Neonicotinoids or “neonics” are neurotoxic insecticides linked to massive bee and insect losses around the globe and, increasingly, to vast water and soil contamination, ecosystem-wide harms, and human health concerns in New York. The Birds and Bees Protection Act’s (A7639A-Englebright/ S5816-Hoylman) five-year moratorium on outdoor uses of these pesticides protects the state—and New Yorkers—while further study is conducted.

**Neonics Are Toxic, Persistent, and Everywhere** – As the world’s most widely used insecticides, neonics have made U.S. agriculture 48 times more harmful to insects since their introduction in the mid-1990s.¹ Neonics permeate plants—turning their nectar, pollen, and fruit toxic. They can be applied to a plant’s roots or as a coating on a crop seed, which the entire plant then absorbs as it grows. Neonics also persist in soil, where they are easily carried long distances by rain or irrigation water. Today, neonics broadly contaminate New York’s water, soil, and plants, concentrating in areas of year-after-year use.²

**Neonics Kill Bees** – Neonics are extremely toxic to insects, including bees. A robust body of scientific evidence links neonic use to massive bee population losses, including two comprehensive worldwide academic assessments, Cornell University research, and even a major pesticide-industry-funded field study—the largest to date.³ In New York, beekeepers have lost more than 40% of their bee colonies nearly every year for the last decade⁴—suggesting possible similar catastrophic losses for the state’s 400+ native bee species. These losses threaten both the state’s ecosystems and the estimated $1.2 billion per year that pollination-dependent crops—including apples, squash, blueberries, and cherries—contribute to the state’s agricultural economy.⁵

**Neonics Kill Birds** – Scientific research increasingly identifies neonics as a leading cause of mass bird losses—such as the 30% decline in North American birds in the last 50 years.⁶ Eating just one neonic-treated seed is enough to kill some songbirds, and even at low doses, neonics can harm birds’ immune systems, fertility, and navigation, and cause rapid weight loss—reducing birds’ chances of surviving in the wild.⁷ As neonics kill insect populations, birds also starve. In Europe, for example, declining bird populations were linked to very low levels of neonics in water, and neonics are a suspected cause of the steep decline in French farmland birds.⁸

**Neonics Contaminate New York Water and Debilitate Ecosystems, Harming Fish, Deer, and Other Wildlife** – Neonics frequently show up in state surface-water testing as well as roughly 30 percent of Long Island groundwater samples—indicating a “very high probability” that the pesticides are causing “ecosystem-wide damage” in New York.⁹ Neonics hollow out ecosystems by eradicating aquatic insect populations that birds, fish, amphibians, and other animals depend upon for food. For instance, recent research shows a Japanese fishery collapsed within a year of the introduction of neonics in nearby agricultural fields—and neonic levels later measured at the site match those commonly seen in New York water.¹⁰ Diminishing trout, salmon, and wild bird populations, in turn, threaten New York’s billion-dollar tourism and recreation industries.¹¹ Neonic water contamination has also been linked to harm to bats and birth and developmental defects in white-tailed deer.¹²

**Neonics May Harm New Yorker’s Health** – According to the U.S. Centers for Disease Control, half the U.S. population is exposed to neonics on a regular basis¹³—a concerning statistic given that studies suggest that neonics may increase risk of developmental or neurological damage in humans, including malformations of the
Alternatives to Neonics — For nearly all uses, neonics are replaceable — with the best and most cost-effective alternative often being nothing. For example, neonics are not recommended because of an estimated 73% of the neonics used in New York agriculture, yet provide little to no benefits to farmers. New research also shows that neonics may often actually decrease yields by killing pollinators or pest predators (i.e., “good bugs”). For growers and homeowners, non-synthetic or less-harmful synthetic substitutes exist, including organic and minimum-risk pesticides.

New York Must Act — Europe has banned outdoor use of several neonics, and Canada is moving to do the same. The Trump administration, however, has done nothing, and no state has yet addressed the heart of the neonics crisis. With more damage done every day and no federal help in sight, state legislators must act to pass the Birds and Bees Protection Act—which would make New York a national leader in protecting its pollinators, water, and people, while providing state regulators time for further study required by the act.

