRA registration procedures do not require EPA to follow the same decision-making procedures that NEPA requires.¹⁷⁷ Furthermore, because subsequent authority is conflicting—a federal district court held cancellations are subject to NEPA,¹⁷⁸ one federal circuit court held registration is not subject to NEPA,¹⁷⁹ and EPA does

¹⁷² 42 U.S.C. § 4333 (2018).

¹⁷³ OFFICE OF THE GEN. COUNSEL, ENVTL. PROT. AGENCY, *CEQ's Guidelines for Preparation of Environmental Impact Statements: General & Administrative* (Nov. 30, 1971), 1971 WL 18361, at *1, *2. (E.P.A.G.C.).

¹⁷⁴ *Coahoma Chem. Co. v. Ruckelshaus*, 358 F. Supp. 680, 681–82 (N.D. Miss. 1973).

¹⁷⁵ *Merrell v. Thomas*, 807 F.2d 776, 776 (9th Cir. 1986).

¹⁷⁶ *Cf.* cases cited *supra* notes 159–60 (numerous examples of EPA violating FIFRA and the ESA through noncompliant pesticide registrations shows the thorough decision-making required under FIFRA for approval of registrations does not ensure EPA compliance with other statutes, nor with FIFRA itself).

¹⁷⁷ *See Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1248 (9th Cir. 1984) ("The EPA registration process for herbicides under FIFRA is inadequate to address environmental concerns under NEPA.").

¹⁷⁸ *Coahoma Chem. Co.*, 358 F. Supp. at 681–82.

¹⁷⁹ *Merrell*, 807 F.2d at 776.

not list registration as a categorical exclusion¹⁸⁰—the plain language of the statute should prevail, meaning EPA approval of pesticide registration, as a major federal action, should be subject to NEPA requirements.

The second instance of EPA approval is approval of an EUP, allowing field trials for new pesticides. EUP approval is direct federal permitting of the pesticide field trial, which is an express regulatory example of federal actions subject to NEPA requirements.¹⁸¹ While the idea of pesticide field trials subject to NEPA through EPA approval of an EUP is directly addressed even less often than that of EPA approval of FIFRA registration, there is even more reason to uphold its requirement. The 1971 EPA OGC document also suggested that the approval of an EUP is likely not subject to NEPA requirements for the same reasons discussed above.¹⁸² The OGC stated, however, "[w]e could probably argue for different treatment, if we so desired, on the grounds that a registration of a pesticide represents regulatory activity, while the granting of a temporary permit merely involves waiving the regulatory authority we have under FIFRA."¹⁸³

Thereafter, however, the OGC rejected its own argument and concluded EUP approval should be treated the same as FIFRA registration approval simply because both actions lead to the same result and NEPA requirements are already built into both decisions.¹⁸⁴ To conclude EPA undertakes the same decision-making requirements that NEPA mandates when approving permits under FIFRA—a statute that does not require the procedural steps outlined by NEPA—is naïve, and likely a result of the statement's temporal closeness to the passage of both statutes, prior to any opportunity to witness them in action. In reality, the differences in procedural requirements between NEPA and FIFRA are stark, and were judicially recognized ten years after the OGC document, when the Ninth Circuit noted the "EPA registration process for herbicides under FIFRA is inadequate to address environmental concerns under NEPA."¹⁸⁵

¹⁸⁰ 40 C.F.R. § 6.204 (2019).

¹⁸¹ 40 C.F.R. § 1508.18(b)(4) (2019) ("Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities.").

¹⁸² OFFICE OF THE GEN. COUNSEL, ENVTL. PROT. AGENCY, *supra* note 173.

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1248 (9th Cir. 1984).

