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Via Electronic Filing

EPA-HQ-OPP-2008-0844 (Imidacloprid Registration Review)
EPA-HQ-OPP-2011-0865 (Clothianidin Registration Review)
EPA-HQ-OPP-2011-0920 (Dinotefuran Registration Review)
EPA-HQ-OPP-2011-0581 (Thiamethoxam Registration Review)

Yu-Ting Guilaran, Director
Pesticide Re-Evaluation Division
Office of Pesticide Programs
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460-0001

Re: Notice of Availability and Request for Comments on EPA's Risk Assessments and Benefits Assessments for the Registration Reviews of Imidacloprid, Clothianidin, Thiamethoxam, and Dinotefuran (82 Fed. Reg. 60,599 (Dec. 21, 2017))

Dear Director Guilaran:

The Attorneys General of Massachusetts, Hawaii, Maryland, and the District of Columbia appreciate this opportunity to comment on the U.S. Environmental Protection Agency's ("EPA") reviews under Section 3(g) of the Federal Insecticide, Fungicide, and Rodenticide Act ("FIFRA")[1] of the registrations of four neonicotinoid insecticides: imidacloprid, clothianidin, thiamethoxam, and dinotefuran (collectively, the "Registration Reviews").

In its notice dated December 21, 2017,[2] EPA requested comments on its draft non-pollinator ecological risk assessment for the review of imidacloprid[3] and on its draft human-health and non-pollinator ecological risk assessments for the reviews of clothianidin,[4]

[1] 7 U.S.C. § 136a(g).

[2] *See* 82 Fed. Reg. 60,599 (Dec. 21, 2017).

[3] Keith Sappington, Mohammed Ruhman, & Justin Housenger, *Imidacloprid – Transmittal of the Preliminary Terrestrial Risk Assessment to Support the Registration Review* (Nov. 28, 2017), EPA Docket No. EPA-HQ-OPP-2008-0844-1256.

[4] Michael Wagman, Amy Blankinship, & Chuck Peck, *Preliminary Aquatic and Non-Pollinator Terrestrial Risk*

thiamethoxam,[5] and dinotefuran.[6] These preliminary risk assessments supplement EPA's previously published draft pollinator ecological risk assessments,[7] and draft aquatic ecological and human-health risk assessments for imidacloprid.[8] The notice also requested comments on EPA's assessments of the benefits of neonicotinoid insecticide use on cotton[9] and citrus.[10] These benefits assessments supplement EPA's 2014 assessment of the benefits to soybean production of neonicotinoid insecticide seed treatments.[11]

The Attorneys General submit the following comments for EPA's consideration in its ongoing analyses in connection with the Registration Reviews.

SUMMARY OF COMMENTS

The undersigned Attorneys General are pleased that EPA is undertaking a much-needed review of the registrations of imidacloprid, clothianidin, thiamethoxam, and dinotefuran (collectively "the Subject Neonicotinoid Insecticides")—four toxic neonicotinoid insecticides that threaten significant harm to our states. We urge EPA to act promptly based on science to severely cancel or restrict uses of these insecticides, including unnecessary applications and other uses that pose particular risk to pollinators and aquatic environments, such as seed coatings, cosmetic uses, uses on non-crop plants, and application during bloom periods.

Assessment to Support the Registration Review of Clothianidin (Nov. 27, 2017), Doc. No. EPA-HQ-OPP-2011-0865-0242; Danette Drew et al., *Clothianidin. Draft Human Health Risk Assessment in Support of Registration Review* (Sept. 7, 2017), Doc. No. EPA-HQ-OPP-2011-0865-0243.

[5] Ryan Mroz, Christopher M. Koper, & Kristina Garber, *Preliminary Risk Assessment to Support the Registration Review of Thiamethoxam* (Nov. 29, 2017), Doc. No. EPA-HQ-OPP-2011-0581-0093; Margarita Collantes et al., *Thiamethoxam. Draft Human Health Risk Assessment for Registration Review* (Dec. 5, 2017), Doc. No. EPA-HQ-OPP-2011-0581-0096.

[6] Elizabeth Donovan & Rochelle F.H. Bohaty, *Preliminary Ecological Risk Assessment (excluding terrestrial invertebrates) for the Registration Review of Dinotefuran* (Nov. 28, 2017), Doc. No. EPA-HQ-OPP-2011-0920-0616; Julie L. Van Alstine et al., *Dinotefuran: Human Health Draft Risk Assessment for Registration Review* (Sept. 12, 2017), Doc. No. EPA-HQ-OPP-2011-0920-0620.

[7] Justin Housenger, Keith Sappington, & Mohammed Ruhman, *Preliminary Pollinator Assessment to Support the Registration Review of Imidacloprid* (Jan. 4, 2016), Doc. No. EPA-HQ-OPP-2008-0844-0140; Michael Wagman et al., *Preliminary Bee Risk Assessment to Support the Registration Review of Clothianidin and Thiamethoxam* (Jan. 5, 2017), Doc. No. EPA-HQ-OPP-2011-0865-0173; Frank Farruggia et al., *Draft Assessment of the Potential Effects of Dinotefuran on Bees* (Jan. 5, 2017), Doc. No. EPA-HQ-OPP-2011-0920-0014.

[8] Keith Sappington. Mohammed Ruhman, & Justin Housenger, *Preliminary Aquatic Risk Assessment to Support the Registration Review of Imidacloprid* (Dec. 22, 2016), Doc. No. EPA-HQ-OPP-2008-0844-1086; Jennifer R. Tyler et al., *Imidacloprid: Human Health Draft Risk Assessment for Registration Review* (June 22, 2017), Doc. No. EPA-HQ-OPP-2008-0844-1235.

[9] K. Welch & TJ. Wyatt, *Benefits of Neonicotinoid Insecticide Use in the Pre-Bloom and Bloom Periods of Cotton* (Nov. 21, 2017), Doc. No. EPA-HQ-OPP-2011-0865-0246.

[10] K. Welch & D. Sells, *Benefits of Neonicotinoid Insecticide Use in the Pre-Bloom and Bloom Periods of Citrus* (Nov. 21, 2017), Doc. No. EPA-HQ-OPP-2011-0865-0245.

[11] Clayton Myers & Elizabeth Hill, *Benefits of Neonicotinoid Seed Treatments to Soybean Production* (Oct. 15, 2014), *available at* https://www.epa.gov/sites/production/files/2014-10/documents/benefits_of_neonicotinoid_seed_treatments_to_soybean_production_2.pdf.

Under FIFRA, EPA must analyze and duly consider during the registration-review process the full suite of risks posed by the Subject Neonicotinoid Insecticides. EPA must ensure the Subject Neonicotinoid Insecticides "will not generally cause unreasonable adverse effects on the environment," taking into consideration each insecticide's relative economic, social, and environmental costs and benefits.[12] If EPA determines that the common use of an insecticide "generally causes unreasonable adverse effects on the environment," FIFRA authorizes EPA to take action to cancel or modify the registration of the insecticide.[13]

As demonstrated below, the Subject Neonicotinoid Insecticides are known to be highly toxic to bees and other pollinators, contributing to potentially catastrophic pollinator losses that threaten our states' agricultural economies, the health and welfare of our residents, and the food supply. In addition, these insecticides are harmful to fish, amphibians, birds, bats, aquatic invertebrates, and other wildlife. They threaten the health of our lakes, streams, and rivers, while also posing risks to human health.

For these reasons, EPA cannot support a finding under FIFRA that continued extensive use of imidacloprid, clothianidin, thiamethoxam, and dinotefuran "will not generally cause unreasonable adverse effects on the environment."[14] On balance, the significant risks posed by the Subject Neonicotinoid Insecticides outweigh the benefits of at least many, if not most, uses—a conclusion that is underscored by a litany of actions by states, retailers, citizen groups, and other countries around the world to limit neonicotinoid insecticide use and mitigate associated environmental harms.

These comments proceed as follows. In Part I, we describe the standard for EPA's Registration Reviews of the Subject Neonicotinoid Insecticides. In Part II, we provide a summary of our states' interests with regard to the Registration Reviews. In Part III, we offer analysis supporting our call for EPA to cancel or severely restrict uses of the Subject Neonicotinoid Insecticides. This Part III analysis starts with a description of how the Subject Neonicotinoid Insecticides are ubiquitous in the environment. We then summarize recent science on the severe risks the Subject Neonicotinoid Insecticides pose to pollinators, ecosystems, and human health. Finally, the analysis outlines actions by the federal government, states, other countries, and major retailers to control and mitigate neonicotinoid insecticide use, which evidence a consensus that the risks of neonicotinoid insecticides outweigh the benefits. In light of the compelling evidence linking neonicotinoid insecticides to severe, unacceptable risks, we conclude that EPA's evaluation of the costs and benefits of the Subject Neonicotinoid Insecticides must lead EPA to determine that uses of each of the Subject Neonicotinoid Insecticides should be cancelled or severely restricted.

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[12] *See* 7 U.S.C. §§ 136(bb), 136a(c)(5), 136a(g). *See also Pollinator Stewardship Council v. EPA*, 806 F.3d 520 (9th Cir. 2015).

[13] *See* 7 U.S.C. §§ 136a(c)(5), 136d(b).

