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The Blight of the Bumblebee: How Federal Conservation Efforts and Pesticide Regulations Inadequately Protect Invertebrate Pollinators From Pesticide Toxicity*

INTRODUCTION

Over three-quarters of global crop production depends upon insect pollination; in other words, one in three bites of food relies on bugs to reach your dining room table.¹ Bee pollination helps produce crops such as apples, citrus, onions, blueberries, cucumbers, avocados, coffee, and pumpkins, to name a few.² Cross-pollination from wild bees, such as the bumblebee, contribute to ninety percent (90%) of wild plant growth.³ In addition to being essential to food production, bees also significantly contribute to the economy, adding more than \$15 billion to the United States' agricultural industry alone.⁴ Valuable cash crops reliant on pollination, such as coffee and cocoa, are important sources of income in developing countries, not to mention daily indulgences throughout the world.⁵ Were bees to vanish completely, that morning cup of coffee or slice of

* Dedicated to my parents, David and Kelli Helmick, who instilled in me the values of prioritizing an education.

1. Damian Carrington, *Loss of Wild Pollinators Serious Threat to Crop Yields, Study Finds*, THE GUARDIAN (Feb. 28, 2013), <https://www.theguardian.com/environment/2013/feb/28/wild-bees-pollinators-crop-yields>; *Why We Need Bees: Nature's Tiny Workers Put Food on Our Tables*, NAT'L RES. DEF. COUNCIL (Mar. 2011), <https://www.nrdc.org/sites/default/files/bees.pdf>.

2. Christina Sarich, *List of Foods We Will Lose if We Don't Save the Bees*, HONEY LOVE (Aug. 15, 2013) <http://honeylove.org/list-of-food/>; *Why We Need Bees*, *supra* note 1.

3. *Why We Need Bees*, *supra* note 1.

4. *Presidential Memorandum— Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators*, THE WHITE HOUSE, OFFICE OF THE PRESS SECRETARY (June 20, 2014), <https://www.whitehouse.gov/the-press-office/2014/06/20/presidential-memorandum-creating-federal-strategy-promote-health-honey-b> [hereinafter *Presidential Memo*].

5. *Pollinators Supply Under Threat*, FOOD AND AGRIC. ORG. OF THE U.N. (Feb. 26, 2016), <http://www.fao.org/news/story/en/item/384726/icode/>.

chocolate birthday cake might become quite scarce. Absent a targeted, collaborative intervention by local governments, agriculturalists, and conservationists, the buzzing pollinator may soon become extinct and, consequently, global economies and food supplies would suffer.

Extinction threatens over forty percent (40%) of bee species across the globe.⁶ Over a decade ago, beekeepers all over the world began reporting significant hive disappearances and deaths, with some reporting losses as high as ninety percent (90%); many attribute this massive extinction to Colony Collapse Disorder (“CCD”).⁷ CCD does not have a single cause, but is the result of multiple factors.⁸ Perhaps the most controversial factor contributing to bee extinction is pesticide toxicity.⁹ Pesticides can poison untargeted insects if the application instructions are not followed; however, some of these chemicals are so inherently toxic that even limited exposure results in debilitating illness and death to bees.¹⁰ One of the most widely used class of pesticides—neonicotinoids or neonics—has been linked to severe side effects, such as diminished colony growth and increased mortality rates in various bee species.¹¹ Yet, the easy application and effectiveness of neonicotinoids have made this type of pesticide popular among farmers and gardeners.¹²

6. SIMON G. POTTS ET AL., INTERGOVERNMENTAL SCI.-POL’Y PLATFORM ON BIODIVERSITY AND ECOSYSTEM SERV., THE ASSESSMENT REPORT ON POLLINATORS, POLLINATION AND FOOD PRODUCTION: SUMMARY FOR POLICY MAKERS 9 (2016), https://www.ipbes.net/sites/default/files/downloads/pdf/spm_deliverable_3a_pollination_20170222.pdf.

7. *Pollinator Protection: Colony Collapse Disorder*, EPA <https://www.epa.gov/pollinator-protection/colony-collapse-disorder> (last updated Apr. 18, 2017).

8. *Id.*

9. Seth Borenstein, *Bees Hurt by Some Crop Pesticides, But Not All*, US NEWS (Jan. 6, 2016), <http://www.usnews.com/news/politics/articles/2016-01-06/apnewsbreak-epa-says-pesticide-harms-bees-in-some-cases>.

10. L. Hooven et al., *How to Reduce Bee Poisoning from Pesticides*, 591 PACIFIC NORTHWEST EXTENSION 1, 3-9 (2013), <https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/pnw591.pdf>.

11. L.W. Pisa et al., *Effects of Neonicotinoids and Fipronil on Non-Target Invertebrates*, 22 ENVIRON. SCI. POLLUT. RES. 68, 72 (2015).

12. Allison Aubrey, *Buzz Over Bee Health: New Pesticide Studies Rev Up Controversy*, NPR (Apr. 22, 2015, 6:36 PM), <http://www.npr.org/sections/thesalt/2015/04/22/401536105/buzz-over-bee-health-new-pesticide-studies-rev-up-controversy>.

This vital pollinator's population has been so severely diminished in recent years that the U.S. Fish and Wildlife Service ("FWS") recently intervened. In September 2016, the FWS granted endangered species status to seven species of bee native to Hawaii.¹³ This was the first time the FWS granted this type of protection to any bee species.¹⁴ The FWS continued to grant invertebrate pollinators protection when it added the Rusty-Patched Bumblebee ("Bumblebee") to the Endangered Species Act ("ESA") on January 11, 2017.¹⁵

Once commonly spotted on clover fields and wild flowers throughout the continental U.S., the Rusty-Patched Bumblebee is rapidly disappearing. This particular bumblebee is vital to the survival of crops such as tomatoes, blueberries, apples, and others.¹⁶ The fuzzy pollinator's habitat, long life cycle, and underground nesting preferences make it especially vulnerable to pesticide contamination.¹⁷

The Endangered Species Act protects plant and animal species vulnerable to extinction from a myriad of threats, including those posed to Bumblebees by pesticides.¹⁸ The ESA's objectives and protections, as they apply to bees, directly conflict with farmers' use of pesticides to protect crops. ESA protections extend to the trading, sale, taking, and degradation of critical habitats.¹⁹ More specifically, the ESA protects against endangered species being killed or harmed.²⁰

When farmers use pesticides toxic to pollinators or improperly apply pesticides to fields, exposed bees die in

13. Merrit Kennedy, *Bees Added to U.S. Endangered Species List for 1st Time*, NPR (Oct. 3, 2016), <http://www.npr.org/sections/thetwo-way/2016/10/03/496402620/bee-species-added-to-u-s-endangered-species-list-for-1st-time>.

14. *Id.*

15. *In a Race Against Extinction, Rusty Patched Bumble Bee is Listed as Endangered: First Bumble Bee Protected Under the Endangered Species Act*, U.S. FISH AND WILDLIFE SERV. (Jan. 10, 2017), <https://www.fws.gov/midwest/news/861.html>.

16. *Bumble Bees: Rusty Patched Bumble Bee (Bombus Affinis)*, XERCES SOC'Y, <http://www.xerces.org/rusty-patched-bumble-bee/> (last visited Jan. 11, 2017).

17. *Fact Sheet Rusty Patched Bumble Bee (Bombus Affinis)*, U.S. FISH AND WILDLIFE SERV. (Jan. 10, 2017), <https://www.fws.gov/midwest/endangered/insects/rpbb/pdf/RPBBFactSheet10Jan2017.pdf> [hereinafter *Fact Sheet*].

18. 16 U.S.C.S. § 1531 et seq.

19. 16 U.S.C.S. § 1532; *Endangered Species Act*, NATIONAL WILDLIFE FEDERATION, <http://www.nwf.org/Wildlife/Wildlife-Conservation/Endangered-Species-Act.aspx> (last visited Aug. 28, 2017).

20. 16 U.S.C.S. § 1532(19).

droves. Pesticides are vital to protect crops from unwanted pests; in the same turn, bees are equally necessary to pollinate these crops, facilitating growth and harvest. These agricultural practices raise a novel question: how will the ESA protect endangered bee species from harmful, but necessary pesticides?

An examination of the ESA's conservation efforts towards the Rusty-Patched Bumblebee serves as a case study for the gaps in protections afforded by the law as it concerns invertebrate pollinators and pesticides. Specifically, this Comment will focus on how the ESA, as it exists, cannot adequately protect endangered invertebrate pollinators from inadvertent pesticide poisoning. For purposes of brevity, this Comment will focus on the neonicotinoid category of pesticides as they pose the most recognized and severe threat per recent scientific research. It is important to note additional classifications of pesticides may threaten invertebrate pollinators not discussed in this article.

Part I provides an overview of the Rusty-Patched Bumblebee, why it is important to conserve, and the threats pesticides pose to it. Part II summarizes the Endangered Species Act, how it protects endangered or threatened species, and the current plan of action for the endangered bumblebee. Part III of this Article examines pesticide regulations at the Federal, State, and International levels and their shortfalls and benefits. Part IV concludes by arguing in favor of relegating financial resources and increased regulatory authority to the states to reduce Bumblebee exposure to pesticides and improve conservation efforts.

I. Rusty-Patched Bumblebees and the Threats They Face

Bees are integral to the ecosystem, economy, and agriculture; absent their pollination, gardens, and crops would cease to thrive and other forms of life that depend on vegetation would suffer. The survival and vitality of bee populations now hinge upon human intervention.

A. The Bumblebee's Role in the North American Economy, Ecosystem, and Agriculture

The buzzing bumblebee often goes unnoticed as it flits from flower to flower, but this tiny winged invertebrate is an

essential component in the global economy. Native bee pollination adds an annual \$3 billion to America's economy.²¹ Conversely, declines in bee populations have cost the global economy an estimated \$5.7 billion annually.²² In an effort to curb diminishing wild bee numbers, the FWS granted endangered status to the Rusty-Patched Bumblebee on January 10, 2017.²³ This is the first species of bumblebee native to the continental U.S. to be granted such protection.²⁴ The Bumblebee officially received endangered species status on March 21, 2017.²⁵

A large, fuzzy bee marked with a distinct rust colored patch, the Rusty-Patched Bumblebee's population has declined by eighty-seven percent (87%) since the late 1990's.²⁶ The bumblebee's native habitat once spanned twenty-eight states, from the northern shores of Maine to the peach orchards of Georgia and as far west as North Dakota.²⁷ Now, the fuzzy pollinator can only be found scattered across thirteen states and

21. *In a Race Against Extinction*, *supra* note 15.

22. *Presidential Memo*, *supra* note 4.

23. *Rusty Patched Bumblebee*, *supra* note 16.

24. *Rusty Patched Bumble Bee, Archives*, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/midwest/endangered/insects/rpbb/archives.html> (last updated June 5, 2017).