Ultimately, compliance with FIFRA through registration approval or EUP approval does not eliminate EPA's obligation to comply with other statutes, including NEPA.¹⁸⁶ Courts that have recognized a "functional equivalence" doctrine exempting EPA from NEPA compliance, simply because the statutes EPA enforces are presumed to contain NEPA-like decision-making requirements,¹⁸⁷ may not be familiar with the recent dicamba lawsuits and other previously discussed evidence of EPA's ability to circumvent FIFRA requirements. Enforcing NEPA's statutory provision mandating EPA's compliance¹⁸⁸ would achieve the thorough decision-making NEPA requires, decreasing both EPA's ease of circumventing FIFRA obligations, and the likelihood of more "unprecedented disaster"¹⁸⁹ crop seasons like that of 2017.

2. Direct USDA Sponsorship

A second major avenue for pesticide field trials to satisfy NEPA's "federal" prong is USDA sponsorship of the trials. USDA sponsorship occurs frequently and operates primarily through its ARS facilities,¹⁹⁰ though it can also, less commonly, operate through the Economic Research Service and the Forest Service,¹⁹¹ both of which are extensions of USDA.¹⁹² During these sponsorship situations, USDA fully funds the trials, which occur at USDA-operated facilities or fields.¹⁹³

When USDA directly sponsors a pesticide field trial, it is exerting "[f]ederal control and responsibility" over the trial, making the trial a "project . . . entirely . . . financed . . . conducted, regulated, or approved by [a] federal agenc[y]."¹⁹⁴ Because the sponsorship involves an agency completely funding and directly exerting control over the trial, the sponsorship is a "federal" action under NEPA. Additionally, as of July 2020, USDA does not identify any categorical exclusions that would apply to pesticide field trials; however, it does identify

¹⁸⁶ See *id.*

¹⁸⁷ See *supra* Part III.

¹⁸⁸ 42 U.S.C. § 4333 (2018) (requiring all federal agencies to conform with NEPA's intent, purposes, and procedures).

¹⁸⁹ Ctr. for Food Safety, *supra* note 44.

¹⁹⁰ See *supra* Part II.A.

¹⁹¹ See *Project Listing*, *supra* note 23.

¹⁹² *Agencies*, U.S. DEPT' AGRIC., <https://www.usda.gov/our-agency/agencies> (last visited Dec. 4, 2020).

¹⁹³ See *Project Listing*, *supra* note 23.

¹⁹⁴ 40 C.F.R. § 1508.18(a) (2019).

the Economic Research Service as an agency categorically excluded from NEPA, meaning only ARS and Forest Service trials would be "federal" actions under NEPA.¹⁹⁵ Ultimately, then, USDA is arguably subject to NEPA requirements for its pesticide field trials conducted by ARS and the Forest Service.

3. Federal Funding of Field Experiments

A third avenue for pesticide field trials to satisfy NEPA's "federal" prong is federal funding of the experiments. A common route for receiving federal funding of agricultural field experiments is through the RCPP.¹⁹⁶ Through RCPP, an individual can receive funding either directly from USDA ("RCPP Classic" program) or from a USDA regional representative, who receives the funding directly from USDA (AFA program).¹⁹⁷ The purpose of RCPP in the agriculture context is to encourage innovation of on-farm conservation techniques or practices.¹⁹⁸ Thus, one hypothetical example of a pesticide field trial that would qualify for RCPP funding is a trial testing a new pesticide with a less environmentally harmful method of delivery. Other examples might include a field trial testing a pesticide that will increase crop yield, or a trial testing a pesticide that is more beneficial to soil health. Essentially, any field trial for a pesticide with environmental benefits (or less environmental harms than comparative pesticides) will often qualify for RCPP funding.

Under NEPA, federal agency funding constitutes a "federal" action, as long as the project is "entirely or partly financed" by the agency.¹⁹⁹ The only restriction on funding for NEPA purposes is that federal actions "do not include funding assistance solely in the form of general revenue sharing funds, distributed under the State and Local Fiscal Assistance Act of 1972 . . . with no Federal agency control over the subsequent use of such funds."²⁰⁰ RCPP funding, however, comes from USDA under the Farm Bill,²⁰¹ so it would not be subject

¹⁹⁵ 7 C.F.R. §§ 1b3, 1b4(b)(2) (2020).

¹⁹⁶ See *supra* Part II.A.