[14] *See id.* § 136a(c)(5) ("The Administrator shall register a pesticide if the Administrator determines that, when considered with any restrictions imposed . . . it will not generally cause unreasonable adverse effects on the environment.").

I. Standard for Registration Review

Under FIFRA, every pesticide distributed or sold in the United States, including neonicotinoid insecticides, must be registered by EPA (with limited exceptions).[15] "A FIFRA registration is a product-specific license describing the terms and conditions under which the product can be legally distributed, sold, and used."[16] The purpose of the registration process is "to protect man and his environment."[17]

FIFRA requires EPA to review pesticide registrations at least every fifteen years to "assess any changes that may have occurred since EPA's last registration decision" and "determine . . . whether the insecticide still satisfies the FIFRA standard for registration."[18] EPA can register a pesticide only if EPA "determines that, when considered with any restrictions imposed . . . it will perform its intended function without unreasonable adverse effects on the environment" and "when used in accordance with widespread and commonly recognized practice it will not generally cause unreasonable adverse effects on the environment."[19] "Unreasonable adverse effects on the environment" are defined as "(1) any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any insecticide, or (2) a human dietary risk . . . inconsistent with [federal standards]."[20] In other words, EPA must weigh the relative risks and benefits of the pesticides and evaluate whether, on balance, the benefits of the use outweigh risks to humans and the environment.[21] EPA must base its risk evaluation on sufficient data and cannot rely on ambiguous or inconclusive studies to support a conclusion that a pesticide does not cause unreasonable adverse effects.[22] If a pesticide under review "fails to satisfy the FIFRA standard for registration, the product's registration may be subject to cancellation . . . ."[23]

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[15] *See id.* § 136a(a). Insecticides are a class of pesticides used specifically to target, manage, and kill insects. *See id.* § 136 (defining the term "pesticide" as "(1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, and (3) any nitrogen stabilizer," with certain exceptions).

[16] *Reckitt Benckiser Inc. v. EPA*, 613 F.3d 1131, 1133 (D.C. Cir. 2010).

[17] S. REP. NO. 92-838 (1972), *reprinted in* 1972 U.S.C.C.A.N. 3993, 3993.

[18] 40 C.F.R. § 155.53(a). *See also id.* § 155.40(a)(1) ("Registration review is intended to ensure that each pesticide's registration is based on current scientific and other knowledge regarding the pesticide, including its effects on human health and the environment."); 7 U.S.C. § 136a(g)(1)(A).

[19] 7 U.S.C. § 136a(c)(5). *See Reckitt Benckiser Inc.*, 613 F.3d at 1133.

[20] 7 U.S.C. § 136(bb).

[21] *See Headwaters, Inc. v. Talent Irrigation Dist.*, 243 F.3d 526, 532 (9th Cir. 2001) ("FIFRA registration is a cost-benefit analysis that no unreasonable risk exists to man or the environment . . . ." (quoting *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1248 (9th Cir. 1984))); *Pollinator Stewardship Council*, 806 F.3d at 522–23 ("FIFRA uses a 'cost-benefit analysis to ensure that there is no unreasonable risk created for people or the environment from a pesticide.'" (quoting *Washington Toxics Coal. v. EPA*, 413 F.3d 1024, 1032 (9th Cir. 2005))).

[22] *See Pollinator Stewardship Council*, 806 F.3d at 531–32 (vacating EPA's unconditional registration of the neonicotinoid insecticide sulfoxaflor where approval decision was not supported by substantial evidence).

[23] 40 C.F.R. § 155.40(a)(2). *See also* 7 U.S.C. § 136d(b) (EPA may commence action to cancel or reclassify a registration if it appears that common use of the pesticide "generally causes unreasonable adverse effects on the environment."); *Envtl. Defense Fund, Inc. v. EPA*, 510 F.2d 1292, 1296 n.4 (D.C. Cir. 1975) (EPA must commence

EPA commences a registration review by opening a public docket containing "information that will assist the public in understanding the types of information and issues that EPA may consider in the course of the registration review," including any "[r]isk assessment documents."[24] EPA then solicits public comment on the registration review docket, and "interested persons may identify any additional information they believe EPA should consider in the course of the registration review."[25] The registration review docket remains open during the pendency of the review process, until EPA has completed all actions required for a final decision.[26]

II. States' Interests

Our states have a significant interest in ensuring that the Registration Reviews are conducted in accordance with FIFRA and in protecting our pollinators, ecosystems, and the health of our residents from the risks posed by the Subject Neonicotinoid Insecticides.

Honey bees and other pollinators, including wild bees, bats, and birds, play an essential role in crop production.[27] Pollinators are critical to both small local farms and large national farming operations, and to the production of food consumed by people as well as livestock, domestic pets, and wild animals. The U.S. Department of Agriculture ("USDA") reports that a quarter of the American diet depends on honey bee pollination.[28] Honey bee pollination contributes more than fifteen billion dollars in value to U.S. agricultural crops each year.[29]

Alarmingly, the critically important ecological services provided by pollinators are in jeopardy due to significant pollinator declines in recent years. Between April 2014 and April 2015, U.S. beekeepers lost approximately 42 percent of honey bee colonies, with summer losses exceeding winter losses for the first time.[30] From 2007 to 2011, commercial beekeepers in the United States reported a 28- to 33-percent overwinter hive loss, and in 2012, a 22-percent

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a cancellation or reclassification proceeding "whenever there is a substantial question about the safety of a registered pesticide." (quoting *Envtl. Defense Fund, Inc. v. Ruckelshaus,* 439 F.2d 584, 594 (D.C. Cir. 1971)).

[24] 40 C.F.R. § 155.50(a).

[25] *Id.* § 155.50(b).

[26] *See id.* § 155.58(c).

[27] *See generally* L.A. Garibaldi et al., *Wild Pollinators Enhance Fruit Set of Crops Regardless of Honey Bee Abundance*, 339 SCIENCE 1608 (2013); NATURAL RESOURCES DEFENSE COUNCIL, BUSY AS A BEE: POLLINATORS PUT FOOD ON THE TABLE (2015), *available at* https://www.nrdc.org/sites/default/files/bee-deaths-FS.pdf.

[28] *See* Michael Wines, *Mystery Malady Kills More Bees, Heightening Worry on Farms*, N.Y. TIMES, Mar. 28, 2013.

[29] *See* Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators (June 20, 2014), *available at* https://obamawhitehouse.archives.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b.

[30] Kim Kaplan, *Bee Survey: Lower Winter Losses, Higher Summer Losses, Increased Total Annual Losses*, U.S. DEP'T OF AGRIC. (May 13, 2015), https://www.ars.usda.gov/news-events/news/research-news/2015/bee-survey-lower-winter-losses-higher-summer-losses-increased-total-annual-losses/.

overwinter hive loss.[31] Those losses, according to the USDA, "far exceed the historical rate . . . and represent a threat to both beekeepers and to those agriculture crops that rely upon pollination as a production input."[32] These bee loses have a significant economic impact, as well, translating to billions of dollars of costs borne by beekeepers.[33]

Recent catastrophic pollinator declines coincide with dramatically increased use of neonicotinoid insecticides (*see, e.g.*, Figure 1 below).[34] Neonicotinoid insecticides are a class of systemic pesticides: water-soluable pesticides that are absorbed by the treated plant or animal, and circulate within its tissues. Neonicotinoid insecticides were first registered for use in the United States in the mid-1990s, and are now abundant in the environment across most of the country. EPA has approved hundreds of neonicotinoid-containing products and authorized broad use of these products in residential and commercial settings, including agricultural use on nearly all major U.S. crops. It is estimated that more than four million pounds of neonicotinoid insecticides are applied to U.S. cropland annually to protect against sap-sucking insects and plant-feeding insects, and application is only projected to grow (*see, e.g.*, Figure 2 below).[35] Much of the use of neonicotinoid insecticides in agriculture is prophylactic, meaning the toxic insecticide is applied prior to any experienced pest problem (for example, as a seed coating).[36] Neonicotinoid insecticides are also approved for a wide variety of non-agricultural uses, including use on lawns and gardens, in building materials, and in treatments for domestic pets.

[31] *See* U.S. Dep't of Agric., *Report on the National Stakeholders Conference on Honey Bee Health*, National Honey Bee Health Stakeholder Conference Steering Committee, at 1 (2012) [hereinafter USDA Report]. *See also* Angela M. Spleen et al., *A National Survey of Managed Honey Bee 2011-2012 Winter Colony Losses in the United States: Results from the Bee Informed Partnership*, 52(2) J. APICULTURAL RESEARCH 44 (2013); Wines, *supra* note 28, (reporting even higher 2012 commercial beekeeper hive losses at 40 to 50 percent).

[32] USDA Report, *supra* note 31, at 1.

[33] *See id*. at 1–2.

[34] *See* Margaret R. Douglas & John F. Tooker, *Large-Scale Deployment of Seed Treatments Has Driven Rapid Increase in Use of Neonicotinoid Insecticides and Preemptive Pest Management in U.S. Field Crops*, 49 ENVTL. SCI. & TECH. 5088 (2015).

[35] *Id.*

[36] *Cf.* Brad Haire, *Are Seed Treatments Worth the Investment?*, SOUTHEAST FARM PRESS (Jan. 9, 2014), http://www.southeastfarmpress.com/soybeans/are-seed-treatments-worth-investment (reporting that sale of insecticide-treated seeds in the United States has tripled over the last decade).