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5. DEC & NYS Dep’t of Ag. and Markets, New York State Pollinator Protection Plan Update, 8 (Jun. 2018), https://on.ny.gov/2nBygPW.
Recent Science on Neonicotinoid Insecticides

A recent outpouring of scientific research identifies the use of neonicotinoid insecticides or “neonics” as a leading cause of massive losses of bees and other pollinators. New science also links neonics with harms to other wildlife—like fish, birds, deer, bats and aquatic insects—sometimes dubbed a “second Silent Spring”—and raises concerns about neonic water contamination and potential human health impacts. The most recent relevant research is summarized below:

**Neonic Impacts on Bees and Other Pollinators:**

- *Douglas et al.* (Jan. 2020) — Finding the oral “bee toxic load” of U.S. agriculture increased nine-fold from 1997-2012, likely driven by adoption of widespread neonic use. [https://go.nature.com/2SNtbZI.](https://go.nature.com/2SNtbZI)
- *Main et al.* (Oct. 2019) — Neonics detected in soils adjacent to fields with historic neonic use as well as those without; higher neonic soil concentrations were correlated with lower native bee species richness. [http://bit.ly/2OhMB6W.](http://bit.ly/2OhMB6W)
- *Chan et al.* (Aug. 2019) — Finding neonics residues in soil from *cucurbita* and field crops “pose a high risk” to the female hoary squash bee, also concluding risks are likely to be applicable to other species of ground-nesting bees in agricultural soils. [https://go.nature.com/2Ry2loa](https://go.nature.com/2Ry2loa) (and discussed at [https://bit.ly/2LCMwJi](https://bit.ly/2LCMwJi)).
- *Basley and Goulson* (Apr. 2018) — Plants located next to neonic-treated wheat crop found to be contaminated with neonics; concentrations were comparable to and sometimes higher than those in treated crops and stayed at these levels for up to 21 months after sowing. [https://bit.ly/2LCTRbO.](https://bit.ly/2LCTRbO)
- *McArt et al.* (2017) — Finding neonic thiamethoxam posed the greatest oral exposure risk to honey bees in apple orchards and was detected in beebread at multiple orchard sites where thiamethoxam was not sprayed. [https://go.nature.com/2LO2ksS.](https://go.nature.com/2LO2ksS)

**Harms to Fish, Birds, Deer, and Other Wildlife:**


• *Berheim et al.* (Jan. 2019) — White tailed deer exposed to the neonic imidacloprid demonstrated hypothyroidism and lethargy, decreased body and organ weight, decreased jawbone length, and higher mortality rates for fawns. Surprisingly, imidacloprid found in spleens of control group deer, demonstrating ubiquity of neonics in the environment. [https://go.nature.com/2sgOOhb](https://go.nature.com/2sgOOhb).


**Food and Water Contamination and Human Health:**


• *Mineau* (Sept. 2019) — Analysis of state and federal water testing data finding neonics “frequently” in New York surface waters and roughly a third of Long Island ground water samples, indicating a “very high” probability of “ecosystem-wide” damage. [https://on.nrdc.org/2QTkTl7](https://on.nrdc.org/2QTkTl7).


**Neonic Inefficacy and Alternatives:**

• *Mourtzinis et al.* (Sept. 2019) — Neonic seed treatments in soybean provide negligible benefits to farmers. [https://go.nature.com/2KVXUQa](https://go.nature.com/2KVXUQa).


Alternatives to Neonicotinoids in New York

In General

- A French National Institute for Agricultural Research review of nearly 3,000 case studies comprising 120 crops and 279 pest insect species found that in 78% of cases a non-chemical alternative can effectively replace neonicotinoid (“neonic”) use. (Jactel et al., 2019). In the limited number of cases where use of an insecticide may be warranted, less harmful substitutes exist—including those approved for organic crops, see 7 C.F.R. § 205.601 et seq., and federally designated “minimum risk” pesticides. See 40 C.F.R. § 152.25(f).