¹⁹⁷ *Notice of Funding Opportunity*, *supra* note 32.

¹⁹⁸ *Id.*

¹⁹⁹ 40 C.F.R. § 1508.18(a).

²⁰⁰ *Id.*

²⁰¹ Agriculture Improvement Act (Farm Bill) of 2018, Pub. L. No. 115-334, 132 Stat. 4490, 4598 (codified as amended in scattered sections of 2, 5, 7, 12, 15-16, 18-22, 25, 31, 33-34, 39-40, 42-43, 47 U.S.C.); 16 U.S.C. § 3871d (2018).

to the regulatory restriction. Because RCPP-financed field trials constitute federal action, USDA should comply with NEPA requirements when funding those trials.

Thus far, all three avenues of requiring pesticide field trials to comply with NEPA have assumed the agency's EA will determine an EIS is required, which would obligate the agency to thoroughly consider mitigation plans in its alternatives section, including the option for compensatory mitigation in the form of a conservation bank.²⁰² However, to avoid the EIS requirement, an agency may alter the proposed action with *required* mitigation, to reduce the environmental impacts to a level below "significant."²⁰³ Should the agency choose to do so, it will issue a "mitigated FONSI," or a "finding of no significant impact *given the proposed mitigation*."²⁰⁴

While mitigation in the EIS stage need only be thoroughly considered, when an agency issues a mitigated FONSI, it is committing to altering its action to include the identified mitigation, meaning it is substantively required to conduct that mitigation.²⁰⁵ Because it is practically easier for an agency to issue a FONSI than it is to prepare an EIS,²⁰⁶ the agency responsible for the pesticide field trials in question will likely issue a FONSI—be it EPA if the federal "hook" is FIFRA registration or EUP approval, or USDA if the hook is direct sponsorship or RCPP funding. Ultimately, though, the nature of pesticide use and field trials will essentially force the agency to issue a mitigated FONSI, which will, in turn, require the agency to mitigate the action.

B. Pesticide Field Trials: ESA Mitigation

Aside from NEPA, a second viable mechanism for requiring pesticide field trial mitigation is the ESA and its existing applications that have gone unrecognized in this context.

²⁰² SCHRODER & CANON II, *supra* note 149, at *11-2; *see also* 40 C.F.R. § 1508.20(e) (2019).

²⁰³ JOHNSTON ET AL., *supra* note 93, at 121.

²⁰⁴ *Id.*

²⁰⁵ COUNCIL ON ENVTL. QUALITY & CAL. GOVERNOR'S OFFICE OF PLANNING & RESEARCH, NEPA AND CEQA: INTEGRATING FEDERAL AND STATE ENVIRONMENTAL REVIEWS 38 (2014), https://ceq.doe.gov/docs/ceq-publications/NEPA_CEQA_Handbook_Feb_2014.pdf.

²⁰⁶ *See* JOHNSTON ET AL., *supra* note 93, at 121 (noting the economic, environmental, and biological expertise required for the production of an EIS).

One recognized application of the ESA to pesticide use focuses on the requirement that federal agencies consult with USFWS or NMFS to ensure any agency action, including the use of a pesticide, is not "likely to jeopardize the continued existence" of a listed species, or "result in the destruction or adverse modification" of designated critical habitat.²⁰⁷ This constraint on federal agencies in the context of pesticide use extends to EPA when deciding whether to register a pesticide under FIFRA.²⁰⁸ In *Washington Toxics Coalition*, the Ninth Circuit held EPA violated the ESA when it approved fifty-four pesticides with "conceded adverse effects" on listed salmon species or critical habitat without consulting with NMFS.²⁰⁹ In response to this ruling, USFWS and NMFS (together, the Services) issued regulations allowing an agency, such as EPA, to "unilaterally determine" that actions not likely to adversely affect listed species are "also not likely to jeopardize listed species," in which case EPA would never be required to consult with the Services before approving a pesticide registration under FIFRA.²¹⁰ The court held the regulations violated the ESA because a finding of no jeopardy requires prior consultation with USFWS or NMFS, a requirement that even EPA cannot avoid.²¹¹