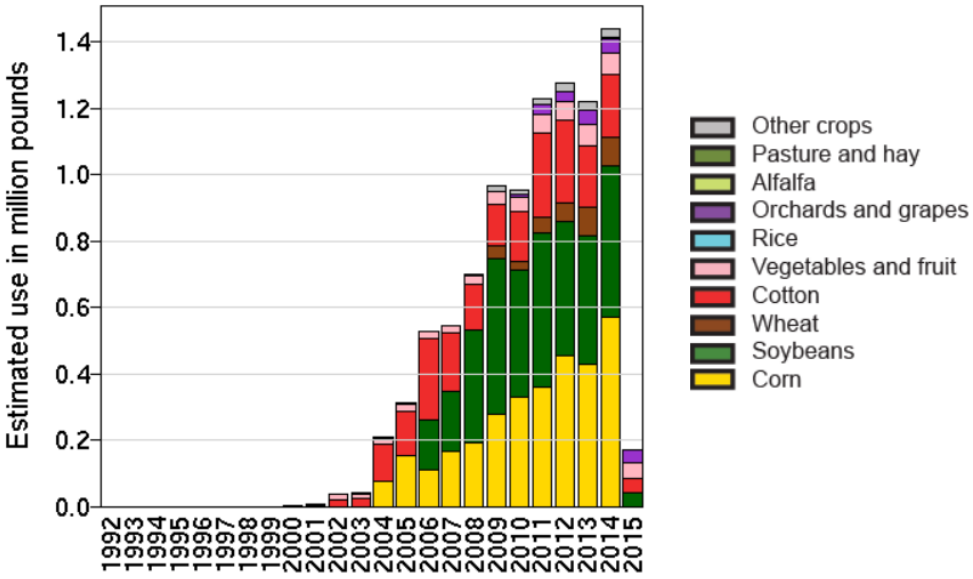

Figure 1. Estimated Thiamethoxam Use by Year and by Crop[37]

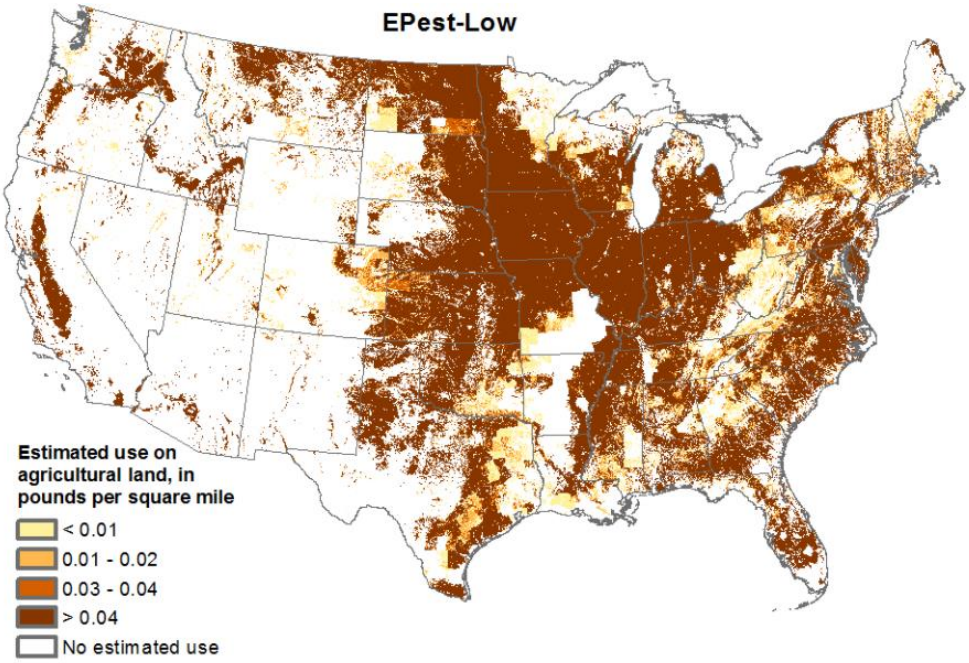

Figure 2. Lower-Bound Estimate of Agricultural Use of Imidacloprid in 2014[38]

[37] *Estimated Annual Agricultural Pesticide Use – Pesticide Use Maps – Thiamethoxam*, U.S. GEOLOGICAL SURVEY (2017), https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2014&map=THIAMETHOXAM&hilo=L&disp=Thiamethoxam.

[38] *Estimated Annual Agricultural Pesticide Use – Pesticide Use Maps – Imidacloprid*, U.S. GEOLOGICAL SURVEY (2017), https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2014&map=IMIDACLOPRID&hilo=L

Manufacturers promoted neonicotinoid insecticides as a safer alternative for wildlife because these insecticides were thought to be less toxic to birds and mammals than older classes of chemicals. However, the environmental risks of neonicotinoid insecticides are now a significant global concern, prompting calls for neonicotinoid insecticide bans, and state and international action to limit neonicotinoid insecticide use.[39] Studies have found increasing evidence that neonicotinoid insecticides are harmful not only to pollinators but also to a broad range of terrestrial and aquatic wildlife, threatening the health and functioning of our natural ecosystems.[40] In addition, though there is little research on the human-health risks of chronic exposure to neonicotinoid insecticides, studies raise concerns about significant impacts such as nervous system disorders and developmental impacts to infants and children.[41]

As described below, each of our states has a significant interest in ensuring that in the course of the Registration Reviews, EPA fulfills its responsibilities under FIFRA and takes appropriate action to protect our state's resources, residents, wildlife, and agricultural economy from the risks posed by the Subject Neonicotinoid Insecticides.

Massachusetts

Pollinators play a critical role in supporting Massachusetts' economy and the health and welfare of Massachusetts residents. For centuries, Massachusetts' agricultural economy, which includes more than 7,750 farms and 523,000 acres of farmland, has been a vital source of job opportunities, land preservation, and valuable commodities such as our native cranberry.[42] Nearly half of our state's agricultural production relies on our rich diversity of pollinator species. Massachusetts is home to an estimated 380 wild bee species and 120 butterfly species, including some protected species,[43] as well as numerous managed pollinator species.[44]

In recent years, Massachusetts has experienced declines in pollinator populations that threaten the economic and environmental health of our state. In the 2015/2016 season, Massachusetts beekeepers reported an annual loss of 55.75 percent of honey bee colonies—which is the highest level of bee loss in New England and among the top 10 percent of losses

(depicting a lower-bound estimate of agricultural use of imidacloprid in 2014).

[39] *See infra* at pp. 18–23.

[40] *See infra* at pp. 11–17.

[41] *See infra* at pp. 17–18.

[42] *See* APIARY PROG. WORKING GROUP, DIV. OF CROP & PEST SERV., MASS. DEP'T OF AGRIC. RES., MASSACHUSETTS POLLINATOR PROTECTION PLAN 3 (2017), *available at* https://www.mass.gov/files/documents/2017/06/zw/pollinator-plan.pdf [hereinafter MA Pollinator Plan].

[43] The Massachusetts Division of Fisheries and Wildlife and the Natural Heritage and Endangered Species Program have listed seven species of wild bees and nineteen species of butterflies and moths as "of concern," endangered, or threatened. The Natural Heritage and Endangered Species Program has identified pesticides as a key threat to the state's imperiled pollinators. *See id.* at 6–8.

[44] Managed species include, *e.g.*, honey bees, bumble bees, leafcutting bees, and orchard bees. *See id.* at 5.

across the nation.[45] State surveys indicate that on average, beekeepers lost 30 percent of their honey bee colonies that season, with some counties reporting losses as high as 41 percent.[46]

Following guidance from the federal government, the Massachusetts Department of Agricultural Resources ("MDAR"),[47] with input from stakeholder groups, finalized a *Massachusetts Pollinator Protection Plan* ("MA Pollinator Plan") in 2017. The MA Pollinator Plan is designed to improve the health of pollinators by promoting best management practices and facilitating collaboration on solutions to protect Massachusetts' critical pollinator populations.[48] The MA Pollinator Plan links recent alarming colony losses to pesticide use (which the plan notes is one of "the major threats facing pollinators"),[49] and sets forth wide-ranging guidelines for beekeepers, pesticide applicators, land managers and farmers, nurseries and landscapers, and homeowners and gardeners.[50]

The Massachusetts Attorney General's Office has also responded to the risks posed by pesticides. In 2016, Attorney General Maura Healey pursued enforcement action against Bayer CropScience LP for unfair or deceptive practices in marketing the company's lawn and garden products containing imidacloprid and clothianidin. The Attorney General alleged that Bayer CropScience LP violated the state's Consumer Protection Act[51] by failing to disclose harms to bees and making misleading claims regarding its neonicotinoid insecticide products, including that the products were "environmentally friendly" and using them was akin to "taking a daily vitamin." In settlement, Bayer CropScience LP agreed to pay $75,000 and reform its advertising and branding practices for neonicotinoid products in Massachusetts.[52] The Attorney General also initiated an investigation of Scotts Miracle-Gro for similar allegations. Scotts Miracle-Gro announced in 2016 that it was phasing out neonicotinoid insecticides from its lawn and garden product line.