25. *Endangered Species: Rusty Patched Bumble Bee (Bombus Affinis)*, U.S. FISH & WILDLIFE SERV., <https://www.fws.gov/midwest/endangered/insects/rpbb/> (last updated June 6, 2017); See Juliet Eilperin, *The Trump Administration Puts off Listing Bumble Bee as Endangered*, THE WASHINGTON POST (Feb. 9, 2017), https://www.washingtonpost.com/news/energy-environment/wp/2017/02/09/trump-administration-puts-off-listing-bumblebee-as-endangered/?utm_term=.47ddb5c52ee0. The Trump Administration enacted a regulatory freeze on listing the Rusty-Patched Bumblebee as an endangered species on February 10, 2017. *Id.* The administrative freeze delayed the endangered species protections from taking effect until March 21, 2017, more than one month after they were set to begin. *Id.* The delay was not expected to impact the FWS's conservation efforts. *Id.* A reversal of the FWS designation requires the Administration to prove through scientific evidence that the species has recovered. *Id.*

26. *Rusty Patched Bumblebee*, *supra* note 16.

27. *Id.*; The twenty-eight states that once made up the Rusty Patched Bumblebee's natural habitat include Connecticut, Delaware, Georgia, Indiana, Maine, Maryland, Massachusetts, lower Michigan, Minnesota, , New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Vermont, Virginia, West Virginia, Wisconsin, and portions of North Dakota, South Dakota, Iowa, Illinois, Kentucky, and Tennessee. *Id.*; Tatiana Schlossberg & John Schwartz, *A Bumblebee Gets New Protection on Obama's Way Out*, THE NEW YORK TIMES (Jan. 10, 2017), https://www.nytimes.com/2017/01/10/science/endangered-bee.html?_r=0.

one Canadian province.²⁸ A field survey from 2007-2009 found just over 16,000 Rusty-Patched Bumblebees throughout the continental United States, compared to historical numbers of 73,000 in the same regions.²⁹

Not dependent upon any one type of flower to survive, Bumblebees are incredibly efficient pollinators, second only to honeybees in crop pollination importance.³⁰ Rusty-Patched Bumblebees can pollinate in cooler temperatures and lower light levels than other bee species.³¹ These characteristics enable the Bumblebee to pollinate longer throughout the day and on overcast days. This effective pollinator also has a longer pollination period, emerging in April to begin pollinating and hibernating in October.³²

Coupled with these unique characteristics, the Rusty-Patched Bumblebee also performs a special type of pollination function called “buzz pollination.”³³ Bumblebees perform buzz pollination by grabbing the pollen-producing structure of the flower with its jaws and vibrating its wings, freeing pollen that otherwise would have remained in the flower.³⁴ Tomatoes, peppers, and cranberries require buzz pollination to produce fruit and thrive.³⁵ Along with these flavorful crops, Bumblebees are integral to pollinating wildflowers, blueberries, plums, apples, alfalfa, and onion seeds.³⁶ Alfalfa pollination is crucial to nourish dairy cows whose produce creates dietary staples for American consumers.³⁷ The disappearance of the Rusty-Patched

28. *Fact Sheet*, *supra* note 17; The thirteen states where the Rusty Patched Bumblebee can now be found are Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and Wisconsin. *Id.*

29. *Bombus Affinis (Rusty Patched Bumble Bee)*, THE IUCN RED LIST OF THREATENED SPECIES (2015), <http://www.iucnredlist.org/details/44937399/0>.

30. Sydney A. Cameron et al., *Patterns of Widespread Decline in North American Bumble Bees*, 108 PROC. OF THE NAT'L ACAD. OF SCI. OF THE U.S 662, 663-65 (2011), <http://www.pnas.org/content/108/2/662.full>; *see also Rusty Patched Bumble Bee*, *supra* note 16.

31. *Rusty Patched Bumblebee*, *supra* note 16.

32. Cameron et al., *supra* note 30.

33. *Fact Sheet*, *supra* note 17.

34. *Id.*

35. *Id.*

36. *Fact Sheet*, *supra* note 17; *Rusty Patched Bumble Bee*, *supra* at note 16.

37. *Pollinate Your Plate Part 2: A Filling Lunch*, DIADASIA BLOG (May 26, 2015), <https://diadasia.wordpress.com/2015/05/26/pollinate-your-plate-part-2-a-filling-lunch/>.

Bumblebee would create a domino effect, negatively impacting derivative crops and the species who consume them.

B. Toxic Threats: Neonicotinoids and Why the Rusty-Patched Bumblebee is Susceptible to Contamination

The massive bee disappearances and deaths in recent decades are often attributed to CCD. CCD is the phenomenon when a majority of worker bees disappear from a colony, leaving a queen and immature bees behind.³⁸ Researchers have been unable to narrow CCD down to one cause.³⁹ Numerous factors are believed to contribute to CCD: invasive pests, parasites, changes in habitat, inadequate sources of nutrition, and pesticides.⁴⁰ All of these factors pose significant threats to bee populations, but pesticides are solely the result of human action. Because pesticides are only introduced to wild bee populations through human intervention, this is arguably the easiest threat to remedy.

Bumblebees may be exposed to pesticides in a variety of ways and not solely because of improper pesticide application. The FWS attributes the Rusty-Patched Bumblebee's decline, in part, to intensive farming, increased application of pesticides to crops, and pesticide toxicity.⁴¹ All of these practices increase pesticide levels present in the air, soil, and ground water thereby increasing the Bumblebee's chances of exposure.

A particularly popular and hazardous class of pesticides are neonicotinoids.⁴² Introduced in the 1990's, neonicotinoids, also known as neonics, are some of the most widely used pesticides, having over \$1 billion in global market value.⁴³ Neonicotinoids, literally meaning "new nicotine-like insecticide," are chemically related to nicotine.⁴⁴ They bind to certain types of receptors

38. *Colony Collapse Disorder*, *supra* note 7.

39. *Id.*

40. *Id.*

41. *Fact Sheet*, *supra* note 17.

42. *What is neonicotinoid?*, TEXAS A&M AGRILIFE EXTENSION, <http://citybugs.tamu.edu/factsheets/ipm/what-is-a-neonicotinoid/> (last visited Oct. 30, 2016).

43. Tjeerd Blacquiere et al., *Neonicotinoids in Bees: A Review on Concentrations, Side-Effects and Risk Assessment*, 21 *ECOTOXICOLOGY* 973, 974-98 (2012).

44. *What is neonicotinoid?*, *supra* note 42.

within the nerve synapse introducing toxins directly to the nervous system to eliminate unwanted pests.⁴⁵

These pesticides are popular among farmers because they are simple to use and effectively protect crops from unwanted pests.⁴⁶ Farmers plant seeds in the spring and apply the water-soluble neonicotinoids directly to the soil.⁴⁷ As the crop draws the neonic-laced ground water through its structure, the pesticide is distributed throughout the plants' pollen and nectar.⁴⁸ Insects that feed on the plant's structure, nectar, or pollen ingest the pesticide, effectively delivering the toxin into the pests' system.⁴⁹ Unfortunately, unwanted insects are not the only invertebrates susceptible to the neonicotinoid's toxins. The lingering pesticide also poisons bees that feed on contaminated nectar and pollen, which can remain for months in the crop's structure after initial treatments.⁵⁰

Not only are neonicotinoids popular among farmers, but they have become household staples for gardeners as well.⁵¹ The various applications of neonicotinoids make them practical and easy to use: neonic-treated seeds,⁵² foliar spray, trunk injections for trees, and granules applied to the soil are user-friendly options for the amateur gardener.⁵³ Name brand products like Miracle Gro Plant Food, Knockout Ready-To-Use Grub Killer, Aloft, Green Light, 12 Month Tree & Shrub Protect Feed, and

45. *Id.*

46. Aubrey, *supra* note 12.

47. *What is neonicotinoid?*, *supra* note 42.

48. *What are Neonicotinoids?*, PESTICIDE ACTION NETWORK UK, http://www.pan-uk.org/about_neonicotinoids/ (last visited Oct. 30, 2016).

49. *See id.*

50. *Preliminary Pollinator Assessment to Support the Registration Review of Imidacloprid*, EPA, OFF. OF CHEM. SAFETY AND POLLUTION PROT. 2, 16 (Jan. 4, 2016), <https://www.regulations.gov/contentStreamer?documentId=EPA-HQ-OPP-2008-0844-0140&contentType=pdf>.

51. Jennifer Hopwood & Matthew Shepherd, *Neonicotinoids in Your Garden*, WINGS: ESSAYS ON INVERTEBRATE CONSERVATION 22, 23 (2012) http://www.xerces.org/wp-content/uploads/2016/05/HopwoodShepherd_NeonicsInYourGarden_WingsFall2012.pdf.

52. Tom Oder, *Neonicotinoids: What Home Gardeners Need to Know*, MOTHER NATURE NETWORK (Aug. 15, 2017), <https://www.mnn.com/your-home/organic-farming-gardening/stories/neonicotinoids-what-home-gardeners-need-to-know>.

53. *Neonicotinoids in Your Garden*, XERXES SOC'Y, <http://www.xerces.org/wings-magazine/neonicotinoids-in-your-garden/> (last visited Mar. 12, 2017).

Marathon are but a few products that contain neonics.⁵⁴ Many of these products may be applied by gardeners to flowers and vegetables that Bumblebees pollinate.⁵⁵

Initially touted as harmless to non-target insects, a wave of research over the past decade contradicts the neonic industry's innocuous claims. A study released in the spring of 2016, implicated two of the three most widely-used neonicotinoids—imidacloprid and thiamethoxam—as negatively affecting bees.⁵⁶

Research demonstrates neonicotinoids have numerous negative side-effects on bumblebees: decreased larvae production and growth, diminished colony growth rate, and fewer queens surviving to maturation.⁵⁷ One study noted pesticide-exposed-bumblebees exhibited reduced nest growth and an eighty-five percent (85%) decrease in queen production, compared with their non-exposed counterparts.⁵⁸ Neonicotinoid residues in pollen present high risks to bumblebees; a linear relationship exists between daily doses of neonics and a fifty percent (50%) increase in bee mortality rates.⁵⁹ Studies found one particular strain of neonicotinoid, imidacloprid, poses the highest risk to bumblebees, with a 31.8 – 49% probability that exposed bumblebees would ingest a lethal dose after two days of feeding on contaminated pollen.⁶⁰

An English study indicated that neonicotinoid application to oilseed rape⁶¹ increased exposure to foraging pollinators, which were negatively affected three times more than non-foraging pollinators.⁶² The results of this research suggests that neonicotinoids' sub-lethal effects could increase losses to bee

54. *Id.*; *Help the Honey Bees!*, CTR. FOR FOOD SAFETY (Apr. 2013), http://www.centrforfoodsafety.org/files/pesticide_list_final_59620.pdf.