- Practices that build healthy soil, including cover cropping and crop rotation, help plants resist pest pressure. (Rodale Institute, The Farming Systems Trial 30 Year Report and Soil Health (visited Feb. 3, 2020)).

Seed Treatments

- Neonic seed treatments—where a neonic coating is applied to a crop seed before planting—account for the vast majority of neonic use on field crops and agriculture generally. In New York, corn and soybean seed treatments account for an estimated 73% of all agricultural neonic use. (Mineau, An Assessment of Neonicotinoid Insecticides (2019), p. 49). Because these treatments provide little to no yield benefits, they may be eliminated entirely—likely reducing input costs for New York farmers.

- For soybean, an evaluation of 194 field studies from 14 states concluded that blanket neonic seed treatment use provides “little to zero net benefit in most cases” (Moutzinis et al., (2019)). Likewise, the U.S. Environmental Protection Agency (“EPA”) concluded “neonicotinoid seed treatments likely provide $0 in benefits to growers.” (EPA, Benefits of Neonicotinoid Seed Treatments to Soybean Production (2014)). In some cases, neonic use may even increase pest pressure by killing beneficial insects that prey on insect pests. (See Douglas et al., (2015)).

- Similarly, for corn, independent field tests have observed “no benefit of [neonic] insecticidal seed treatments for crop yield.” (Krupke et al., (2017)). The available data suggest that “in most cases, no replacement would be necessary to ensure production of corn and soybean crops if

3 https://on.nrdc.org/36BWdil.
[neonic seed treatments] were eliminated.” (Testimony of Dr. Christian Krupke, Purdue University (2019)).

**Soybean**

- For seed corn maggot, see below under “Corn.”

- For soybean aphid, careful scouting and encouragement of beneficial insect predators are generally recommended. Insecticide treatments are often discouraged as they can eliminate beneficial insect populations, which can lead to spider mite infestations that cause even greater yield losses. (Cornell, NRCCA Pest Management Study Guide (2016) p. 60). Where aphids reach economically damaging levels, insecticidal soaps and azadirachtin-based neem products may be used (Cornell University, Resource Guide for Organic Insect Control and Disease Management (2013), p. 40, 151-53).

- Outbreaks of two-spotted spider mite have been linked to early-season insecticide application. (Cornell 2016 NRCCA Guide at p. 60). Farmers can protect against outbreaks by avoiding early-season insecticide use and employing beneficial insect biological controls. (UConn, Biological Control of Two-Spotted Spider Mites (visited Jan. 29, 2020)).

**Corn**

- For seed corn maggot, farmers can plant seeds in warm, dry soil to promote rapid crop emergence, so that crops become established before damage can occur. Farmers can also employ no-till or minimum-tillage practices, delay planting after incorporation of a green cover crop or other organic matter, and plant during the “fly-free window” between insect generations. (UMass Extension, Seed Corn Maggot (2013), p.3-4).

- To control populations of seed corn maggot, cutworm, corn borer, and armyworms, spinosad seed treatments, chemigation, foliar sprays, or bait products may be used. (Cornell Organic Resource Guide at p. 5-6, 27, 163-66), (see also, e.g., Dow, Entrust SC Label).

- For corn rootworm, crop rotation with non-host crops as well as early planting can serve as effective controls. (North Dakota State University (2017)). Additionally, farmers can introduce entomopathogenic nematodes that parasitize corn rootworm. (Elson Shields, Cornell University (2019)).

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8 https://on.nrdc.org/2RD3BX2.
13 https://go.aws/2GNT2Kr.
The booming organic dairy industry in New York relies upon organic corn for animal feed, and organic corn producers cannot use synthetic pesticides such as neonics or chlorpyrifos. New York is among the top five states in the country for organic corn production. (Agricultural Marketing Resource Center, Organic Corn Profile (2018), p.4).16

Wheat

- Cultural practices like diverse crop rotation and planting “trap crops” at field borders can address pest problems without using chemicals. (National Sustainable Agriculture Information Service, Disease and Insect Management in Organic Small Grains (2011)).17

- Spinosad sprays and other products can be used for control of common armyworm and fall armyworm. (Cornell Organic Resource Guide at p. 166).