The Massachusetts state legislature has also recognized the grave risks posed by neonicotinoids and developed pioneering legislation that would impose strict state-level controls on the application of bee-toxic pesticides. House bill 4041[53] would limit neonicotinoid use, mandate the disclosure of information regarding risks and alternatives. and require the state to identity opportunities to plant pollinator-attracting vegetation near certain state-owned solar energy projects. House bill 4041 is currently moving swiftly through the legislative process with

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[45] *See id.* at 6–7.

[46] *See id.* at 7.

[47] MDAR's Pesticide Enforcement Program is responsible for enforcement of FIFRA and the Massachusetts Pesticide Control Act. *See* MASS. GEN. LAWS ch. 132B; 333 MASS. CODE REGS. 1–14.

[48] MA Pollinator Plan, *supra* note 42, at 3.

[49] *See id.* at 7.

[50] *Id.* at 13–24.

[51] MASS. GEN. LAWS ch. 93A.

[52] *See* Assurance of Discontinuance, *Commonwealth of Massachusetts v. Bayer CropScience LP*, Civil Action No. 16-3269G (Suffolk Cty. Super. Crt. Oct. 26, 2016).

[53] *Available at* https://malegislature.gov/Bills/190/H4041.

broad support, and was favorably reported out of a joint committee in November 2017.

District of Columbia

The District of Columbia ("District") is vitally interested in ensuring that EPA performs the Registration Reviews for the Subject Neonicotinoid Insecticides appropriately and considers the results from recent scientific studies and assessments that demonstrate adverse impacts of the Subject Neonicotinoid Insecticides. The District is primarily an urban environment, but within that environment, the District has expansive parks, an impressive tree canopy, miles of shore, numerous buildings with green roofs, open space, and many avid gardeners. The District is home to approximately 130 native bee species. Four of these species are designated as Species of Greatest Conservation Need in the 2015 District of Columbia Wildlife Action Plan,[54] and these species and their critical habitats are managed by the District's Department of Energy & Environment ("DOEE"). In addition, one of them, the rusty patched bumble bee, is an endangered species.

In 2016 the District had the distinction of being proclaimed a Bee City USA in part due to the efforts of the DOEE to promote pollinators through pollinator seed giveaways, native meadow creation, and educational outreach. Although the District has no commercial agriculture or commercial beekeeping for pollination services or honey production, the DOEE has created a Pollinator Protection Plan that focuses not only on the protection of managed pollinators but also on the protection of all pollinators in the District. The goal of this Plan is to engage non-profit organizations, government agencies, businesses, pesticide applicators, beekeepers, educational institutions, and the general public in the promotion and protection of pollinators by helping people understand pollinators' importance and how there can be a home for them in the District's urban environment.

In further promoting the District's interest in the health of pollinators and the potential impacts to human health and the environment, the DOEE is in the process of publishing a proposed rulemaking that will add the Subject Neonicotinoid Insecticides and other pesticides to the list of District Restricted-Use Pesticides ("DRUP"). A pesticide that is on the DRUP list is subject to a number of use restrictions, including purchase and use only by a DOEE-licensed applicator. The DOEE started this rulemaking effort in part due to the extensive scientific and toxicological assessments and corresponding legislation adopted by the State of Maryland and the European Union.[55]

Maryland

Maryland, which has experienced precipitous declines in bee populations, sharply

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[54] DEP'T OF ENERGY & ENV'T, DISTRICT OF COLUMBIA, 2015 DISTRICT OF COLUMBIA WILDLIFE ACTION PLAN (2015), *available at* https://doee.dc.gov/service/2015-district-columbia-wildlife-action-plan.

[55] *See, e.g.*, MD. DEP'T OF LEGIS. SERVS., POLLINATOR HEALTH AND THE USE OF NEONICOTINOIDS IN MARYLAND (2015), *available at* http://mgaleg.maryland.gov/pubs/legislegal/2015-pollinator-health.pdf; *Pesticides and Bees*, EUR. COMM'N, https://ec.europa.eu/food/animals/live_animals/bees/pesticides_en; Commission Implementing Regulation 485/2013, 2013 O.J. (L 139) 12, *available at* http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:139:0012:0026:EN:PDF.

restricts the sale and use of neonicotinoid insecticides. Neonicotinoid insecticides can be sold at retail only by entities that sell restricted use pesticides.[56] The use of neonicotinoids is tightly circumscribed, moreover: these pesticides can be used only by certified applicators (or persons working under their supervision); by farmers (or persons working under their supervision) for agricultural purposes; or by veterinarians.[57] Additionally, Maryland's Department of Agriculture is directed, by statute, to "incorporate pollinator habitat expansion and enhancement practices" into the Managed Pollinator Protection Plan that the state develops in coordination with EPA.[58]

Maryland law also directs certain state agencies to create and implement pollinator habitat plans. Subject to certain exceptions, those plans may not permit the use of neonicotinoids, or seeds or plants treated with neonicotinoids, in designated pollinator habitat areas.[59] Consistent with that directive, Maryland's State Highway Administration, Department of Natural Resources, and Environmental Service have issued such plans for land they manage.

III. Analysis

A. The Subject Neonicotinoid Insecticides Pose Severe, Unacceptable Risks to the Environment and Must Be Canceled or Restricted.

Because the neonicotinoid insecticides imidacloprid, clothianidin, thiamethoxam, and dinotefuran pose unreasonable risks to pollinators, other wildlife, human health, and state agricultural economies, EPA must severely restrict or cancel uses of these insecticides under FIFRA.

As described below, a robust body of research demonstrates that neonicotinoid insecticides are toxic to bees, causing a variety of adverse sublethal effects that reduce the survival of colonies and the survival of wild bees.[60] Moreover, neonicotinoid insecticides also pose risks to other wildlife, including fish, amphibians, birds, aquatic invertebrates, and bats. There is a dearth of studies that assess the human health effects of chronic exposure to neonicotinoid insecticides, but what data do exist indicate a risk of potentially serious harms. These significant risks outweigh the benefits of at least many, if not most, uses of neonicotinoid

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[56] MD. CODE ANN., AGRIC. § 5-2A-02(a).

[57] *Id.* § 5-2A-02(b). The state's restrictions on the use and sale of neonicotinoid pesticides do not apply to certain pet care products, personal care products, and indoor pest control products. *Id.* § 5-2A-02(a)(1).

[58] *Id.* § 5-2A-03.

[59] *Id.* § 2-1801.

[60] *See, e.g.*, A. Decourtye & J. Devillers, *Ecotoxicity of Neonicotinoid Insecticides to Bees*, 683 ADV. EXP. MED. BIOL. 85 (2010); Richard J. Gill et al., *Combined Pesticide Exposure Severely Affects Individual- and Colony-Level Traits in Bees*, 491 NATURE 105 (2012); P.R. Whitehorn et al., *Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen Production*, 336 SCIENCE 351 (2012). *See also* Press Release, EPA, EPA Releases the First of Four Preliminary Risk Assessments for Insecticides Potentially Harmful to Bees (Jan. 6, 2016), *available at* https://archive.epa.gov/epa/newsreleases/epa-releases-first-four-preliminary-risk-assessments-insecticides-potentially-harmful.html (summarizing EPA's preliminary finding that "imidacloprid potentially poses risk to hives" and exposure to imidacloprid at a common level has likely adverse effects, "includ[ing] decreases in pollinators as well as less honey produced").

insecticides. Accordingly, EPA cannot support a finding under FIFRA that continued extensive use of the Subject Neonicotinoid Insecticides "will not generally cause unreasonable adverse effects on the environment."[61]

1. Neonicotinoid Insecticides Are Ubiquitous in the Environment, Posing a Chronic Threat to Wildlife and Humans.

As a consequence of their chemical characteristics and common application practices, neonicotinoid insecticides are pervasive in the environment, posing a chronic threat to pollinators and other animals.

Neonicotinoid insecticides are the most extensively applied insecticides in the United States by land area.[62] Neonicotinoid product application typically involves spraying or injecting a plant, inundating soil, or coating plant seeds. Because of the systemic nature of neonicotinoid insecticides, a treated plant absorbs the poison into its tissues and vascular systems, rendering its pollen, nectar, roots, leaves, stem, and fruit toxic to insects.

Neonicotinoid insecticides remain in the environment long after they are applied, and can be found in pollen, dust, sediment, water, soils, and untreated vegetation.[63] On average, 95 percent of the active ingredient in neonicotinoid insecticides remains in the environment after application. When sprayed, neonicotinoid-containing products drift via air to nearby soils, water, and other plants. Neonicotinoid insecticides also dissolve in water and therefore move and spread easily throughout the environment via groundwater and surface waters. The U.S. Geological Survey's recent national-scale study of U.S. streams found at least one neonicotinoid present in 63 percent of surveyed streams, in both urban and agricultural areas; and the top four most commonly detected neonicotinoid insecticides were the four chemicals currently under EPA review.[64] The drift and persistence of neonicotinoid insecticides in the environment is especially concerning considering that several neonicotinoid-containing products approved by EPA for homeowner use in gardens and lawns, and on ornamental trees have manufacturer-recommended application rates that are sometimes 120 times higher than rates approved for use on agricultural crops. In general, neonicotinoid insecticides are applied to plants in greenhouses and nurseries and trees in urban areas at much higher rates than field crops.[65]

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[61] *See* 7 U.S.C. § 136a(c)(5).