55. *Neonicotinoids in Your Garden*, *supra* note 53.

56. Damian Carrington, *Two of the World's Top Three Insecticides Harm Bumblebees*, THE GUARDIAN (Apr. 28, 2016), <https://www.theguardian.com/environment/2016/apr/28/two-worlds-top-three-leading-insecticides-harm-bees-study-shows>.

57. Pisa et al., *supra* note 11, at 74.

58. *Id.* at 76.

59. *Id.* at 71.

60. *Id.*

61. BBC, *Who what why: Why is There More Oilseed Rape Being Grown?*, BBC NEWS (May 29, 2012), <http://www.bbc.com/news/magazine-18249840>; Oilseed rape is flowering plant grown for its oil; it is also known as rapeseed. *Id.*

62. Ben Woodcock et al., *Impacts of neonicotinoid use on long-term population changes in wild bees in England*, NATURE COMMUNICATIONS (Aug. 16, 2016), <https://www.nature.com/articles/ncomms12459.pdf>.

populations and restrictions on neonicotinoids may decrease population decline.⁶³

Even low dose exposure to neonicotinoids significantly interferes with a bee's ability to pollinate.⁶⁴ Bees exposed to these pesticides collected less pollen, ventured outside the hive less often, and visited flowering plants less frequently.⁶⁵ Bees exposed to neonicotinoids are able to gather food within the hive, yet bees attempting to gather pollen and nectar from adjacent fields struggled to detect sources of nectar and pollen.⁶⁶ Further, the research reveals that fruit trees pollinated by exposed bees produced fruit with fewer seeds.⁶⁷ Neonicotinoids—commonly used on wheat, corn, soy, and cotton—even in sub-lethal doses, also make bees more susceptible to *Nosema*, a gut parasite.⁶⁸

Other studies suggest neonicotinoid exposed bees failed to supply enough food to their hives to support queen production.⁶⁹ Queen bees are crucial to the colony's survival; queen failure is a significant contributing factor to bee extinction.⁷⁰ Additionally, exposed queens showed significant changes in their reproductive anatomy and physiology.⁷¹ The changes seen in the queen bees' anatomy and physiology are linked to fewer

63. *Id.*

64. Steve Connor, *Neonics: Controversial Pesticide 'affects ability of bumblebees to pollinate fruit trees'*, THE INDEPENDENT (Aug. 16, 2016), <http://www.independent.co.uk/news/science/neonics-controversial-pesticide-affects-ability-of-bumblebees-to-pollinate-fruit-trees-a6739571.html>.

65. Pisa et al., *supra* at note 11 at 74.

66. *Id.* at 76-77.

67. Connor, *supra* note 64.

68. Jennifer S. Holland, *The Plight of the Honeybee*, NATIONAL GEOGRAPHIC NEWS (May 10, 2013), <http://news.nationalgeographic.com/news/2013/13/130510-honeybee-bee-science-european-union-pesticides-colony-collapse-epa-science.html>; Eric C. Mussen, *Diagnosing and Treating Nosema Disease*, UC DAVIS (Mar. 11, 2011), <http://entomology.ucdavis.edu/files/147621.pdf>. *Nosema* disease is caused by two fungi named *Nosema Apis* and *Nosema Ceranae*. *Id.* *Nosema* is a fungus-like, intra-cellular parasite that penetrates the gut and absorbs nutrients from the cells within the gut. *Id.* The parasite makes its way through the bumblebee's body cavity, infecting other tissues. *Id.* Heavily infected bees may contain millions of the parasitic spores. Parasite-infected intestinal tissues become riddled with secondary infections. *Id.* Infected bees cannot ingest food and their life span can be reduced up to 78%. *Id.*

69. Hopwood & Shepherd, *supra* note 53, at 25.

70. Geoffrey R Williams et al., *Neonicotinoid Pesticides Severely Affect Honey Bee Queens*, 5 SCIENTIFIC REPORTS 1, 1-5 (2015), <http://www.nature.com/articles/srep14621.pdf>.

71. *Id.* at 1, 4.

healthy queen bees able to produce worker bees.⁷² Scientists at the Royal Holloway University of London released new research, which examined the specific effects neonicotinoids have upon bumblebee queens.⁷³ Bumblebee queens fed neonic-laced syrup were twenty-six percent (26%) less likely to lay eggs than queens not exposed to the pesticide.⁷⁴ The results of this research are incredibly significant: without a queen who can lay eggs, the bumblebee colony dies.⁷⁵

Physical features and habit preferences increase the Rusty-Patched Bumblebee's risk of exposure. Due to their preference for nesting underground, pesticide-contaminated soil poses an additional threat to Bumblebees that other bees do not face.⁷⁶ Bumblebees nesting near farms and other agricultural operations have limited habitat alternatives because they generally have a smaller foraging range.⁷⁷ Additionally, Bumblebees nesting near agricultural areas applying neonicotinoids face exposure through neonic-laced water, nectar, and pollen.⁷⁸ Bumblebees gathering contaminated pollen and nectar expose larvae to the toxic pesticide when they return to the hive, thereby furthering the destructive cycle.⁷⁹ Neonicotinoids are also absorbed through the Bumblebee's exoskeleton,⁸⁰ the Rusty-Patched Bumblebee's larger size and weight further increases its exposure.⁸¹

Assessing the impacts of insecticides on bee species is a challenge because of the numerous bee species and the variety of neonicotinoid mixtures.⁸² The majority of the research

72. *Id.* at 1, 5.

73. Dan Charles, *Popular Pesticides Keep Bumblebees from Laying Eggs*, NPR (Aug. 14, 2017), <http://www.npr.org/sections/thesalt/2017/08/14/542895824/popular-pesticides-keep-bumblebees-from-laying-eggs>.

74. *Id.*

75. *Id.*

76. Pisa et al., *supra* note 11, at 75.

77. *Id.*

78. COMM. ON THE STATUS OF ENDANGERED WILDLIFE IN CAN., ENV'T & CLIMATE CHANGE CAN., RECOVERY STRATEGY FOR THE RUSTY-PATCHED BUMBLE BEE (*BOMBUS AFFINIS*) IN CANADA 10 (2016), https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_rusty_patched_bumble_bee_e_proposed.pdf.

79. *Id.*

80. *Id.*

81. Pisa et al., *supra* note 11, at 75. In comparison with the smaller honeybee, the Rusty-Patched Bumblebee is a significantly larger and heavier invertebrate pollinator. *Id.*

82. See Pisa et al., *supra* note 11 at 69-72, 75.

available examines the effects neonicotinoids have upon commercial bees, such as the honeybee.

II. Endangered Species Act

The Endangered Species Act was described by the United States Supreme Court as “the most comprehensive legislation for the preservation of endangered species enacted by any nation.”⁸³ Congress ratified the Endangered Species Act (“ESA”) in 1973 and it remains one of the most far-reaching wildlife conservation laws ever created.⁸⁴ As of 2009, 1,361 plant and animal species native to the United States have been granted endangered or threatened status.⁸⁵ But before each of these listed species received federal protection, their populations were radically reduced and indigenous habitats severely encroached.⁸⁶ This section will address the ESA’s purposes, including its takings provision and conservation endeavors.

A. Purpose, Policies, and Procedures

The Endangered Species Act’s purpose is to preserve the ecosystems of endangered or threatened species, to conserve endangered or threatened plants and animals, and to help recover the populations of at risk animals, plants, and insects.⁸⁷ The ESA requires federal agencies to use their authority to protect endangered and threatened species and prohibits them from “authorizing, funding, or carrying out any action that would jeopardize, destroy, or modify” a listed species’ “critical habitat.”⁸⁸ Enforcement of the ESA falls upon the FWS⁸⁹

83. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978).

84. *Endangered Species Act: A History of the Endangered Species Act of 1973*, U.S. FISH AND WILDLIFE SERV., <https://www.fws.gov/endangered/laws-policies/esa-history.html> (last updated Aug. 23, 2016); *Listing a Species as a Threatened or Endangered Species: Section 4 of the Endangered Species Act*, U.S. FISH AND WILDLIFE SERV. (Aug. 2016), <https://www.fws.gov/endangered/esa-library/pdf/listing.pdf>.

85. 16 U.S.C.S. § 1532(9) (2012).

86. *Listing and Critical Habitat: Overview*, U.S. FISH & WILDLIFE SERV. (Aug. 3, 2017) <https://www.fws.gov/endangered/what-we-do/listing-overview.html>.

87. 16 U.S.C.S. § 1531(b).

88. *A History of the Endangered Species Act*, *supra* note 84.

89. *About the U.S. Fish and Wildlife Service*, U.S. FISH AND WILDLIFE SERV. (Mar 24, 2016), https://www.fws.gov/help/about_us.html. The U.S. Fish and Wildlife Service is a bureau of the Department of the Interior. It enforces federal wildlife laws, such as the

working in conjunction with the National Marine Fisheries Service (“NMFS”),⁹⁰ state, and local agencies, tribes, non-governmental organizations, and private citizens.⁹¹

The FWS and the NMFS have the ultimate decision making authority on which species will be classified as “threatened” or “endangered” under the ESA.⁹² An “endangered species” is any animal or plant “in danger of extinction throughout all or a significant portion of its range.”⁹³ A “threatened species” is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.”⁹⁴ A species may be endangered or threatened if there is an on-going or imminent threat of “destruction, modification, or curtailment of its habitat or range,” overuse for “commercial, recreational, scientific, or educational purposes,” disease, predators, or other natural or manmade factors impacting survival.⁹⁵

Proceedings to classify a species as endangered or threatened begin with a petition, followed by a ninety (90) day review of any threats posed to the species.⁹⁶ Once the FWS determines a species is under significant threat of extinction, it begins the regulatory procedures to grant protections under the ESA.⁹⁷ First, the FWS assesses the species’ status by publishing notices of review which identify candidate species and by collecting biological information about the candidates.⁹⁸ During the listing process, the FWS prioritizes species by evaluating the threat’s magnitude and immediacy and the species’

ESA, conserves and restores wildlife and fish habitats, and excises taxes on fishing and hunting to equipment to State agencies. *Id.*

90. *National Oceanic and Atmospheric Administration: Our Mission*, NOAA FISHERIES, http://www.nmfs.noaa.gov/aboutus/our_mission.html (last visited Aug. 5, 2017). Also known as NOAA Fisheries, the NMFS oversees the nation’s ocean resources and their habitats. *Id.* As it relates to the ESA and FWS, the NMFS oversees the nation’s ocean resources and their habitat. *Id.* As it relates to the ESA and FWS, the NMFS recovers and conserves protected species and their habitats. *Id.* NMFS is an office of the National Ocean and Atmospheric Administration within the Department of Commerce. *Id.*

91. *Listing a Species*, *supra* note 84.