- Insecticidal soaps and neem-based products can be used to combat aphids. (Id. at 136-41, 151-53).

- The use of insecticides is not recommended for control of Hessian fly. (Cornell, Insects of Small Grains (visited Feb. 6, 2020)).18 Farmers are advised to plant Hessian-fly-resistant varieties after the “fly-free” date for their area, provided on the Cornell College of Agriculture and Life Sciences website. (Id. at Figure 5.8.1).
Setting the Record Straight on Neonics:  
In Support of A7639A (Englebright)/SS816 (Hoylman) the “Birds and Bees Protection Act”

With U.S. beekeepers experiencing the worst winter losses on record,¹ and declines of other bees, butterflies, and insects reaching levels some now call an “insect apocalypse,”² there has never been a more urgent need to address a key leading cause—the widespread use of neurotoxic neonicotinoid insecticides, or “neonics.” However, false or misleading messaging has arisen regarding neonics’ role in the current pollinator crisis as well as in agriculture generally. This misinformation is addressed below.

The Chemical Industry’s Campaign Against Neonic Science — A recent report reveals that the pesticide industry has fought a well-funded “information war” to deflect attention away from science showing neonics’ harms to bees and other species.³ While that science is now voluminous and unequivocal,⁴ industry talking points continue to follow the longstanding script, focusing mainly on the honey bee parasite known as the varroa mite.

Neonics Weaken Bees, Making Them Vulnerable to Parasites and Disease — The varroa mite has afflicted New York’s honey bees since the late 1980s, but the most-recent spike in honey bee colony losses dates to the mid-2000s—around the time neonic use expanded rapidly—when losses jumped from roughly 10-15% to 40-50% annually.⁵ While varroa mites and neonics each kill bees, they can also work in tandem. Even miniscule, nonlethal neonics weaken bees’ survival systems (immune system, navigation system, etc.),⁶ so it’s no surprise that recent studies show a link between neonic exposure and honey bee susceptibility to varroa mites.⁷

Varroa Mites Affect Only Honey Bees—Neonics Threaten All Bees, Other Wildlife — While varroa mites appear to target only honey bees, the persistent, toxic presence of neonics in large swaths of New York’s soil and water poses a much larger problem. Neonics appear in roughly 30% of Long Island groundwater samples and frequently in state surface waters at levels expected to cause “ecosystem-wide damage.”⁸ Neonic contamination, like that seen in New York, has been linked to the collapse of fisheries,⁹ vanishing bird populations,¹⁰ birth and developmental defects in white-tailed deer,¹¹ as well as other harms to birds, bats, butterflies, and other wildlife.¹² Neonics’ environmental damage is so broad it’s been likened to a “second Silent Spring.”¹³

Neonic Contamination Also Raises Human Health Concerns — At least half the U.S. population is regularly exposed to neonics,¹⁴ and recent research reports a link between human neonic exposures and elevated risk of neurological and developmental damage, such as malformations of the developing heart and brain.¹⁵ While more research is needed, this information is especially concerning because neonic exposures are often difficult or impossible to avoid. Conventional drinking water treatments generally do not remove neonics from contaminated water,¹⁶ and neonic residues commonly contaminate produce and baby food.¹⁷ Because neonics permeate foods, they cannot be washed off.