[62] *See* CTR. FOR FOOD SAFETY, NET LOSS: ECONOMIC EFFICACY AND COSTS OF NEONICOTINOID INSECTICIDES USED AS SEED COATINGS: UPDATES FROM THE UNITED STATES AND EUROPE 1 (2016) [hereinafter NET LOSS REPORT].

[63] For example, recent research has documented high levels of neonicotinoid contamination in vegetation in rural areas near fields treated with neonicotinoid insecticides. *See, e.g.*, C. Botias et al., *Neonicotinoid Residues in Wildflowers, a Potential Route of Chronic Exposure for Bees*, 49 ENVTL. SCI. TECH. 12731 (2016); Arthur David et al., *Widespread Contamination of Wildflower and Bee-Collected Pollen with Complex Mixtures of Neonicotinoids and Fungicides Commonly Applied to Crops*, 88 ENV'T INT'L 169 (2016).

[64] Michelle L. Hladik & Dana W. Kolpin, *First National-Scale Reconnaissance of Neonicotinoid Insecticides in Streams Across the USA*, 13 ENVTL. CHEMISTRY 12 (2015) (detecting neonicotinoid insecticides in surveyed U.S. streams, including imidacloprid (detected 37 percent of the time), clothianidin (24 percent), thiamethoxam (21 percent), and dinotefuran (13 percent)).

[65] L. Pisa et al., *An update of the Worldwide Integrated Assessment (WIA) on systemic insecticides, Part 2: Impacts on organisms and ecosystems*, ENVTL. SCI. & POLLUTION RESEARCH (July 25, 2017),

There is no escape from these toxic chemicals for imperiled pollinators. Pollinators are chronically exposed to neonicotinoid insecticides via a number of pathways, including direct ingestion of neonicotinoid-laced pollen and nectar from commercial crops (largely via the use of neonicotinoid-treated seeds) and from backyard gardens and plantings where neonicotinoid-containing gardening and lawn-care products have been used.[66] Research shows that bees are drawn to food containing neonicotinoid insecticides such as imidacloprid and thiamethoxam, and cannot limit their exposure to these chemicals.[67] Research also shows that "set-aside" strips of untreated pollinator-friendly vegetation near treated fields fail to provide pollinators relief from neonicotinoid exposures.[68]

Moreover, humans are chronically exposed to neonicotinoid insecticides in the natural environment; in the built environment, where neonicotinoid-containing products are used; and in the water and food supplies.[69] Notably, because of the systemic nature of neonicotinoid insecticides, the insecticides cannot be washed off the surface of foods prior to consumption. The most recent pesticide monitoring study by the U.S. Food and Drug Administration found neonicotinoid residues in a variety of different foods found in the human diet. Imidacloprid was the second most frequently occurring pesticide residue in the study, found in approximately 30 percent of samples. Thiamethoxam and clothianidin were also present in approximately 11 percent of samples.[70] In addition, a recent worldwide survey of neonicotinoids in honey found at least one of five tested neonicotinoid insecticides (acetamiprid, clothianidin, imidacloprid, thiacloprid, and thiamethoxam) in 75 percent of honey samples, with 10 percent of samples containing four or five of the compounds.[71] Neonicotinoid-containing products are also approved for a variety of residential uses and other uses that result in exposures of vulnerable populations such as children and pregnant women. For instance, imidacloprid is permitted for

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https://link.springer.com/article/10.1007%2Fs11356-017-0341-3.

[66] Other pathways include exposure to treated seed fragments during planting. At least one researcher believes high fructose corn syrup made from corn treated with neonicotinoid insecticides (which is commonly fed to bees by commercial beekeepers) may contain small concentrations of neonicotinoid insecticides and constitute another exposure route. *See* Chensheng Lu, Kenneth M. Warchol, & Richard A. Callahan, In situ *Replication of Honey Bee Colony Collapse Disorder*, 65 BULLETIN OF INSECTOLOGY 99 (2012).

[67] Sebastien C. Kessler et al., *Bees Prefer Foods Containing Neonicotinoid Pesticides*, 521 NATURE 74 (2015).

[68] *See* Christina L. Mogren & Jonathan G. Lundgren, *Neonicotinoid-Contaminated Pollinator Strips Adjacent to Cropland Reduce Honey Bee Nutritional Status*, 6 SCIENTIFIC REPORTS 1 (2016).

[69] In addition, some pesticide handlers and agricultural workers experience occupational exposure. *See* Memorandum from Jennifer R. Tyler et al., Off. of Pesticide Programs, EPA, to Russell Wasem & Susan Lewis, Special Review & Reregistration Div., EPA, at 6 (Dec. 3, 2008), Doc. ID. EPA-HQ-OPP-2008-0844-0004 [hereinafter Imidacloprid Human Health Assessment Scoping Document].

[70] U.S. FOOD & DRUG ADMIN., PESTICIDE RESIDUE MONITORING PROGRAM FISCAL YEAR 2015 PESTICIDE REPORT 27 (2017), *available at* https://www.fda.gov/Food/FoodborneIllnessContaminants/Pesticides/ucm2006797.htm. *See also* AM. BIRD CONSERVANCY, NEONICOTINOID INSECTICIDES HARMFUL TO BIRDS AND BEES FOUND IN CONGRESSIONAL CAFETERIA FOOD (2015), *available at* https://abcbirds.org/wp-content/uploads/2017/02/Congressional-report_Pesticides_FINAL_7-30.pdf (finding that more than 90 percent of food samples taken from Congressional cafeterias contain neonicotinoid insecticides).

[71] E.A.D. Mitchell et al., *A Worldwide Survey of Neonicotinoids in Honey*, 358 SCIENCE 109 (2017).

use on lawns, golf courses, and ornamental plantings; as a wood preservative and termiticide in dwellings, fence posts, decks, utility poles, and other structures; and in domestic pet treatments.[72]

2. Neonicotinoid Insecticides Are Highly Toxic to Pollinators and Impair Bee Colony Success.

There is no question that neonicotinoid insecticides are highly toxic to bees. By their nature, neonicotinoid insecticides are poisons designed to kill insects and invertebrates. Even at tiny doses, neonicotinoid insecticides cause bees to experience convulsions, paralysis, and death. Research shows that bees exposed to neonicotinoid insecticides (including in field-realistic conditions and doses) experience increased mortalities and a number of sublethal adverse effects that impair colony success and increase biodiversity loss.[73] Sublethal adverse effects include:

- neuromuscular impairments;
- disorientation and difficulties navigating back to the hive;
- reduced foraging efficiency;
- increased worker mortality;
- impaired memory, learning, and ability to communicate properly with other bees in the colony;
- reduction in breeding success and colony growth;
- reductions in queen production and survivorship;
- decrease in metabolic efficiency;
- immune suppression; and
- increased susceptibility to disease and parasites.[74]

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[72] *See* Imidacloprid Human Health Assessment Scoping Document, *supra* note 69, at 1, 4–5.

[73] *See, e.g.*, Ben A. Woodstock et al., *Impacts of Neonicotinoid Use on Long-Term Population Changes in Wild Bees in England*, 7 NATURE COMMUNICATIONS (2016); JENNIFER HOPWOOD ET AL., XERCES SOC'Y, HOW NEONICOTINOIDS CAN KILL BEES: THE SCIENCE BEHIND THE ROLE THESE INSECTICIDES PLAY IN HARMING BEES (2d ed. 2016).

[74] *See, e.g.*, Gill et al., *supra* note 60; Whitehorn et al., *supra* note 60; Pisa et al., *supra* note 65; Annely Brandt et al., *Immunosuppression in Honeybee Queens by the Neonicotinoids Thiacloprid and Clothianidin*, 7 SCIENTIFIC REPORTS (2017); Javier Hernandez Lopez et al., *Sublethal Pesticide Doses Negatively Affect Survival and the Cellular Responses in American Foulbrood-Infected Honeybee Larvae*, 7 SCIENTIFIC REPORTS (2017); N. Tsvetkov et al., *Chronic Exposure to Neonicotinoids Reduces Honey Bee Health Near Corn Crops*, 356 SCIENCE 1395 (2017); B.A. Woodcock et al., *Country-Specific Effects of Neonicotinoid Pesticides on Honey Bees and Wild Bees*, 356 SCIENCE 1393 (2017); Claudia Dussaubat et al., *Combined Neonicotinoid Pesticide and Parasite Stress Alter Honeybee Queens' Physiology and Survival*, 6 SCIENTIFIC REPORTS (2016); Lars Straub et al., *Neonicotinoid Insecticides Can Serve as Inadvertent Insect Contraceptives*, 283 PROCEEDINGS OF THE ROYAL SOC'Y B (2016); Judy Wu-Smart & Maria Spivak, *Sub-Lethal Effects of Dietary Neonicotinoid Insecticide Exposure on Honey Bee Queen Fecundity and Colony Development*, 6 SCIENTIFIC REPORTS (2016); Mohamed Alburaki et al., *Neonicotinoid-Coated Zea mays Seeds Indirectly Affect Honeybee Performance and Pathogen Susceptibility in Field Trials*, 10 PLOS ONE (2015); Maj Rundlof et al., *Seed Coating with a Neonicotinoid Insecticide Negatively Affects Wild Bees*, 521 NATURE 77 (2015); Daren M. Eiri & James C. Nieh, *A Nicotinic Acetylcholine Receptor Agonist Affects Honey Bee Sucrose Responsiveness and Decreases Waggle Dancing*, 215 J. EXPERIMENTAL BIOLOGY 2022 (2012); Erik Stokstad, *Field Research on Bees Raises Concern about Low-Dose Pesticides*, News & Analysis, 335 SCIENCE 1555 (2012).