92. *Implementation of the ESA and Related Litigation*, U.S. DEPT. OF JUSTICE (May 15, 2015), <https://www.justice.gov/enrd/endangered-species-act>.

93. 16 U.S.C.S. § 1532(6) (2012).

94. 16 U.S.C.S. § 1532(20).

95. 16 U.S.C.S. § 1533 (a)(1).

96. *Listing a Species*, *supra* note 84.

97. *Id.*

98. *Id.*

distinctiveness.⁹⁹ After a substantial threat is established, the FWS then publishes a proposed rule and holds a sixty (60) day comment period.¹⁰⁰ Comment periods are open to the public, allowing individuals to comment and offer additional information on the proposed rule.¹⁰¹ The final ruling on whether to list the candidate species as endangered or threatened may be issued up to a year after the proposed rule's initial publication.¹⁰²

B. Prohibitions Against the Taking of a Species

Candidate species that make it through the FWS classification procedures receive federal protections. These protections include conservation efforts and prohibitions against takings, transportation, and sales of listed species.¹⁰³ Conservation efforts endorsed by the ESA include, but are not limited to, "research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation."¹⁰⁴ Federal agencies, headed by the FWS, contribute the lion's share of financial resources toward conservation efforts. For Fiscal Year 2014, the FWS spent \$1,437,810,654 to conserve both domestic and foreign species; Federal agencies reported expenditures of \$1,368,502,501 and state governments reported a total of \$69,308,153.¹⁰⁵

The crux of ESA protections is the prohibition against takings. A "taking" of an endangered species is broadly defined and includes harassing, harming, wounding, and killing, or any attempt to engage in such conduct.¹⁰⁶ Harm, under the taking's definition, is any act which "actually kills or injures wildlife," including "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or

99. *Id.*

100. *Id.*

101. *Listing a Species, supra* note 84.

102. *Id.*

103. *See, e.g.*, 16 U.S.C.S. §§ 1531-1532.

104. 16 U.S.C.S. § 1532(3).

105. *Federal and State Endangered and Threatened Species Expenditures*, U.S. FISH AND WILDLIFE SERV. (2014), https://www.fws.gov/Endangered/esa-library/pdf/20160302_final_FY14_ExpRpt.pdf.

106. 16 U.S.C. § 1531; *see also* 16 U.S.C. § 1538.

sheltering.”¹⁰⁷ Illegal takings of protected species can result in criminal charges, civil penalties, and injunctions.¹⁰⁸ Civil penalties can amount to up to \$25,000 per violation.¹⁰⁹ A knowing violation of any provision under the ESA, aside from violations of permits and certificates, may result in fines up to \$25,000, imprisonment for no longer than six months, or both, upon conviction.¹¹⁰

Pesticide poisoning of the Bumblebee falls squarely within the definition of an ESA taking, therefore, it is within the FWS purview to enforce the ESA when endangered insects die or become ill as a result of pesticide exposure.¹¹¹ However, pesticide applications pose challenges for the FWS to enforce the illegal takings prohibition. For example, foliar-spray applications of neonicotinoids may drift outside the intended application range, contaminating Bumblebee nesting and foraging areas without the pesticide applicator even being aware he or she has violated federal law.¹¹² This example poses two unique questions: first, should a pesticide applicator be held responsible for the neonic drifting outside of the application range when he or she had no control over the drift? If so, how should the taking sanctions be applied to this situation? Neonicotinoid exposure could potentially lead to the collapse of an entire colony, even if only a few bees are initially exposed.¹¹³

So, should the pesticide applicator be held responsible for the Bumblebees that were initially exposed or should he or she be sanctioned for the derivative exposure of the entire hive? Fines for the initial Bumblebee contamination may not sufficiently address the applicator’s culpability, but levying fines

107. 50 C.F.R. § 17.3 (1994); *Babbitt v. Sweet Home Chapter of Cmty. for a Great Or.*, 515 U.S. 687, 696-99 (1995).

108. CHRISTINA LOCKE ET AL., DEPT. OF AGRIC., TRADE & CONSUMER PROT., THE WISCONSIN POLLINATOR PROTECTION PLAN 1 (Apr. 2016), <https://datcp.wi.gov/Documents/PPPComplete.pdf>.

109. 16 U.S.C.S. § 1540(a)(1).

110. 16 U.S.C.S. § 1540(b)(1).

111. 16 U.S.C.S. § 1540; *see also Babbitt* 515 U.S. at 691.

112. Jennifer Hopwood et al., *How Neonicotinoids Can Kill Bees*, XERCES SOC’Y, http://www.xerces.org/wp-content/uploads/2016/10/HowNeonicsCanKillBees_XercesSociety_Nov2016.pdf (last visited Sept. 10, 2017).

113. *Id.*; *see also* Chensheng Lu et al., *Sub-lethal exposure to neonicotinoids impaired honey bees winterization before proceeding to colony collapse disorder*, 67 BULLETIN OF INSECTOLOGY, 125, 126-29 (2014), <http://www.bulletinofinsectology.org/pdfarticles/vol67-2014-125-130lu.pdf>.

for every single bee death resulting from the initial contamination may be too severe and an inequitable application of the law. Further, how will the FWS determine which Bumblebees fell ill or died from inadvertent neonic contact and which pollinators died of natural causes? The time and personnel necessary to make these determinations would be extremely costly and an inefficient use of resources. Yet the FWS cannot neglect its congressionally mandated duties by ignoring the complex array of issues these circumstances present.

Further, the ESA provides “any taking otherwise prohibited by [16 U.S.C.S. § 1538(a)(1)(B)] if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity” may be excused via permit issued by the Secretary.¹¹⁴ These permits may only be issued after an applicant submits a conservation plan.¹¹⁵ However, certain exemptions may be made based on economic hardship.¹¹⁶ Given the important role pesticides play in producing viable harvests, it is likely farmers will seek economic hardship exemptions under the ESA. Even though less harmful alternatives are available, farmers could still make an argument for undue economic hardship if prohibited from applying neonics, given their effectiveness.¹¹⁷

For example, in the U.S., corn is the most common cash crop; over 90 million acres of land are planted with corn.¹¹⁸ Soybeans are the second most planted crop with 77.5 million acres planted in 2009.¹¹⁹ One third of soybean acreage (23.2 million acres) and at least seventy-nine percent (79%) of corn acreage (71.1 million acres) were planted with neonicotinoid-

114. 16 U.S.C.S. § 1539(a)(1)(B).

115. 16 U.S.C.S. § 1539(2). The conservation plan must specify the impact likely to result from a taking, what steps will be taken to minimize and mitigate such impact, what funding will be available to implement these steps, alternatives to the taking considered by the applicant and why these alternatives are not being implemented, and any other measures the Secretary may require. *See id.*

116. 16 U.S.C.S. § 1539(b)(2).

117. Endangered Species Act of 1973, 16 U.S.C.A. § 1539, 29 (1973).

118. *Corn and Other Food Grains: Background*, U.S. DEPT. OF AGRIC. ECON. RES. SERV., <https://www.ers.usda.gov/topics/crops/corn/background/> (last updated Sept. 14, 2017).

119. *Soybeans & Oil Crops: Background*, U.S. DEPT. OF AGRIC. ECON. RES. SERV., <https://www.ers.usda.gov/topics/crops/soybeans-oil-crops/background/> (last updated May 1, 2017).

coated seeds.¹²⁰ Based on research performed by EPA, neonicotinoid seed treatments provide anywhere between \$0 to \$6 in benefits per acre compared to their alternatives.¹²¹ This means, if farmers switched to an alternative treatment, they could suffer losses up to \$426,600,000 for corn acreage and up to \$139,500,000 for soybean acreage.¹²² Though these losses make up a small percentage of the market value for these cash crops, it is significant enough to detrimentally impact a local farmer's bottom line. It is feasible that a farmer could receive an undue economic hardship exemption and be permitted to continue using neonicotinoid treated seeds, thereby negating the protections provided to the Rusty-Patch Bumblebee under the ESA.

C. Habitat Conservation Efforts

In conjunction with the taking prohibitions, the FWS provides for critical habitat designation as a way to conserve protected species.¹²³ A critical habitat is a geographic area with features essential to propagate a threatened or endangered species.¹²⁴ Once an area is designated as a critical habitat, federal agencies must consult with the FWS to ensure their actions will not destroy or modify the critical habitat.¹²⁵ Critical

120. Sara LaJeunesse, *Rapid Increase in Neonicotinoid Insecticides Driven by Seed Treatments*, PENN STATE NEWS (Apr. 2, 2015), <http://news.psu.edu/story/351027/2015/04/02/research/rapid-increase-neonicotinoid-insecticides-driven-seed-treatments>.

121. Memorandum from Clayton Myers, Ph.D., Entomologist & Elizabeth Bill, Economist, Biological and Economic Analysis Branch, Biological and Economic Analysis Division to Neil Anderson, Chief of Risk Management and Implementation Branch I, Pesticide Re-evaluation Division 2 (Oct. 3, 2014) (on file with the Office of Chemical Safety and Pollution Prevention) https://www.epa.gov/sites/production/files/2014-10/documents/benefits_of_neonicotinoid_seed_treatments_to_soybean_production_2.pdf.

122. KATHLEEN KASSEL ET AL., *SELECTED CHARTS FROM AG AND FOOD STATISTICS: CHARTING THE ESSENTIALS, 2017* (2017) U.S. DEP'T OF AGRIC. ECON. RES. SERV., 15 <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/>. It is important to note corn cash receipts for 2015 totaled \$47.2 billion and soybean cash receipts totaled \$33.2 billion in the same year. *Id.* These calculations demonstrate a fraction of the market value these crops have. Further, these calculations are rough estimates based upon available data to illustrate the economic consequences farmers could potentially suffer if forced to switch to non-neonicotinoid alternatives per the ESA and to demonstrate the viability of a claim for undue economic hardship.

123. U.S. FISH & WILDLIFE SERV., *CRITICAL HABITAT, WHAT IS IT?*, 2 (Sept. 2011), https://www.fws.gov/sacramento/es/Critical-Habitat/Home/Documents/critical_habitat.pdf.

124. *Id.* at 1.

125. *Id.* at 2.

habitats are not refuges or sanctuaries. Any changes or modifications by private landowners to a designated area located on private property, which do not involve Federal funding, is not regulated by the FWS.¹²⁶ The designation only affects activities that require a Federal permit, license, or funding.¹²⁷ Essentially, habitat conservation efforts fall into two categories: collaborative conservation programs and regulated takings.¹²⁸ For the sake of brevity, this Comment will not examine the regulated takings provision of the ESA, given its complex nature and limited relevance to this Comment.