Most Neonic Use Contravenes IPM Principles and Provides Little to No Benefit — Current neonic use patterns directly contradict Integrated Pest Management (IPM) principles,¹⁸ which guide growers to only
use pesticides as needed, and then to preferentially use the least-toxic pesticides. In contrast, most neonic use is prophylactic, widespread, and generally needless. For example, neonic-treated corn and soybean seeds account for an estimated 73% of all neonics used in New York agriculture.\textsuperscript{19} However, independent research shows soybean and corn seed treatments rarely or marginally benefit yields\textsuperscript{20} and, in some cases, may actually decrease yields by killing predators of insect pests (i.e., “good bugs”).\textsuperscript{21} Pollinator-dependent crops may be doubly harmed, as neonic use also kills pollinators.\textsuperscript{22} For example, an ongoing Purdue University study finds that melon crops preventatively treated with neonic insecticides generally had decreased yields compared to crops treated with non-neonic insecticides “as needed.”\textsuperscript{23}

**Neonics Have Increased Insecticides’ Ecological Harmfulness and Spread** – Neonics have made U.S. agriculture up to 48 times more harmful to insect life since their introduction in the mid-1990s,\textsuperscript{24} and have also dramatically increased the amount of land treated with insecticides. Before the advent of neonics, only 35% of conventional corn acres and 5% of soybean acres were treated with an insecticide, but today, those numbers are up to 100% and 50%, respectively.\textsuperscript{25} Regardless of total weight or volume used, insecticide use today is more ecologically toxic and widespread than ever before due to neonics.

**Farmers Often Get No Choice or Bad Advice** – Because a shrinking number of large corporations dominate seed and chemical markets, farmers sometimes have little choice as to whether to use a neonic. For example, nearly all conventional corn seeds are neonic-treated before they reach the soil.\textsuperscript{26} Even where farmers have options, they are commonly advised to purchase neonic-treated seeds by seed dealers or representatives with a financial interest in promoting products made by the large agrochemical companies.\textsuperscript{27}

**EPA Registration Does Not Protect Pollinators** – The argument that neonics are “safe” when used according to the EPA-approved label is demonstrably false. Neonics contaminate water supplies in New York\textsuperscript{28} and across the country at levels above EPA benchmarks for ecological harm\textsuperscript{29} as honey bee deaths reach record numbers.\textsuperscript{30} History is also full of examples of EPA’s notoriously industry-friendly pesticide office\textsuperscript{31} ignoring health and environmental harms in its approvals of pesticides, even harms identified by its own scientists.\textsuperscript{32}

**EPA’s New Proposed Restrictions Are Inadequate and Unlawful** – As the European Union and Canada move to ban most outdoor neonic uses,\textsuperscript{33} the Environmental Protection Agency (EPA) recently proposed allowing continued widespread use. Characteristic of other Trump administration pesticide decisions, EPA’s justifications are bolstered by suspect and sometimes unlawful reasoning. For example, for certain uses, the agency appears to equate greater use with greater benefit in order to offset neonics’ significant and wide-ranging environmental costs.\textsuperscript{34} Under the same logic, the infamous and now-banned pesticide DDT would still be approved if only it were used more often. Further, while proposing to cancel certain neonic uses due to human health concerns, EPA failed to apply mandatory protective factors, violating federal law and leaving pregnant women and children at risk.\textsuperscript{35}

**Neonics Are Not Needed, Safer Replacements Available** – Although neonics are a relatively new class of insecticides, some claim neonic use is needed for agricultural production. While, as discussed, most neonic use is prophylactic and unneeded, agroecological practices—like diverse crop rotations, cover cropping, and introducing natural enemies of crop pests (A.K.A., “good bugs”)—can eliminate the need for other agricultural neonics. Non-synthetic and less-toxic synthetic substitutes also exist, such as organic and minimum risk pesticides.\textsuperscript{36} More detailed information is provided on our neonic alternatives fact sheet.

**Legislative Action Bolsters State Administrative Efforts** – State administrative action to date has focused only on bees—including the state pollinator protection task force and protection plans, and the
forthcoming Cornell University report on neonicotinoids’ impacts on bees. However, neonicotinoids pose a serious and more broad-based threat to New York’s ecosystems, clean water, and, quite possibly, public health. The Birds and Bees Protection Act addresses these immediate threats with a five-year moratorium on neonic pesticide use—providing time and a mandate for state agencies to study the issue further. With neonic contamination already widespread, the act’s moratorium will also help researchers better understand neonicotinoids’ effects by providing an opportunity to see what the environment looks like without them. Because neonicotinoids can stay in soil, water, and plants for several years, a multi-year moratorium is best.