A growing body of research also links neonicotinoid use to butterfly declines.[75] These threats to pollinators are not at all theoretical. In 2017, the U.S. Fish and Wildlife Service listed a bumblebee species, the rusty patched bumblebee (*Bombus affinis*), as endangered for the first time. The population of this once-common bumblebee has declined nearly 90 percent since the 1990s and is now on the brink of extinction.[76]

The Directorate-General for Internal Policies of the European Parliament issued a report in 2012 concluding that "there is no safe level of exposure [of neonicotinoid insecticides], as even tiny amounts of systemic insecticides can have negative effects in the long term . . . the damage neonicotinoids cause to the central nervous system of insects is both irreversible and cumulative."[77] Moreover, the combined effect of neonicotinoid insecticides and other stressors, which commonly occurs in agricultural areas, can amplify threats to pollinators.[78] Research strongly indicates that exposure to neonicotinoid insecticides is a factor in overall pollinator decline because it impairs the resilience and survival of colonies, and renders pollinators more susceptible to other threats.[79] Exposure to neonicotinoid insecticides may also play a contributing role in the sudden and total collapse of hives known as Colony Collapse Disorder.[80] Furthermore, the demonstrated adverse synergistic and cumulative effects of insecticides in the environment suggest that research and risk assessments to date may have underestimated the real-world adverse effects of neonicotinoid insecticides.[81]

3. Neonicotinoid Insecticides Have Other Adverse Ecological Effects and Risks that Underscore the Need for Stricter Federal Limits.

The risks posed by neonicotinoid insecticides extend well beyond pollinating insects. The scientific literature connects neonicotinoid exposure in terrestrial and aquatic environments to mortality and sublethal effects, such as feeding inhibition, impaired movement, reduced

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[75] *See, e.g.*, NET LOSS REPORT, *supra* note 62, at 16–17; Pisa et al., *supra* note 65 (reviewing studies concluding that the use of studied neonicotinoid insecticides "cause[s] negative effects on the most common butterfly families, such as reduced survival rate, feeding interruption, and alteration of oviposition behavior"); M.L. Forister et al., *Increasing Neonicotinoid Use and the Declining Butterfly Fauna of Lowland California*, 12 BIOLOGY LETTERS (2016); J.R. Pecanka & J.G. Lundgren, *Non-target Effects of Clothianidin on Monarch Butterflies*, 102 THE SCI. OF NATURE 1 (2015).

[76] *See* Michael Greshko, *First U.S. Bumblebee Officially Listed as Endangered*, NAT'L GEOGRAPHIC, Mar. 22, 2017, *available at* https://news.nationalgeographic.com/2017/03/bumblebees-endangered-extinction-united-states/.

[77] EUR. PARL., DIRECTORATE-GENERAL FOR INTERNAL POLICIES, EXISTING SCIENTIFIC EVIDENCE OF THE EFFECTS OF NEONICOTINOID PESTICIDES ON BEES 15 (2012), *available at* http://www.europarl.europa.eu/RegData/etudes/note/join/2012/492465/IPOL-ENVI_NT(2012)492465_EN.pdf.

[78] Simone Tosi et al., *Neonicotinoid Pesticides and Nutritional Stress Synergistically Reduce Survival in Honey Bees*, 284 PROCEEDINGS OF THE ROYAL SOCIETY B: BIOLOGICAL SCI. (2017).

[79] *See* Francisco Sanchez-Bayo et al., *Are Bee Diseases Linked to Pesticides? – A Brief Review*, 89–90 ENV'T INT'L 7 (2016).

[80] *See* Lu, Warchol, & Callahan, *supra* note 66.

[81] *See* CTR. FOR BIOLOGICAL DIVERSITY, TOXIC CONCOCTIONS: HOW THE EPA IGNORES THE DANGERS OF PESTICIDE COCKTAILS (2016) (arguing that EPA has failed to adequately analyze the risks associated with the synergistic effects of chemical mixtures in the environment, including neonicotinoid products); Tsvetkov et al., *supra* note 74.

fecundity, body size reductions, and immune suppression, in a host of species, including fish, amphibians, birds, bats, and aquatic invertebrates such as insects and crabs.[82] Also concerning are the potential indirect effects of neonicotinoid-induced decline of invertebrate species in both terrestrial and aquatic environments. Such decline can reduce the decomposition capacity of ecosystems and also disrupt the food chain, leading to losses of birds, amphibians, and bats that feed on those invertebrates.[83] In general, there is increasingly strong evidence that neonicotinoid insecticides disrupt important ecosystem functioning and services such as pollination, nutrient cycling, fish productivity, and pest and weed control, as well as ecosystem resilience.[84]

Neonicotinoid impacts to aquatic ecosystems are particularly troubling. Monitoring studies have documented "world-wide contamination of creeks, rivers and lakes" by neonicotinoid insecticides.[85] Although initial studies suggested that neonicotinoid insecticides would not have major impacts on aquatic environments, later studies have since found that aquatic organisms are "much more sensitive" to neonicotinoid insecticides than standard test species.[86] Furthermore, "[d]iscrepancies between the acute and chronic sensitivity of species can lead to water quality benchmarks that are under-protective, especially for low-level chronic

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[82] *See, e.g.*, CTR. FOR FOOD SAFETY, WATER HAZARD – AQUATIC CONTAMINATION BY NEONICOTINOID INSECTICIDES IN THE UNITED STATES (2015); Pisa et al., *supra* note 65; Francisco Sanchez-Bayo et al., *Contamination of the Aquatic Environment with Neonicotinoids and is Implications for Ecosystems*, 4 FRONTIERS IN ENVTL. SCI. 1, art. 71 (2016); Francisco Sanchez-Bayo, *The Trouble with Neonicotinoids*, 346 SCIENCE 806 (2014); Rosemary Mason et al., *Immune Suppression by Neonicotinoid Insecticides at the Root of Global Wildlife Declines*, 1 J. ENVTL. IMMUNOLOGY & TOXICOLOGY 3 (2013). *See also* Order, *Ellis v. Housenger*, Case No. 13-cv-01266-MMC, Doc. 269 (N.D. Cal. May 8, 2017) (holding, in response to claims from beekeepers, environmental groups, food safety advocates, and consumer advocates that EPA failed to protect wildlife from pesticides containing clothianidin or thiamethoxam, that EPA unlawfully issued registrations for fifty-nine pesticides without consulting with the U.S. Fish and Wildlife Service as required by the Endangered Species Act); Compl., *Natural Resources Defense Council v. Pruitt*, Case No. 17-cv-2034 (D.D.C. Oct. 2, 2017) (alleging that EPA failed to properly evaluate the impacts of hundreds of neonicotinoid products on threatened and endangered species, including pollinator species, and seeking to vacate the registrations of insecticide products containing acetamiprid, dinotefuran, and imidacloprid).

[83] *See* DR. PIERRE MINEAU & CYNTHIA PALMER, AMERICAN BIRD CONSERVANCY, THE IMPACT OF THE NATION'S MOST WIDELY USED INSECTICIDES ON BIRDS (Mar. 2013), *available at* https://abcbirds.org/wp-content/uploads/2015/05/Neonic_FINAL.pdf; Sanchez-Bayo et al., *supra* note 82. *See also* Pisa et al., *supra* note 65 ("The consequences of losing the invertebrate fauna due to continuous exposure to ubiquitous residues of neonicotinoids and fipronil are . . . far reaching and cannot be ignored any longer."); Agence France-Presse, '*Catastrophe' as France's Bird Population Collapses Due to Pesticides*, GUARDIAN, Mar. 20, 2018, *available at* https://www.theguardian.com/world/2018/mar/21/catastrophe-as-frances-bird-population-collapses-due-to-pesticides (describing two recent studies by France's National Museum of Natural History and National Centre for Scientific Research documenting significant declines in bird populations across France, in some cases by more than two-thirds, which researchers speculate are connected to neonicotinoid insecticide use).

[84] *See* Pisa et al., *supra* note 65; SARAH HOYLE & AIMEE CODE, XERCES SOC'Y, NEONICOTINOIDS IN CALIFORNIA'S SURFACE WATERS: A PRELIMINARY REVIEW OF POTENTIAL RISK TO AQUATIC INVERTEBRATES (2016), *available at* https://xerces.org/neonicotinoids-and-surface-waters/; J.L. Pestana et al., *Structural and Functional Responses of Benthic Invertebrates to Imidacloprid in Outdoor Stream Mesocosms*, 157 ENVTL. POLLUTION 2328 (2009).

[85] Sanchez-Bayo et al., *supra* note 82.