Collaboration is crucial to ensure the survival of at risk species since local governments, agencies, and citizens are more familiar with the specific challenges and threats present in their areas.¹²⁹ More than half of endangered or threatened species live on privately owned lands; this necessitates the cooperation and collaboration between the FWS, communities, tribes, and private landowners.¹³⁰

Congress provided for partnerships between the FWS and non-Federal parties to collaborate on Habitat Conservation Plans (“HCP”).¹³¹ HCPs are documents required to apply for an incidental taking.¹³² The HCP outlines measures which the applicant will take to conserve the species in question.¹³³ Applicants must demonstrate that the impact of the incidental taking will be minimized and that it will not reduce the species chances of survival and recovery.¹³⁴

The Cooperative Endangered Species Conservation Fund (“CESCF”) provides grants to states and territories so they may

126. *Id.* at 1.

127. *Id.*

128. Endangered Species Act of 1973, 16 U.S.C.A. § 1532 (1973). In situations where a given ecosystem essential to an endangered or threatened species survival cannot otherwise be preserved, regulated takings are permissible under the ESA. *Id.*

129. *Endangered Species Grants: Overview*, U.S. FISH AND WILDLIFE SERV., <https://www.fws.gov/endangered/grants/index.html> (last updated June 14, 2017).

130. *Id.*

131. *Habitat Conservation Plans: Overview*, U.S. FISH AND WILDLIFE SERV., <https://www.fws.gov/endangered/what-we-do/hcp-overview.html> (last updated Aug. 3, 2017).

132. *Id.* An incidental taking permit allows the holder to proceed with an activity that would normally be considered an illegal taking. *Id.*; *Habitat Conservation Plans Under the Endangered Species Act*, U.S. FISH AND WILDLIFE SERV. (Apr. 2011), <https://www.fws.gov/endangered/esa-library/pdf/hcp.pdf> [hereinafter *Habitat Conservation Plans*].

133. *Habitat Conservation Plans*, *supra* note 131.

134. *Id.*

participate in voluntary conservation projects.¹³⁵ To participate, states must contribute at least twenty-five percent (25%) of the estimated costs; if two or more states or territories engage in a joint program, each may contribute ten percent (10%).¹³⁶ Federal monies supply the remaining funding. Approximately \$56.3 million was awarded in the fiscal year 2016 under four grant programs: Conservation Grants, Habitat Conservation Planning Assistance Grants, HCP Land Acquisition Grants, and Recovery Land Acquisition Grants.¹³⁷ Conservation Grants financially assist programs for habitat restoration, species status surveys, public education and outreach, and genetic studies, among others.¹³⁸ Habitat Conservation Planning Assistance Grants support HCP development by funding baseline surveys, document preparation, and other planning activities.¹³⁹ HCP Land Acquisition Grants, which received the bulk of Federal funding in 2016, fund land acquisition by State or local governments.¹⁴⁰ Finally, Recovery Land Acquisition Grants finance habitat acquisitions to secure continuing protection for species.¹⁴¹ Federal financing allows local and state governments to tailor conservation efforts to protected species native to the area.¹⁴²

Unfortunately, cuts in the FWS budget impacts the Federal and States' governments ability to collaborate under these programs. The proposed 2018 budget for the FWS would reduce funding for habitat conservation efforts by \$5.8 million.¹⁴³ The Cooperative Endangered Species Conservation Fund proposed budget for Fiscal Year 2018 would be \$19.3 million, a decrease of \$34.1 million.¹⁴⁴ The Conservation Grants to States would receive \$10.5 million, Habitat Conservation Planning Assistance

135. *Cooperative Endangered Species Conservation Fund Grants*, U.S. FISH AND WILDLIFE SERV. (Sept. 2016), <https://www.fws.gov/endangered/esa-library/pdf/section6.pdf> [hereinafter *Conservation Fund Grants*].

136. *Id.*

137. *Id.*

138. *Id.*

139. *Id.*

140. *Conservation Fund Grants*, *supra* note 135.

141. *Id.*

142. *Id.*

143. U.S. FISH AND WILDLIFE SERV., BUREAU HIGHLIGHTS 59-60 (2017), https://www.doi.gov/sites/doi.gov/files/uploads/fy2018_bib_bh059.pdf.

144. *Id.* at 62.

grants would receive \$6.5 million, and the remaining \$2.3 million would be allocated to administrative costs.¹⁴⁵ The proposed FWS 2018 budget would also eliminate funding for land acquisition grants.¹⁴⁶ With federal monies constituting the majority share of funding for these collaborative conservation programs, the efficacy and prevalence of habitat conservation may significantly decrease. Especially with no money being allocated towards land acquisition grants, which typically receives the lion's share of funding,¹⁴⁷ habitat conservation efforts by state and tribal governments are likely to crawl to a halt until either federal funding is reestablished or alternative state conservation initiatives are implemented.

III. Pesticide Regulations

A. Federal Regulations: The Environmental Protection Agency and its Role

The EPA plays a key role in protecting pollinators. Its mission is to protect human health and the environment.¹⁴⁸ One of its key goals is to implement environmental protections which make ecosystems diverse, sustainable, and economically productive.¹⁴⁹ In recent years, the EPA adopted policies and regulations aimed at reducing the impact of pesticides on invertebrate pollinators.

1. FIFRA and Pesticide Labeling Requirements Under the EPA

The EPA's primary means of regulating pesticides falls within the Office of Pesticide Programs ("OPP") enforcement of FIFRA. The OPP regulates the use of pesticides within the United States.¹⁵⁰ OPP executes the Federal Insecticide,

145. *Id.*

146. *Id.*

147. *Id.*

148. *Our Mission and What We Do*, EPA, <https://www.epa.gov/aboutepa/our-mission-and-what-we-do> (last updated Mar. 28, 2017).

149. *Id.*

150. *Summary of the Federal Insecticide, Fungicide, and Rodenticide Act*, EPA (Jan. 10, 2017), <https://www.epa.gov/laws-regulations/summary-federal-insecticide-fungicide-and-rodenticide-act> [hereinafter *Federal Insecticide, Fungicide, and Rodenticide Act*].

Fungicide, and Rodenticide Act (“FIFRA”). Funded by fees from pesticide manufacturers and Congressional monies,¹⁵¹ FIFRA regulates the distribution, sale, and use of pesticides.¹⁵² Under FIFRA, the EPA registers (licenses) any pesticide sold or distributed within the United States.¹⁵³ It ensures pesticides licensed by the EPA will not cause “unreasonable adverse effects on the environment.”¹⁵⁴ An unreasonable adverse effect is “any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide.”¹⁵⁵ Given recent research and the Rust Patch Bumblebee’s significance, neonicotinoid toxicity to Bumblebees certainly constitute an “unreasonable adverse effect.”

The FIFRA labeling provision requires pesticide labels to be clearly and prominently displayed.¹⁵⁶ Pesticide labels must display a name, brand, or trademark, the name and address of the producer or registrant, net contents, a product registration number, an ingredient statement, a warning or precautionary statement, the directions for use, and the use classification.¹⁵⁷ Violations of FIFRA may result in steep civil and criminal penalties. Civil penalties may be assessed in a fine up to \$5,000 per violation.¹⁵⁸ Criminal violators may be fined up to \$50,000 or imprisoned for not more than one year, or both.¹⁵⁹ Many companies opt to settle with the EPA, rather than face these statutory penalties.¹⁶⁰

151. *Fiscal Years 2014 and 2013 Financial Statements for the Pesticides Reregistration and Expedited Processing Fund*, EPA OFFICE OF INSPECTOR GEN. (Sept. 22, 2016), https://www.epa.gov/sites/production/files/2016-09/documents/_epaig_20160922-16-1-0322_glance.pdf. In Fiscal Year 2014, the EPA collected \$28.6 million in pesticide maintenance fees, \$800,000 over the established target for the fiscal year. *Id.*

152. 7 U.S.C.S. § 136 et seq. (1996).

153. *See id.*; *see also Federal Insecticide, Fungicide, and Rodenticide Act supra*, note 150.

154. 7 U.S.C.S. § 136(bb).

155. *Id.*

156. 40 C.F.R. § 156.10(a)(1)-(a)(4) (2009).

157. 40 C.F.R. § 156.10(b)-(j) (2009). The product registration number is assigned by FIFRA after the pesticide is registered. *See id.*

158. 7 U.S.C.S. § 136l(a)(1) (2012).

159. 7 U.S.C.S. § 136j(a) (2012) (codifying unlawful acts).

160. *Civil Cases and Settlements by Statute*, EPA, <https://cfpub.epa.gov/enforcement/cases/index.cfm?templatePage=12&ID=10> (last updated Oct. 24, 2017).

With increasing concerns over the risks neonics pose to bees, the EPA rolled out additional labeling requirements for this class of pesticides under FIFRA in 2013.¹⁶¹ Neonicotinoid labels must inform users that there are additional prohibitions against application when bees are present, warn that direct contact and ingestion could harm bees, and require the pesticide not be applied until all petals have fallen from flowering plants and trees.¹⁶² Improvements to neonicotinoid labels also include more clear and precise application directions to protect bees from toxic exposure.¹⁶³ These requirements tailor the pesticide regulations to better reduce neonic exposure to bees.¹⁶⁴

Yet, enforcement of FIFRA provisions does little to stay pesticide exposure to the Rusty-Patched Bumblebee, which do not have invested beekeepers to bring claims on their behalf. Unlike commercial honeybees, wild bee hives are not constantly monitored. This means Bumblebee exposure to toxic pesticides could go unnoticed, increasing the probability of hive death from pesticide exposure. Furthermore, FIFRA extends to the labeling, distribution, and application of pesticides. Violations of labeling provisions have negligible impact on the Bumblebee and sanctions for failure to adhere to directions for use of a pesticide are unlikely to recompense the species for its losses. While the neonicotinoid-specific labeling provision proactively combats exposure to bees, even small doses of the pesticide may be harmful to the Rusty-Patched Bumblebee.

2. EPA Actions Targeting Neonicotinoids

Along with new protective policies and more precise labeling requirements, the EPA has accelerated the re-evaluation of neonicotinoid pesticides and issued a temporary suspension on the approval of new outdoor neonicotinoids.¹⁶⁵ The EPA has scheduled reviews of several types of neonicotinoid pesticides,

161. Letter from Steven Bradbury, Director of Office of Pesticide Programs, to Registrants of Nitroguanidine Neonicotinoid Products (Aug. 15, 2013) (on file with Office of Chemical Safety and Pollution Prevention) <https://www.epa.gov/sites/production/files/2013-11/documents/bee-label-info-ltr.pdf>.