A second recognized application of the ESA to pesticide use is the statute's principal prohibition against takes of endangered or threatened animals,²¹² a prohibition which an incidental take permit can circumvent.²¹³ Extending back to 1989, courts recognize that pesticide registration under FIFRA may constitute a take, in which case EPA must consult with USFWS or NMFS and acquire an incidental take permit prior to registration approval.²¹⁴ In the landmark case referred to as *Strychnine Registration I*, the strychnine pesticide at issue was successfully targeting the anticipated species, but incidentally

²⁰⁷ 16 U.S.C. § 1536(a)(2)–(4) (2018). Listed species are those identified as endangered or threatened under the ESA. 16 U.S.C. § 1533(a) (2018).

²⁰⁸ *E.g.*, *Wash. Toxics Coal. v. Env'tl. Prot. Agency*, 413 F.3d 1024 (9th Cir. 2005) (applying the ESA requirements to EPA approvals of pesticide registrations).

²⁰⁹ *Id.* at 1029, 1031–32.

²¹⁰ *Wash. Toxics Coal. v. U.S. Dep't of Interior*, 457 F. Supp. 2d 1158, 1178 n.15 (W.D. Wash. 2006).

²¹¹ *Id.* at 1178–79.

²¹² 16 U.S.C. § 1538(a)(1)(B)–(C) (2018); *ESA Basics: 40 Years of Conserving Endangered Species*, *supra* note 139.

²¹³ 16 U.S.C. § 1539(a)(1)(B) (2018).

²¹⁴ *Def's. of Wildlife v. Adm'r, Env'tl. Prot. Agency (Strychnine Registration I)*, 882 F.2d 1294, 1300–01 (8th Cir. 1989).

killing other species, some endangered, that ingested the chemical.²¹⁵ The court reasoned that because the takes would not have occurred had the pesticide not been FIFRA-registered and approved for use, EPA's decision to approve it constituted a take, requiring EPA to obtain an incidental take permit prior to approving its FIFRA registration.²¹⁶

Decades after *Strychnine Registration I*, EPA is consistently reluctant to comply with the ESA when registering pesticides.²¹⁷ Although it established an Endangered Species Protection Program (ESPP) that should address pesticide threats to endangered species, EPA published a revised purpose for the ESPP in 2005, stating its goal as meeting FIFRA and ESA requirements "without unnecessarily burdening pesticide users."²¹⁸ Subsequently, EPA began settling lawsuits attempting to compel it to comply with the ESA take prohibition when approving pesticide registrations.²¹⁹ In these ESA settlements, EPA agreed to make the requisite determinations and acquire an incidental take permit if necessary.²²⁰ As a result of mounting litigation and settlement agreements, EPA now engages in a number of compliance measures, including developing interactive maps showing species-pesticide buffer areas, and completing nationwide assessments of registered pesticides' effects on listed species, four of which are scheduled for completion "by 2020."²²¹

Ultimately, EPA's requirement to consult with USFWS or NMFS and possibly acquire an incidental take permit depends on whether EPA determines the pesticide may have adverse effects on a protected species or critical habitat,²²² a determination requiring complex

²¹⁵ *Id.* at 1301.

²¹⁶ *Id.*

²¹⁷ 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. ENVTL. L. REV. 95, 111-17 (2008).

²¹⁸ *Id.* at 128.

²¹⁹ *Id.* at 116.

²²⁰ *See id.*

²²¹ *Endangered Species Litigation and Associated Pesticide Limitations*, U.S. ENVTL. PROTECTION AGENCY, <https://www.epa.gov/endangered-species/endangered-species-litigation-and-associated-pesticide-limitations> (last updated Sept. 16, 2016).