[86] *See id.* *See also* HOYLE & CODE, *supra* note 84, at 12 (concluding that "[i]n the case of imidacloprid, there is strong evidence that the EPA aquatic life benchmarks are under-protective of invertebrates."); Pisa et al., *supra* note 65.

exposures."[87] According to Sanchez-Bayo et al. (2016),

> [o]ne particular aspect of neonicotinoids became apparent only after years of testing: median toxicity values varied significantly depending on the time of exposure. . . . Neonicotinoids bind irreversibly to the nicotinic acetylcholine receptors (nAChR) embedded in the synaptic membranes of neurons, and their activation elicits a continuous electric impulse that eventually leads to the death of the neuron. The neuronal death toll accumulates as more and more chemical molecules bind to other nAChRs until the organism cannot cope with the damage and dies . . . . Aquatic organisms are constantly being exposed to residues of chemicals present in water, a medium from which they cannot escape. The time to reach the organism's death threshold depends on the internal concentration of insecticide, which in turn depends on its external concentration and the kinetics and detoxification ability of each species . . . .[88]

Sanchez-Bayo et al. (2016) concludes that "[t]he decline of many populations of invertebrates, due mostly to the widespread presence of waterborne residues and the extreme chronic toxicity of neonicotinoids, is affecting the structure and function of aquatic ecosystems."[89]

Another recent review of neonicotinoid insecticides in surface waters finds "[s]trong evidence exists that water-borne neonicotinoid exposures are frequent, long-term, and at levels . . . which commonly exceed several existing water quality guidelines" and "neonicotinoids in surface waters worldwide are well within the range where both short- and long-term impacts on aquatic invertebrate species are possible . . . ."[90] The toxicological risk to aquatic systems and birds has led the American Bird Conservancy to call for an outright ban on neonicotinoid insecticides.[91]

4. Evidence of Potential Serious Risks to Human Health Should Lead EPA to Take a Precautionary Approach and Restrict Neonicotinoid Insecticide Use.

As noted above, neonicotinoid insecticides are ubiquitous in the environment, including in our groundwater, our surface waters, and the food we eat. Yet, there is very little research on the human-health risks of chronic exposure to these chemicals. What limited data do exist are alarming; neonicotinoid insecticides have been shown to disrupt mammalian nerve cell activity,

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[87] HOYLE & CODE, *supra* note 84, at 12

[88] Sanchez-Bayo et al., *supra* note 82.

[89] *Id. See also generally* HOYLE & CODE, *supra* note 84.

[90] Christy A. Morrissey et al., *Neonicotinoid Contamination of Global Surface Waters and Associated Risk to Aquatic Invertebrates: A Review*, 74 ENV'T INT'L 291 (2015).

[91] MINEAU & PALMER, *supra* note 83.

raising concerns about significant human-health impacts such as nervous system disorders and developmental impacts to infants and children.

According to a recent review of the risks of neonicotinoid exposure to human health, Cimino et al. (2017),[92] neonicotinoid insecticides have been linked to adverse effects in vertebrates, and recent studies show adverse effects on mammals even at sublethal doses. For instance, neonicotinoid insecticides have similar effects to nicotine, affecting human brain receptors that are critically important to development, memory, cognition, and behavior. Similar nerve cell effects play a role in central nervous system disorders such as Alzheimer's disease, Parkinson's disease, schizophrenia, and depression. Other studies have shown adverse reproductive and developmental effects such as reduced sperm production, reduced pregnancy rates, stillbirth, premature birth, and reduced offspring weight. Overall, Cimino et al. (2017) concludes that "there remains a paucity of data on neonic exposure and human health. Given the widespread use of neonics in agriculture and household products and its increasing detection in U.S. food and water, more studies on the human health effects of chronic (non-acute) neonic exposure are needed."[93]

In light of the dearth of studies about the impacts of neonicotinoid insecticides on human health—and acknowledging the critical need for additional studies regarding chronic neonicotinoid insecticide exposure, in particular—EPA should restrict product use pending research that demonstrates a lack of significant adverse human health effects. FIFRA requires EPA to base its risk evaluation on sufficient data, and any determination by EPA that the Subject Neonicotinoid Insecticides pose reasonable risks to human health would not be supported by substantial evidence.[94] As in *Pollinator Stewardship Council v. EPA*, "[t]he limitations of the underlying data in this case mean that no such conclusion can be reached."[95]

B. Stricter Federal Controls Are Needed to Fulfill Federal Policy Goals, Protect States from the Unreasonable Risks of Neonicotinoid Insecticides, and Buttress State Action to Protect Pollinators.

Since 2014, it has been the express policy of the federal government to promote the health of pollinators, including by avoiding pesticide uses that would aggravate already severe pollinator losses, and to support state efforts to develop and implement their own pollinator protection plans.[96] Given that states and EPA have invested considerable resources to advance the federal policy of protecting pollinators from the damaging effects of pesticides, it would be

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[92] *See* Andria M. Cimino et al., *Effects of Neonicotinoid Pesticide Exposure on Human Health: A Systematic Review*, 125 ENVTL. HEALTH PERSPECTIVES 155 (2017).

[93] *Id.* at 160.

[94] *See Pollinator Stewardship Council*, 806 F.3d at 532 ("Without sufficient data, the EPA has no real idea whether [a pesticide] will cause unreasonable adverse effects . . . as prohibited by FIFRA.").

[95] *Id.* at 531.

[96] *See* Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators (June 20, 2014), *available at* https://obamawhitehouse.archives.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b [hereinafter Federal Pollinator Memorandum].

wholly unreasonable for EPA now to undermine this policy by reregistering the continued extensive use of the Subject Neonicotinoid Insecticides, which poses grave risks to pollinators in our states.

In 2014, President Obama issued a memorandum entitled *Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators*[97] ("Federal Pollinator Memorandum"), which recognized recent severe pollinator losses and established an interagency Pollinator Health Task Force. The Pollinator Health Task Force was charged with developing a National Pollinator Health Strategy ("Federal Pollinator Strategy") that sets forth plans for research, public education, and public-private partnerships.[98] The Federal Pollinator Memorandum further required the Pollinator Health Task Force member agencies, including EPA, to develop and implement plans to enhance pollinator habitat and incorporate consideration of pollinator health into certain agency decision-making processes. Additionally, the Federal Pollinator Memorandum required all executive departments and agencies to take appropriate action to protect pollinators, including "avoiding the use of pesticides in sensitive pollinator habitats."[99]

The Federal Pollinator Strategy finalized by the Pollinator Health Task Force in 2015 states that:

> **[m]itigating the effects of pesticides on bees is a priority for the Federal government**, as both bee pollination and insect control are essential to the success of agriculture. . . . [T]he Federal government seeks to create physical and temporal space between the use of pesticides and those areas and times when pollinators are present.[100]

The Federal Pollinator Strategy further details actions that EPA will take by 2020 to protect pollinators as directed by the Federal Pollinator Memorandum. Among other actions, the Federal Pollinator Strategy states that EPA will "[r]estrict the use of pesticides that are acutely toxic to bees," including by potentially restricting uses of pesticides that pose a particular risk to pollinators, such as foliar (leaf) application during bloom periods.[101] Notably, the Federal Pollinator Memorandum specifically required EPA to "assess the effect of pesticides, including neonicotinoids, on bee and other pollinator health,"[102] and the Federal Pollinator Strategy cites

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[97] *Id.*

[98] *See* POLLINATOR HEALTH TASK FORCE, NATIONAL STRATEGY TO PROMOTE THE HEALTH OF HONEY BEES AND OTHER POLLINATORS (2015), *available at* https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/Pollinator%20Health%20Strategy%202015.pdf.

[99] Federal Pollinator Memorandum, *supra* note 96.

[100] POLLINATOR HEALTH TASK FORCE, *supra* note 98, at 47 (emphasis added).

[101] *Id.* at 49.

[102] Federal Pollinator Memorandum, *supra* note 96.

the Registration Reviews as a key implementation action.[103]

The Federal Pollinator Memorandum also specifically required EPA to "engage" states and tribes "in the development of State and tribal pollinator protection plans[.]"[104] As described in these comments, many of our states and other jurisdictions across the country have developed such plans and are taking other action to strictly control bee-toxic chemicals and promote pollinator health.[105] For instance, at least six states have enacted policies to protect their valuable pollinators from neonicotinoid insecticides (*see* Table 1 below).[106]

Table 1. Examples of State Policies Regarding Neonicotinoid Insecticides

California	**Assembly Bill 1789 (2014)**[107] requires the Department of Pesticide Regulation to reevaluate neonicotinoid insecticides by July 1, 2018 and thereafter "adopt any control measures necessary to protect pollinator health."
Connecticut	**Senate Bill No. 231 (2016)**:[108] • prohibits applying neonicotinoid insecticides to certain plants; • requires the Department of Energy and Environmental Protection to classify certain neonicotinoid insecticides as "restricted use" pesticides; • requires the Department of Agriculture to develop best practices for minimizing the release of dust from neonicotinoid-treated seeds; and • encourages protection and restoration of pollinator habitat.
Maryland	**Senate Bill 198 (2016)**:[109] • limits the sale of neonicotinoid insecticides to establishments that sell restricted use pesticides; • generally restricts neonicotinoid use to certified applicators, farm employees, or veterinarians; and • upon completion of EPA's Registration Reviews, requires the Department of Agriculture to review the state's pesticide laws and regulations and recommend changes to protect pollinators.

[103] POLLINATOR HEALTH TASK FORCE, *supra* note 98, at 47, 48–49, 52.