162. *Id.*

163. *Id.*

164. *Id.*

165. *EPA Actions to Protect Pollinators*, EPA, <https://www.epa.gov/pollinator-protection/epa-actions-protect-pollinators> (last updated Jan. 12, 2017).

including imidacloprid and thiamethoxam (two of the most lethal neonics to bee species).¹⁶⁶ The EPA released the first of four preliminary risk assessments of neonicotinoids on January 6, 2016.¹⁶⁷ This risk assessment identified the lowest residue level of imidacloprid likely to negatively affect honeybees; hives exposed to this minimum threshold experienced decreases in populations.¹⁶⁸ Unfortunately, this preliminary risk assessment focused primarily on the effects imidacloprid has on commercial honeybees.¹⁶⁹ None of the scheduled assessments will examine the effects neonicotinoids have on wild bumblebee populations. However, given the Rusty-Patched Bumblebee's susceptibility to neonic poisoning, it is very likely the Bumblebee will experience similar, if not increased, reactions upon exposure to imidacloprid.

In 2017, the EPA implemented a new policy aimed at mitigating risks to commercial bees from agricultural pesticides applied while the bees pollinate crops.¹⁷⁰ Notably, this policy is merely a recommendation for new labeling statements.¹⁷¹ The EPA modified its approach to targeting pesticide compounds that pose acute risks to commercial bees.¹⁷² Essentially, the policy will identify the pesticides which pose the most significant risks to bees using an acute risk assessment methodology.¹⁷³ Once a product is identified as posing a risk, label restrictions will be created to mitigate the risk.¹⁷⁴ Pesticide parent companies may voluntarily comply with the new recommendations; the EPA can only require compliance through FIFRA procedures and this new policy is not a FIFRA provision.¹⁷⁵ None of the new measures are tailored to protect

166. *EPA Releases the First of Four Preliminary Risk Assessments for Insecticides Potentially Harmful to Bees*, EPA (Jan. 6, 2016), <https://www.epa.gov/newsreleases/epa-releases-first-four-preliminary-risk-assessments-insecticides-potentially-harmful>.

167. *Id.*

168. *Id.*

169. *U.S. Environmental Protection Agency's Policy Mitigating the Acute Risk to Bees from Pesticide Products*, EPA OFF. OF PESTICIDE PROGRAMS 1, 10 (Jan. 12, 2017) <https://www.regulations.gov/contentStreamer?documentId=EPA-HQ-OPP-2014-0818-0477&contentType=pdf> [hereinafter *Policy Mitigating Risk to Bees*].

170. *Id.* at 4.

171. *Id.* at 1.

172. *Id.* at 27.

173. *Id.* at 4.

174. *Policy Mitigating Risk to Bees*, *supra* note 169 at 10.

175. *Id.* at 1.

wild bee populations, but the EPA believes the new actions will impact native species.¹⁷⁶

The EPA has also examined the use of neonic treated soybean seeds.¹⁷⁷ An average of 76 million acres of soybeans were harvested annually from 2009-2013; thirty percent (30%) of soybean acreage was planted with neonicotinoid treated seeds.¹⁷⁸ Imidacloprid, thiamethoxam, and clothianidin (the three most commonly used neonicotinoids) are applied to soybean seeds prior to planting.¹⁷⁹ The Biological and Economic Analysis Division of the EPA (the department which researched the effectiveness of neonicotinoid treated soybean seeds) found negligible differences in soybean yield when soybean seeds were treated with neonics and when soybean seeds were not treated.¹⁸⁰ Farmers who planted neonic-treated soybean seeds gained only an estimated 1.7% in net operating revenue.¹⁸¹ Furthermore, less harmful alternatives provide similar levels of pest-protection to soybeans as neonicotinoid treated seeds at a comparable cost.¹⁸² These findings bolster the growing body of research promulgating the risks of neonics and the efficacy of less harmful alternatives. Unfortunately, research and data without regulation and enforcement does little to combat the threats against the Rusty Patch Bumblebee.

3. EPA Protections at the State Level

The 2017 labeling policy also encourages states and tribes to create local pollinator protection plans.¹⁸³ Due to their flexibility and familiarity with local endangered and threatened species, local governments can better address the issues pollinators face in specific locations.¹⁸⁴ The EPA strongly encourages local governments to undertake locally-based

176. EPA Finalizes Steps to Better Protect Bees from Pesticides, EPA (Jan. 12, 2017), <https://www.epa.gov/pesticides/epa-finalizes-steps-better-protect-bees-pesticides> [hereinafter *Steps to Better Protect Bees*].

177. See Memorandum from Clayton Myers & Elizabeth Hill, *supra* note 121.

178. *Id.* at 3.

179. *Id.* at 4.

180. *Id.* at 1.

181. *Id.*

182. Memorandum from Clayton Myers & Elizabeth Hill, *supra* note 121 at 2.

183. *Steps to Better Protect Bees*, *supra* note 176.

184. *Policy Mitigating Risk to Bees*, *supra* note 169.

measures to reduce pesticide exposure,¹⁸⁵ through state Managed Pollinator Protection Plans (“MP³”).¹⁸⁶ The primary purpose of MP³s is to reduce pesticide exposure through communication and coordination between beekeepers, pesticide applicators, and landowners.¹⁸⁷ The EPA believes pesticide risks can be mitigated if beekeepers and pesticide applicators coordinate activities prior to pesticide uses.¹⁸⁸

States may choose how to implement the MP³, whether it be through regulation or voluntary best-management-practice plans.¹⁸⁹ Each state may expand the MP³ scope to include non-pesticide regulations.¹⁹⁰ Though the states are given discretion and flexibility in how they choose to implement their MP³s, the EPA outlined critical elements requisite for the plan to be successful.¹⁹¹ These elements include a participation process for beekeepers, farmers, and pesticide applicators and processes to periodically review and modify the plan.¹⁹² The ultimate goal of a state MP³ is to foster open communication, improve mutual understanding, and safeguard peaceful cooperation to allow parties to successfully operate.¹⁹³

The greatest downfall of the MP³, with respect to the Rusty Patch Bumblebee, is that it fails to incorporate wild bee species in its scope and depends upon voluntary cooperation. If farmers and beekeepers abstain from coordinating their respective activities, then the state’s efforts fall flat. Additionally, the MP³ scope is limited to commercial pollinators under contract to service the pesticide application site; managed and wild bees that are merely nearby a pesticide application site, do not fall under the MP³’s scope.¹⁹⁴

185. Dan Charles, *Cut Down on Bee-Killing Pesticides? Ontario Finds It’s Easier Said than Done*, NPR (Oct. 18, 2016), <http://www.npr.org/sections/thesalt/2016/10/18/496100190/cut-down-on-bee-killing-pesticides-easier-said-than-done>.

186. State FIFRA Issues Research and Evaluation Group, *Final Guidance for State Lead Agencies for the Development and Implementation of Managed Pollinator Protection Plans*, ASS’N AM. PESTICIDE CONTROL OFFICIALS 1 (June 2015), <https://aapco.files.wordpress.com/2015/08/sfireg-mp3-guidance-final.pdf>. [hereinafter *FIFRA Guidance*].

187. *Id.*

188. *Id.*

189. *Id.* at 2.

190. *Id.* at 2-3.

191. See *FIFRA Guidance*, *supra* note 186 at 3-5.

192. *Id.* at 3, 5.

193. *Id.* at 1.

194. *Id.* at 2.

A. State Regulations

States possess wide discretion and authority when it comes to enacting regulations. A variety of avenues may be pursued to achieve a state's goal of pesticide regulation, including legislation, executive orders, and community outreach programs. Recent attention to threatened bee species has spurred some states to undertake new conservation efforts independent of the federal government.

1. *Legislative and Executive Actions*

Recent years have seen an increase in state legislatures restricting neonicotinoid sales and use. In the spring of 2016, Maryland legislatures passed the "Pollinator Protection Act," banning consumer use of neonicotinoid pesticides.¹⁹⁵ The Pollinator Protection Act, one of the first laws ever to prohibit neonicotinoid use in the U.S., is not a complete ban on neonicotinoids, rather it severely restricts their sale and use.¹⁹⁶ This law will restrict sales of neonics only to those who sell restricted-use pesticides.¹⁹⁷ Unless a person is a certified applicator or working under specific circumstances, neonicotinoid use is prohibited.¹⁹⁸ Farmers and veterinarians will also be allowed to use neonicotinoids.¹⁹⁹ Additionally, Maryland's Pollinator Protection Act requires the state Department of Agriculture to integrate habitat expansions into the State's existing MP³.²⁰⁰ The law will go into effect January 1, 2018.²⁰¹

195. H.R. 211, 2016 Gen. Assemb., 436th Sess. (Md. 2016); Pamela Wood, *Bee Advocates Victorious in Maryland General Assembly*, BALT. SUN (Apr. 7, 2016), <http://www.baltimoresun.com/news/maryland/politics/blog/bal-bee-advocates-victorious-in-general-assembly-20160407-story.html>.

196. Wood, *supra* note 195.

197. Md. H.R. 211; *see also* 7 U.S.C. § 136a(c). Pesticides may be classified by the EPA as either general use pesticides or restricted use pesticides upon registration. *Id.* If a pesticide may harm humans or the environment, even if applied according to labeling instructions, it will be classified as restricted use. *See id.* MD. DEP'T OF AGRIC., *Pesticide Applicator Certification and Business Licensing Requirements*, MD. DEP'T AGRIC., <http://www.baltimoresun.com/news/maryland/politics/blog/bal-bee-advocates-victorious-in-general-assembly-20160407-story.html> (last visited Mar. 13, 2017).

198. Md. H.R. 211.

199. Wood, *supra* note 195.

200. Md. H.R. 211.

201. *Id.*

Connecticut took similar measures in late April of 2016 after beekeepers reported losing around sixty percent (60%) of their bees in the past year.²⁰² The Connecticut Senate voted unanimously on the bill and it went into effect January 1, 2017.²⁰³ The new Act requires the Commissioner of Agriculture to draft best practices to minimize airborne neonicotinoid dust, thereby mitigating the effect the dust has on pollinators.²⁰⁴ Application of neonicotinoids to flowering plants is limited to those grown in greenhouses or to anyone conducting academic research.²⁰⁵ Along with neonicotinoid use restrictions, the Act includes plans to improve and to expand domestic and wild pollinator habitats.²⁰⁶ The new legislation also tasked the Connecticut Department of Transportation with planting flowering vegetation along deforested state highways, in an effort to improve wild bee habitats.²⁰⁷ Unlike other pesticide-regulatory legislation, the Connecticut law conserves wild bee habitats, rather than focusing solely on commercial bee concerns.²⁰⁸

California Senators Mark Leno and Ben Allen introduced similar legislation to restrict the use of neonicotinoids.²⁰⁹ The California Pollinator Protection Act would also require labels on all plants and seeds pretreated with neonicotinoids, notifying consumers that the products are toxic to bees.²¹⁰ The California Director of Pesticide Regulation would be required to eliminate pesticides which endanger the environment.²¹¹ Unfortunately,

202. Gregory B. Hladky, *Bee Protection Bill Passes Senate*, Hartford Courant (Apr. 21, 2016), <http://www.courant.com/politics/capitol-watch/hc-bee-protection-bill-passes-senate-20160421-story.html>.