²²² *See Listing and Critical Habitat | Critical Habitat | Frequently Asked Questions*, U.S. FISH & WILDLIFE SERVS., <https://www.fws.gov/endangered/what-we-do/critical-habitats-faq.html> (last updated Jan. 30, 2020) (defining critical habitat as "specific geographic areas that contain features essential to the conservation of an endangered or threatened species

assessments.²²³ Because of EPA's historical reluctance to conduct the required assessments *prior* to approving a pesticide registration, protected species and habitats still suffer the consequences, even if the assessments are later conducted and find that an incidental take permit is required. To prevent the adverse effects both FIFRA and the ESA are designed to avoid,²²⁴ EPA should mitigate the effects of pesticides on listed species *before* it approves a FIFRA registration. While pre-approval ESA mitigation arguably should apply to all pesticides, one category is particularly susceptible: those that are prone to drift or volatilization.²²⁵

An unrecognized application of ESA mitigation requirements to pesticide use, then, is requiring EPA to obtain an incidental take permit before approving an EUP for a drift- or volatilization-prone pesticide. In the event that an EUP is not necessary, EPA should obtain an incidental take permit before approving FIFRA registration (including re-registration) of any such pesticide. Requiring an incidental take permit would also require EPA to submit an HCP detailing the mitigation measures it will take to offset the adverse effects of any pesticide-related takes of listed species.²²⁶ Because USFWS encourages conservation banking as an effective mitigation measure, EPA can simply purchase credits from one of over 130 approved conservation

and that may require special management and protection. Critical habitat may also include areas that are not currently occupied by the species but will be needed for its recovery.").

²²³ See RUSSELL JONES ET AL., U.S. ENVTL. PROT. AGENCY, OVERVIEW OF THE ECOLOGICAL RISK ASSESSMENT PROCESS IN THE OFFICE OF PESTICIDE PROGRAMS, U.S. ENVIRONMENTAL PROTECTION AGENCY: ENDANGERED AND THREATENED SPECIES EFFECTS DETERMINATIONS 31-77 (2004), <https://www.epa.gov/sites/production/files/2014-11/documents/ecorisk-overview.pdf>.

²²⁴ 7 U.S.C. § 136a(a) (2018) (registration of a pesticide under FIFRA is necessary "to prevent unreasonable adverse effects on the environment"); 16 U.S.C. § 1531(a)(1), (b) (2018) (the purpose of the ESA is to respond to Congressional findings of numerous species extinctions and provide a means of conservation of endangered and threatened species).

²²⁵ EPA distinguishes between drift and volatilization, defining drift as "the off-site movement of spray droplets or pesticide particles through the air during and shortly after the pesticide application process," and volatilization as "the change of a pesticide applied in solid or liquid form to a gas or vapor after application has occurred, whereupon the pesticide active ingredient can move off-site through the air." Brief for Respondent at 10, Pesticide Action Network N. Am. v. U.S. Evtl. Prot. Agency, 654 F. App'x 887 (9th Cir. 2016) (No. 14-71514), 2014 WL 6997430, at *3, *10. It also notes that "[r]elative to drift, volatilization can occur for a longer period of time after a pesticide has been applied." *Id.* at *10.

²²⁶ See *supra* Part IV.B.

banks,²²⁷ depending on the species affected by the drift or volatilization, to comply with the mitigation outlined in the HCP.

In fact, the ease of purchasing credits from conservation banks²²⁸—compared to the complexity and cost of nationwide assessments to determine if a pesticide may have adverse effects on a species—may incentivize EPA to obtain an incidental take permit for more pesticides than only those which are prone to drift or volatilization. Should EPA engage in conservation banking (as a form of mitigation required by the incidental take permit) for pesticides beyond those suggested here, it would enjoy the additional benefit of avoiding even more litigation than the substantial amount avoided by mitigating only those pesticides prone to drift or volatilization.²²⁹ Avoiding that litigation would afford EPA various additional benefits—for example, saving time, resources, funds, etc.

VI. CONCLUSION

Ultimately, pesticide field trials should be mitigated to ensure adverse effects are offset when the pesticide is officially registered and approved for use under FIFRA. Current legal remedies for damage caused by pesticides to humans, listed species, or non-target crops (worth tens of millions of dollars) are merely reactions attempting to remedy past damage. Environmental damage should be *prevented* where possible, not remedied retroactively. That is the purpose of arguably every environmental statute, including those discussed here—NEPA, FIFRA, the CWA, and the ESA.²³⁰ Where consequences

²²⁷ *For Landowners / Conservation Banking*, *supra* note 148.