[104] Federal Pollinator Memorandum, *supra* note 96.

[105] *See generally Pollinator Health*, NAT'L CONFERENCE OF STATE LEGISLATURES (2016), http://www.ncsl.org/research/environment-and-natural-resources/pollinator-health.aspx (listing state legislation supporting research on issues related to pollinator health, protecting pollinators from pesticides, protecting and restoring pollinator habitat, educating the public about the role of pollinators, or supporting local beekeepers). *See also supra* pt. II.

[106] In addition, in 2007, New York State denied applications for registration of four new pesticide products containing clothianidin based on concerns regarding impacts to non-target aquatic species and non-target pollinators. *See* Letter from N.Y. Dep't of Envtl. Conservation to Arysta Life Science North America Corp. (July 17, 2007).

[107] *Codified at* CAL. FOOD & AGRIC. CODE § 12838.

[108] 2016 CONN. PUB. ACTS 16-17.

[109] *Codified at* MD. CODE ANN., AGRIC. §§ 5-2A-01 *et seq.*

Massachusetts	**House Bill 4041 (*pending*):**[110] • would establish licensing requirements for neonicotinoid insecticide applicators; • would limit the use of neonicotinoid insecticides during the blooming season; • would mandate the disclosure of information regarding risks and alternatives prior to use; and • would require the state to identity opportunities to plant pollinator-attracting vegetation near certain state-owned solar energy projects. House Bill 4041 was favorably reported out of the Joint Committee on Environment, Natural Resources and Agriculture in November 2017.
Minnesota	**Executive Order 16-07 (Aug. 25, 2016)**:[111] • directs the Department of Agriculture to require a "verification of need" prior to the use of neonicotinoid insecticides, where appropriate, and to implement restrictions on pesticide product labels to protect pollinators; • requires the Department of Natural Resources to develop an integrated pest management strategy for public lands; and • encourages protection and restoration of pollinator habitat.
Oregon	**House Bill 4139 (2014)**[112] requires Oregon State University, in consultation with the State Department of Agriculture, to develop educational materials detailing measures that pesticide applicators can take to protect pollinator health, which shall be included as part of the education required for the pesticide applicator licensing examination. **Administrative Rule No. 603-057-0388 (2015)** prohibits the use of any product containing clothianidin, dinotefuran, imidacloprid, or thiamethoxam on *Tilia* species (*e.g.*, linden trees), which are highly attractive to bees.
Vermont	**House Bill 869 (2014)**[113] requires the Secretary of Agriculture Food, and Markets to evaluate whether neonicotinoid insecticides are safe and not harmful to human health or the health of Vermont's pollinators.

State-level actions to mitigate the threats of neonicotinoid insecticides evidence a growing, widespread consensus that these chemicals pose unreasonable risks and should be strictly curtailed. However, only EPA has the power to limit the use of neonicotinoid insecticides throughout the United States. Given how neonicotinoid insecticides can and do adversely affect pollinating insects, other species, and ecosystems in ways that have serious consequences without respect to state borders, unless EPA takes appropriate action to strictly control them, neonicotinoid insecticide use will continue to undermine state initiatives—as well as federal policy goals—to protect our pollinators, other natural resources, and economies from adverse environmental effects.

[110] *Available at* https://malegislature.gov/Bills/190/H4041.

[111] *Available at* https://mn.gov/governor/assets/2016_08_25_EO_16-07_tcm1055-253931.pdf.

[112] OR. REV. STAT. § 634.045.

[113] 2014 Vt. Legis. Serv. 159.

C. Actions by Other Governments and Major Retailers Evidence a Watershed Consensus That the Risks of Neonicotinoid Insecticides Outweigh Benefits.

Science-based state actions by other governments to limit neonicotinoid insecticide use—and the net benefits associated with those limits—provide further evidence that extensive use of neonicotinoid insecticides poses unreasonable environmental risks.

Since 2013, the European Union has prohibited the use of clothianidin, imidacloprid, and thiamethoxam on flowering crops. Despite industry claims that this moratorium would be disastrous for agricultural productivity and the economy, there is no evidence of production declines; in fact, on average, production of major crops rose following the imposition of the moratorium.[114] Following an assessment of more than 1,500 studies of the effects of clothianidin, imidacloprid, and thiamethoxam, the European Food Safety Authority recently concluded that most uses of neonicotinoid insecticides pose a risk to wild bees and honeybees.[115] European Union member states are now considering proposals by the European Commission to expand restrictions on these neonicotinoid insecticides.

The European moratorium experience generally accords with independent analyses of the relative economic costs and benefits of neonicotinoid insecticide use.[116] In a recent review, the Center for Food Safety concludes regarding seed coatings that

> [t]he lack of economic justification for the prophylactic use of neonicotinoid-coated seeds for soybeans (the second most extensively planted U.S. crop after corn), is virtually uncontested based on the overwhelming weight of independent reviews. . . . On the 'loss' side, a further array of new U.S., Canadian and U.K. scientific studies solidly document harms occurring from the overuse of neonicotinoid seed coatings. . . . **In sum, the net costs of this technology to society outweigh the industry-claimed benefits**.[117]

Notably, Canada's Pest Management Regulatory Agency ("PMRA") is also reevaluating its registrations of imidacloprid, clothianidin, and thiamethoxam, and developing measures to protect pollinators and aquatic life from risks. Following pollinator risk assessments conducted in collaboration with EPA and the California Department of Pesticide Regulation, PMRA recently proposed to phase out some uses of clothianidin and thiamethoxam, and to impose precautionary restrictions on other uses of these insecticides where acceptable risk to bees and

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[114] *See generally* NET LOSS REPORT, *supra* note 62.

[115] See Press Release, European Food Safety Authority, Neonicotinoids: Risks to Bees Confirmed (Feb. 28, 2018), *available at* https://www.efsa.europa.eu/en/press/news/180228.

[116] *See generally* NET LOSS REPORT, *supra* note 62; C.H. Krupke et al., *Planting of Neonicotinoid-Treated Maize Poses Risks for Honey Bees and Other Non-Target Organisms Over a Wide Area Without Consistent Crop Yield Benefit*, 54 J. APPLIED ECOLOGY 1449 (2017).

[117] NET LOSS REPORT, *supra* note 62, at 1–2 (emphasis added).

other pollinators cannot be demonstrated.[118] PMRA will propose measures to protect aquatic life from clothianidin and thiamethoxam in July 2018. PMRA has already assessed the environmental risks of imidacloprid and has concluded that "imidacloprid is being measured at levels that are harmful to aquatic insects."[119] Consequently, PMRA has proposed to phase out the majority of outdoor uses of imidacloprid, including agricultural uses.[120] PMRA intends to make a final decision on measures to protect aquatic life and pollinators from imidacloprid in late 2018.[121] Moreover, Quebec and Ontario have already imposed restrictions on neonicotinoid insecticides, and Montreal banned all uses of neonicotinoid insecticides within city limits in 2015.

Governments are not the only entities responding to calls from the public for action against neonicotinoid insecticides. More than 110 major garden retailers, including Home Depot, Lowe's, Walmart, and True Value, have committed voluntarily to phase out the sale of plants and other products containing neonicotinoid insecticides in recognition of the environmental risks they pose.[122] In addition, at least five large garden center chains in Europe (operating 78 garden stores in the United Kingdom) have agreed voluntarily to remove products containing neonicotinoid insecticides from their shelves.

EPA should follow Europe's lead in recognizing that risks to pollinators necessitate swift federal action to severely curtail the use of neonicotinoid insecticides. And like Canada's PMRA—which is relying on some of the same assessment data as EPA—EPA should propose to restrict severely or cancel uses of the Subject Neonicotinoid Insecticides, including unnecessary uses and other uses that pose particular risk to pollinators and aquatic environments.

CONCLUSION

As EPA continues to evaluate the environmental effects of imidacloprid, clothianidin, thiamethoxam, and dinotefuran, we urge EPA to thoroughly consider the severe risks that these pesticides pose to our states' economies, food supplies, public health, and natural resources. EPA should take heed of the information presented herein, including actions by our states and other jurisdictions here and abroad to protect pollinators, ecosystems, and public health from the unreasonable adverse effects of neonicotinoid insecticides. In light of the compelling evidence linking neonicotinoid insecticides to environmental harm and health risks, we are confident that EPA's evaluation of the costs and benefits of the Subject Neonicotinoid Insecticides will lead EPA to conclude that uses of each of the Subject Neonicotinoid Insecticides should be cancelled or severely restricted for the reasons detailed above.

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[118] HEALTH CANADA, UPDATE ON THE NEONICOTINOID PESTICIDES 1–2 (Dec.19, 2017), *available at* https://www.canada.ca/content/dam/hc-sc/documents/services/consumer-product-safety/reports-publications/pesticides-pest-management/fact-sheets-other-resources/update-neonicotinoid-pesticides/update-neonicotinoids-eng.pdf.

[119] *Id.* at 2.

[120] *Id.*

[121] *Id.* at 3.

[122] *See* Press Release, Friends of the Earth, Walmart and True Value to Phase Out Bee-Killing Pesticides While Ace Hardware Lags Behind (May 3, 2017).

We would be pleased to work with you as EPA continues its Registration Reviews. Please do not hesitate to contact us if you wish to engage us further in this important effort.

Sincerely,

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