203. S.B. 231, 2016 Gen. Assemb., Feb. Sess. (Conn. 2016).

204. *Id.*

205. *Id.*

206. Hladky, *supra* note 202.

207. *Id.*

208. Annie Lemelin, *Beelieve it! Maryland and Connecticut Pass Landmark Legislation To Protect Pollinators*, CONSERVATION LAW FOUNDATION (June 24, 2016), <https://www.clf.org/blog/beelieve-maryland-connecticut-pass-landmark-legislation-protect-pollinators/>.

209. S.B. 1282, 2016 Leg., Reg. Sess. (Cal. 2016); *see also Bill Protects Bees in California from Harmful Pesticides*, SENATOR BILL ALAN (Mar. 9, 2016), <http://sd26.senate.ca.gov/news/2016-03-09-bill-protects-bees-california-harmful-pesticides> [hereinafter *Bees in California*].

210. *Id.*; *see also Bees in California*, *supra* note 209.

211. Cal. S.B. 1282.

this Bill died in the California senate due to a failure to meet a deadline.²¹²

Spurred by scientific evidence of neonicotinoid toxicity to commercial and wild bees, Minnesota Governor, Mark Dayton, signed an executive order which restricts the use of neonicotinoids.²¹³ Farmers in Minnesota who want to use neonics must verify the pesticides are necessary.²¹⁴ Minnesota's Department of Agriculture ("MDA") will increase inspections and enforcement efforts to ensure highly toxic pesticides are used in compliance with state regulations.²¹⁵ Additionally, the MDA must develop "pollinator stewardship materials" to distribute, in an effort to minimize exposure to non-target insects, like bumblebees, through education.²¹⁶ Raising awareness is a key provision of this executive order, recognizing that collaborative efforts by farmers, beekeepers, and the public will more swiftly and efficiently conserve threatened bee populations.²¹⁷ A new pest management strategy enacted by the Minnesota Department of Natural Resources will minimize pesticide use on public lands and maximize the restoration, creation, and management of wild pollinator habitats.²¹⁸

2. *Alternative State Programs*

Some states have opted for less formal, legal means of curbing pesticide use and opted for more collaborative, educational methods to meet their ends. One such example is the Wisconsin government's collaboration with the University of Wisconsin.

212. *SB-602 Pesticides: neonicotinoids: labeling*. CAL. LEGIS. INFO. (June 1, 2017), https://leginfo.legislature.ca.gov/faces/billHistoryClient.xhtml?bill_id=201720180SB602.

213. Minn. Exec. Order No. 16-07 (Aug. 25, 2016).

214. *Id.*; The executive order did not elaborate what form this additional verification would take, only that farmers must now verify neonicotinoids are necessary. *See id.*; *See also* Dan Charles, *Minnesota Cracks Down on Neonic Pesticides, Promising Aid to Bees*, NPR (Aug. 31, 2016), <http://www.npr.org/sections/thesalt/2016/08/31/491962115/minnesotacracks-down-on-neonic-pesticides-promising-aid-to-bees>.

215. Minn. Exec. Order No. 16-07 (Aug. 25, 2016); *see also* Dan Charles, *Minnesota Cracks Down on Neonic Pesticides, Promising Aid to Bees*, NPR (Aug. 31, 2016), <http://www.npr.org/sections/thesalt/2016/08/31/491962115/minnesotacracks-down-on-neonic-pesticides-promising-aid-to-bees>.

216. Minn. Exec. Order No. 16-07 (Aug. 25, 2016).

217. *Id.*

218. *Id.*

In Wisconsin, pollinator-dependent crops contribute over \$55 million in revenue annually.²¹⁹ The state Department of Agriculture, Trade, and Consumer Protection partnered with the University of Wisconsin to develop a plan to protect the state's lucrative pollinators.²²⁰ This plan, dubbed the Wisconsin Pollinator Protection Plan, is an education resource, providing guidance to improve public understanding of pollinator health issues and to minimize risk to pollinators through voluntary actions.²²¹ Many people criticize this plan because it relies on individuals and businesses choosing to self-regulate their behavior to protect bee populations.²²² Scientists and beekeepers doubt that large-scale farming operations for corn and soy will reduce the use of neonicotinoids because these crops do not rely on invertebrate pollinators, despite posing significant risks of toxic exposure by means of contaminated soil and ground water.²²³

C. International Regulations: Canadian and EU Restrictions on Neonicotinoids

The Canadian government and the European Union have been faster to react to the lethal effects neonicotinoids have on invertebrate pollinators than their American counterpart. As a result, neonic restrictions are more pervasive throughout the European continent.

1. *Canadian Neonicotinoid Restrictions*

America's northern neighbor is also concerned with the Rusty-Patched Bumblebee's well-being. Canada added the Rusty-Patched Bumblebee to its "Species at Risk in Ontario List" in 2010, seven years before the United States granted similar status to the Bumblebee.²²⁴ In 2011, the Ontario

219. *Supra* at note 108.

220. *Id.*

221. *Id.*

222. Marion Ceraso, *Critics: State's Plan to Save Bees Provides Little Protection from Pesticides*, WISCONSIN WATCH (Feb. 21, 2016), <http://wisconsinwatch.org/2016/02/critics-states-plan-to-save-bees-provides-little-protection-from-pesticides/>.

223. *Id.*

224. *Rusty-Patched Bumble Bee*, ONTARIO MINISTRY OF NATURAL RESOURCES <https://www.ontario.ca/page/rusty-patched-bumble-bee> (last updated Sept. 25, 2015); *In a Race Against Extinction*, *supra* note 15.

government released a “Recovery Strategy” for the Rusty-Patched Bumblebee.²²⁵ The recovery strategy noted the primary threat to the Rusty-Patched Bumblebee, once common throughout southern Ontario and southwestern Quebec, is the use of pesticides.²²⁶ The main goal for the recovery strategy is to “ensure the species’ long-term survival in Ontario by restoring and maintaining self-sustaining populations.”²²⁷ Canada has already taken steps to protect the Bumblebee through public education programs, collaborative research endeavors developing solutions for the various threats to the Bumblebee, and new laws restricting the use of neonicotinoid insecticides.²²⁸

Ontario recently undertook efforts to reduce the amount of neonicotinoids applied to crops.²²⁹ Widespread neonicotinoid use and severe losses to bee hives prompted a grassroots political movement calling for a ban of this pesticide.²³⁰ Passed in 2015, the new law intends to cut neonicotinoid applications to corn and soybean seeds by eighty percent (80%) (in phases) in 2017.²³¹ The Ontario government targeted corn and soybean seeds because almost one-hundred percent (100%) of corn seeds and sixty percent (60%) of soybean seeds sold within the province are neonic-coated, thus presenting the greatest opportunity to reduce bee exposure.²³² Field research revealed that on average only a 1 to 2% loss of non-pesticide treated seeds; in some cases, though, farmers can lose up to fifteen percent (15%) of their crops.²³³

Before farmers can use neonicotinoid-coated seeds, they must demonstrate a pest problem is present on their land and that the application of neonicotinoids is necessary to save the

225. ONTARIO MINISTRY OF NATURAL RESOURCES, RUSTY-PATCHED BUMBLE BEE, ONTARIO RECOVERY STRATEGY SERIES 1 (Dec. 7, 2011), http://files.ontario.ca/environment-and-energy/species-at-risk/stdprod_086037.pdf.

226. *Id.* at 4.

227. *Id.* at 7.

228. *Bumblebee Recovery*, WILDLIFE PRESERVATION CANADA, <https://wildlifepreservation.ca/bumble-bee-recovery/>, (last visited Sept. 17, 2017); *Bumblebee census takes flight over Ottawa*, CBC NEWS, <http://www.cbc.ca/news/canada/ottawa/bee-census-ottawa-1.3689857>, (last visited Sept. 17, 2017).

229. Charles, *supra* note 185.

230. *Id.*

231. *Neonicotinoid Regulation*, MINISTRY OF THE ENVIRONMENT AND CLIMATE CHANGE ONTARIO (June 6, 2016), <https://www.ontario.ca/page/neonicotinoid-regulations>.

232. *Id.*

233. Charles, *supra* note 185.

crop.²³⁴ The trouble is that the pests neonic-coated seeds target live underground, making it difficult for farmers to know whether the pests are in their fields.²³⁵ Ontario solved this dilemma with a test: farmers wanting to plant neonic-treated corn or soybean seeds must set out bait traps to determine if underground pests are contaminating the field.²³⁶ Farmers go out to their fields, dig holes, and drop insect bait into each hole; if even one pest is found in a hole, they can plant the pesticide treated seed.²³⁷ If no pests are found, the farm cannot plant neonic-treated seeds.²³⁸

Ontario's new restrictions on neonicotinoids balance the farmers' interests in using neonicotinoid treated seeds and the government's interest in reducing toxic exposure to bees. Unfortunately, the new restrictions have hit a few snags. Despite the new prohibitions, many farmers are still using the neonicotinoid coated seeds; one seed dealer in Ontario estimated that between 75 and 85% of corn seed purchased was treated with neonicotinoids during the first year of the new pesticide restrictions.²³⁹ Additionally, a lack of regulation fails to ensure that farmers are accurately reporting the results of their bait-trap-tests.²⁴⁰ Ontario's efforts to restrict neonic-treated seeds serves as a case-study: restrictions with good intentions, but minimal follow-up or regulation are effective only in name. Were similar neonicotinoid prohibitions enacted in the United States, additional reporting requirements for farmers would be necessary to ensure compliance. This could take many forms, but would ultimately be limited to the financial resources available to support additional regulations.

Along with this restriction on neonicotinoid treated seeds, a complete ban on the neonicotinoid, imidacloprid, has been proposed.²⁴¹ An environmental assessment revealed imidacloprid present in Canadian water sources in levels toxic to

234. *Id.*; *Neonicotinoid Regulation*, note 231.

235. Charles, *supra* note 185.

236. *Id.*

237. *Id.*

238. *Id.*

239. *Id.*

240. *Id.*

241. *Health Canada Proposes Ban on Pesticide Linked to Bee Deaths*, BBC NEWS (Nov. 24, 2016), <http://www.bbc.com/news/world-us-canada-38096765>.

insects.²⁴² Bee health is not mentioned in the proposed ban, but apiaries across the country welcome any reduction in neonicotinoids.²⁴³ Absent an out-right ban, Canada's restrictions on neonicotinoids will require further tweaking to better achieve the desired reduction in neonic use while balancing the farmers' interests.