²²⁸ *See, e.g., Conservation Credits*, WESTERVELT ECOLOGICAL SERVS. (2018), <https://www.wesmitigation.com/our-solutions/conservation-credits/> (exemplifying a national company providing conservation credits for purchase organized by bank location and types of species and habitat credits available).

²²⁹ Acquiring an incidental take permit and complying with the mitigation requirements in the permit's supplemental HCP would eliminate causes of action against EPA for violating ESA provisions, including those of take prohibitions, 16 U.S.C. § 1538(a)(1)(B)–(C) (2018), incidental take permit requirements, 16 U.S.C. § 1539(a)(1)(B) (2018), and the jeopardy provision, 16 U.S.C. § 1536(a)(2) (2018).

²³⁰ 42 U.S.C. § 4321 (2018) (explaining that one purpose of NEPA is to "prevent or eliminate damage to the environment and biosphere"); 7 U.S.C. § 136a(a) (2018) (explaining that registration of a pesticide under FIFRA is necessary "to prevent unreasonable adverse effects on the environment"); 33 U.S.C. § 1251(a) (2018) (one purpose of the CWA is to "maintain the chemical, physical, and biological integrity of the Nation's waters"); 16 U.S.C.

cannot be avoided, however, they must be offset. Mitigation is the most efficient way to offset unavoidable environmental consequences before they occur because mitigation measures are put in place before the project with unavoidable consequences begins.

Thus far, the conventionally acknowledged applications of mitigation requirements to pesticide use and approval have proven to be inadequate. Not only has USDA avoided compliance with NEPA when conducting pesticide field trials despite no identified categorical exclusions, so too has EPA avoided its obligations under both NEPA and the ESA. By inaccurately assuming compliance with FIFRA eliminates its other statutory obligations, EPA has avoided (1) procedural requirements that lead to substantive mitigation under the ESA, and (2) mitigation consideration requirements and substantive mitigation commitments under NEPA. Essentially, EPA circumvents its chief responsibility to enforce environmental statutes as they are written. In the context of the ESA, by repeatedly allowing pesticides to harm or kill protected species, EPA skirts its obligation to "utilize [its] authorities in furtherance of" the ESA's purpose: "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."²³¹ In the context of NEPA, the "Magna Carta of federal environmental laws,"²³² both EPA and USDA have managed to circumvent their duties to "create and maintain conditions under which man and nature can exist in productive harmony, [and] . . . attain the widest range of beneficial uses of the environment without degradation, [or] risk to health or safety."²³³

The substantial damage pesticides unceasingly cause should be offset through pre-registration mitigation, and this mitigation should be required for approval of an EUP, or, where an EUP is not required, for approval of FIFRA registration. The two most viable, thus-far unrecognized mechanisms to require such mitigation are (1) requiring EPA and USDA to comply with NEPA through federal actions of (a) EPA approval of EUPs or FIFRA registration, (b) USDA sponsorship of field trials, and (c) federal funding of field experiments; and (2) requiring EPA to obtain incidental take permits under the

§ 1531(b) (2018) (explaining that one purpose of the ESA is to provide a means of conservation of endangered and threatened species to prevent species extinctions).

²³¹ 16 U.S.C. § 1531(b)-(c)(1).

²³² *Welcome*, NEPA.GOV, <https://ceq.doe.gov/> (last visited Dec. 4, 2020).

²³³ 42 U.S.C. § 4331(a), (b)(3) (2018).

ESA and engage in HCP mitigation measures when approving an EUP or FIFRA registration for a pesticide that is prone to drift or volatilization. These requirements will allow the federal government to come closer to fulfilling its responsibility to serve as trustee of the environment for succeeding generations, and perhaps, then, "man and nature can exist in productive harmony."²³⁴

²³⁴ 42 U.S.C. § 4331(a).