Legislative Action Can Correct Gaps in State Regulation – More than a decade ago, the Department of Environmental Conservation (DEC) refused to register two neonicotinoids for outdoor use, citing concerns that they would harm pollinators and contaminate water. Yet due to a loophole in federal and state pesticide law for pesticide-coated seeds, clothianidin—one of the neonicotinoids DEC refused to register—is estimated to be the most used neonic in New York agriculture. Other neonicotinoids and related insecticides posing similar (or greater) risks are also widely used. Perhaps unsurprisingly, DEC’s fears about neonicotinoids appear to have come true—New York bee losses remain at near record levels, and neonicotinoids are frequently detected in New York water, including Long Island groundwater.

1 Susie Neilson, More Bad Buzz for Bees: Record Numbers of Honey Bee Colonies Died Last Winter, NPR (Jun. 19, 2019), https://npr.org/2WT1tLQq.
2 Brooke Jarvis, The Insect Apocalypse Is Here, New York Times Mag. (Nov. 27, 2018), https://nyti.ms/2Aq0jMX.
6 See 2017 Worldwide Assessment.
7 Lars Straub et al., Neonicotinoids and Ectoparasitic Mites Synergistically Impact Honeybees, Scientific Reports (Jun. 4, 2019), https://go.nature.com/2WTJlU8 (“Our data clearly show a significant negative synergistic effect of neonicotinoids and V. destructor mites on A. mellifera honeybee body mass and longevity”); Nuria Morfin et al., Effects of Sublethal Doses of Clothianidin and/or V. Destructor on Honey Bee (Apis Mellifera) Self-Grooming Behavior and Associated Gene Expression, Scientific Reports (Mar. 2019), https://go.nature.com/2tXLS7q (finding low levels of exposure to the neonic clothianidin reduced honey bee grooming behavior that helps bees rid themselves of the mites).
8 Mineau 2019.


18 See Written Testimony Prepared by Christian Krupke, Ph.D, Regarding N.J. Senate Bill 2288 Professor of Entomology, Purdue University, (Jun. 6, 2019), [https://on.nrdc.org/39VRE4H](https://on.nrdc.org/39VRE4H).


23 See Purdue University, *Don’t Just Spray – Survey*, [https://on.nrdc.org/2m0a98t](https://on.nrdc.org/2m0a98t).

24 Michael DiBartolomeis et al., *An Assessment of Active Insecticide Toxicity Loading (AITL) of Chemical Pesticides Used on Agricultural Land in the United States*, PLOS One (Aug. 6, 2019), [https://bit.ly/2Yr4Xc7](https://bit.ly/2Yr4Xc7); Margaret Douglas et al., *County-level Analysis Reveals a Rapidly Shifting Landscape of Insecticide Hazard to Honey Bees (Apis Mellifera) on US Farmland*, Scientific Reports (Jan. 21, 2020), [https://go.nature.com/2SKhjHP](https://go.nature.com/2SKhjHP).


30 See, supra, at n. 1.

31 See, e.g., Jennifer Sass, ATSDR Report Confirms Glyphosate Cancer Risks, NRDC (Apr. 11, 2019), [https://on.nrdc.org/2vaTs7X](https://on.nrdc.org/2vaTs7X).

32 See, e.g., Appeals Court Orders EPA to Ban a Pesticide Known to Harm Children, Time (Aug 10, 2018), [https://ti.me/2N2V2UJ](https://ti.me/2N2V2UJ).


36 See, e.g., 7 C.F.R. § 205.601 et seq. (pesticides allowed for use in organic crop production); 40 C.F.R. § 152.25(f) (minimum risk pesticides).


39 See id.