2. European Union Prohibitions Against Neonicotinoids

Although the Rusty-Patched Bumblebee is not native to any member state of the European Union, the EU has led the world in banning neonicotinoids. With more than a quarter of Europe's bumblebees and one in ten honeybees at risk, European invertebrate pollinators face crippling population losses.²⁴⁴

The EU has one of the strictest pesticide regulation systems; all pesticides available on the market have been subjected to thorough assessments, ensuring human and animal health is protected.²⁴⁵ In the spring of 2013, the European Union enacted the first continent-wide ban on neonicotinoids.²⁴⁶ The EU Commission proposed the suspension of neonics after the European Food Safety Authority ("EFSA") found three common variations of neonicotinoids—thiamethoxam, clothianidin, and imidacloprid—"posed unacceptable risks to bees."²⁴⁷ Use of these neonics was banned for two years on flowering crops that bees feed upon, like corn, oilseed rape, and sunflowers.²⁴⁸ The ban applies to neonic seed, soil, and foliar treatments, except for treatments inside greenhouses and winter cereal crops.²⁴⁹ In

242. *Id.*

243. *Id.*

244. ANA NIETO ET AL., IUCN GLOBAL SPECIES PROGRAMME, EUROPEAN RED LIST OF BEES iv (2014), http://cmsdata.iucn.org/downloads/erl_of_bees_low_res_for_web.pdf.

245. *Pesticides and Bees*, EUROPEAN COMM'N, https://ec.europa.eu/food/animals/live_animals/bees/pesticides_en (last updated Sept. 15, 2017).

246. Damian Carrington, *Bee-Harming Pesticides Banned in Europe*, THE GUARDIAN (Apr. 29, 2013), <https://www.theguardian.com/environment/2013/apr/29/bee-harming-pesticides-banned-europe>.

247. *Id.*

248. *Id.*

249. USDA FOREIGN AGRIC. SERV., NEONICOTINOID INSECTICIDES TO BE BANNED IN FRANCE FROM 2018 (Aug. 31, 2016) https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Neonicotinoid%20Insecticides%20to%20Be%20Banned%20in%20France%20from%202018_Paris_France_8-31-2016.pdf.

emergency situations, countries can authorize neonicotinoid use for 120 days.²⁵⁰ The EU crafted the moratorium to focus on commercial pollinators, leaving questions about the efficacy of this ban as it concerns wild bees.²⁵¹

This pioneering ban ended in 2015, but the EFSA has since placed the decision under review.²⁵² In 2015, the EFSA confirmed that neonicotinoid foliar sprays pose risks to bees and submitted its findings to the EU Commission.²⁵³ EU scientists in a letter to the EU Commission stated the review would be completed in January 2017; while the review is conducted, the EU Commission elected to maintain the restrictions on neonicotinoids.²⁵⁴

Independent of the EU Commission, France has restricted neonicotinoid use for nearly twenty years.²⁵⁵ In 1999, France enacted legislation banning the application of the neonic imidacloprid on sunflowers; a similar moratorium on the use of the insecticide on corn followed in 2004.²⁵⁶ Productivity appears unaffected by the neonic restrictions on corn and sunflowers since 2007 brought the best yields of these crops in over a decade.²⁵⁷ 2012 brought additional restrictions on the application of thiamethoxam on rapeseed.²⁵⁸ The French Parliament on July 20, 2016 enacted a bill that bans the use of neonicotinoids in France.²⁵⁹ Any plant protection products and seeds treated with

250. Claire Milne, *Bees, Neonicotinoids and the EU*, FULL FACT (May 20, 2016), <https://fullfact.org/europe/bees-neonicotinoids-and-eu/>.

251. Carrington, *supra* note 246.

252. *Id.*; Arthur Nelson, *EU Scientists Begin Review of Ban on Pesticides Linked to Bee Declines*, THE GUARDIAN (Jan. 7, 2016), <https://www.theguardian.com/environment/2016/jan/07/eu-scientists-begin-review-ban-pesticides-linked-bee-declines>.

253. *Neonicotinoids: foliar spray uses confirmed as a risk to bees*, EUROPEAN FOOD SAFETY AUTH. (Aug. 26, 2015), <http://www.efsa.europa.eu/en/print/press/news/150826>.

254. Neslen, *supra* note 252; *Pesticides and Bees: EFSA to Update Neonicotinoid Assessments*, EUROPEAN FOOD SAFETY AUTHORITY (Jan. 11, 2016), <http://www.efsa.europa.eu/en/press/news/160111>.

255. USDA FOREIGN AGRIC. SERV, *supra* at note 249. At the time this article was written, the review scheduled to be completed in 2017 has yet to be made available to the public.

256. *Id.*

257. EUROPEAN ENV'T. AGENCY, NEONICOTINOID PESTICIDES ARE A HUGE RISK – SO BAN IS WELCOME, SAYS EEA 5 (2013) <https://www.eea.europa.eu/downloads/7fc89e7a25474612ad988c13c2940405/1472813140/neonicotinoid-pesticides-are-a-huge.pdf>.

258. USDA FOREIGN AGRIC. SERV, *supra* at note 249.

259. *Id.*

neonics will be banned.²⁶⁰ The law is set to take effect September 1, 2018.²⁶¹

These extensive prohibitions against neonicotinoid applications address the dangers posed to a narrow, commercial subsection of bees found within the European continent. The primary objective behind these moratoriums is the preservation and viability of profitable honeybees and commercial pollinators. Contributing over €2 billion (approximately \$23.5 billion) to the European economy, the EU stands to lose a significant contributor to its GDP.²⁶² Yet, the overall financial contributions of wild bees has not been quantified and is relatively ignored by European legislatures. A complete ban against neonicotinoids would likely reduce the rate of exposure to wild bees, but until further research is done the impact of these laws remains somewhat speculative and ambiguous.

Though not a member of the EU, Cuba's pesticide-free honey industry serves as a case study that bolsters the latest science linking pesticides to massive bee deaths and supports the ban of neonicotinoids in some capacity.²⁶³ The Soviet Union collapse combined with the U.S. trade embargo made acquiring pesticides unaffordable, resulting in Cuba adopting organic agriculture.²⁶⁴ Pesticide free since 1991, Cuban beekeepers have not suffered extensive hive losses over the past decade.²⁶⁵ They attribute their hives' endurance to the absence of pesticides, all the while their international counterparts continue to suffer losses.²⁶⁶ Cuba's honey market illustrates the virtues of eliminating neonics, as it pertains to the impact of toxic exposure to bees.

IV. Conclusion

260. *Id.*

261. *Id.*

262. David Jolly, *Europe Bans Pesticides Thought Harmful to Bees*, THE NEW YORK TIMES (Apr. 29, 2013), <http://www.nytimes.com/2013/04/30/business/global/30iht-eubees30.html>.

263. Chris Arsenault, *Cuba's Organic Honey Exports Create Buzz as Bees Die Off Elsewhere*, REUTERS (Feb. 9, 2016), <http://www.reuters.com/article/us-cuba-farming-honey-idUSKCN0V1172>.

264. *Id.*

265. *Id.*

266. *Id.*

When it thrived, the Rusty-Patched Bumblebees' indigenous habitat was found in twenty-eight States; since its decline, the Bumblebee is now found in only thirteen States. Because the fuzzy Bumblebee, at its height, was not common throughout the continental U.S.,²⁶⁷ Federal conservation resources and efforts are best targeted at those original twenty-eight States. The FWS and EPA have also noted that local governments and agencies are better equipped to handle threats unique to the area. Federal grants are currently available, upon petition, to preserve critical habitats of listed species.

Unfortunately, additional Federal funding may not be a feasible option in the foreseeable future. The Trump Administration's proposed budget for 2018 undercuts existing funding for Federal agencies key to the preservation of the Rusty-Patched Bumblebee.²⁶⁸ The EPA's proposed budget will be reduced by thirty-one percent (31%) or a \$2.6 billion reduction. While the EPA does not directly regulate conservation efforts, it does enforce FIFRA. The lower budget will likely reduce existing enforcement measures, leading to an increase in pesticide exposure. The Executive Branch's proposed budget also reduces the Department of Interior's funding by twelve percent (12%) or \$1.5 billion.²⁶⁹ Within the Department of Interior is the FWS. Though the proposed budget supports stewardship of land management operations, it is unclear what, if any, impact this will have on endangered species conservation efforts.²⁷⁰ Other tangential budget decreases may impact conservation efforts by way of state's having fewer resources to allocate toward endangered species conservation.

With the proposed budget cuts restricting the Federal government's ability to adjust conservation efforts to address pesticide toxicity to the Rusty-Patched Bumblebee, effective conservation of the Rusty-Patched Bumblebee falls to the states. Some states have already taken it upon themselves to regulate

267. Sclossberg & Schwartz, *supra* note 27.

268. OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, AMERICA FIRST: A BUDGET BLUE PRINT TO MAKE AMERICA GREAT AGAIN (2017), https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/fy2018/2018_blueprint.pdf.

269. *Id.*

270. *Id.*

deadly pesticides in efforts to conserve bee populations. Federal regulations fail to take into account the toxic effects pesticides have on wild bee species, whereas states have recognized the significance of these threats.

New legislation may learn from previous failures and craft more effective conservation measures. Ontario's recent neonicotinoid restriction serves as an example. Reducing the neonicotinoid treated seeds used in the Canadian province offered a solution for beekeepers, but proved difficult to enforce. The law granted significant discretion to pesticide applicators with little to no compliance measures. This could be remedied with compliance measures, such as random bait-trap-tests by government officials or more formal documentation requirements prior to purchase. The downfalls to implementing compliance measures are the costs, personnel, and time it would take for these measures to go into effect.

The most direct and efficient way to reduce toxic pesticide exposure and increase conservation efforts, is to allow state and local governments more latitude when undertaking conservation plans. States could allocate existing resources towards conservation efforts by tailoring existing plans to conserve wild pollinators. For example, Connecticut's pollinator protection legislation includes a provision requiring its Department of Transportation to plant wild flowers along stretches of highway that have already been deforested. This option is cost effective, does not require additional personnel, and may be implemented almost immediately. Another option is to replace ornamental flowers and shrubbery in public space and park landscaping with flowers and plants which draw in Rusty-Patched Bumblebees. State and local governments could also establish neighborhood gardens that grow fruits and vegetables dependent upon the Bumblebee to thrive, such as tomatoes and peppers.

States could also adopt measures similar to those enacted in Minnesota by Governor Dayton. Under the executive order, Minnesota's Department of Natural Resources developed a pest management strategy aimed at reducing pesticide and restoring wild pollinator habitats. Corresponding state agencies could undertake similar measures. Elimination of neonicotinoid pesticide application from state-managed lands could be executed almost immediately. Neonicotinoid pesticides could

easily be replaced with less-harmful alternative insecticides, reducing toxic exposure to the Bumblebee. Also, states could prioritize the restoration and maintenance of Bumblebee habitats by planting wild flowers and restricting or eliminating pesticide application to these designated areas. This narrow restriction would appropriately address the threats posed to the Bumblebee by neonics without severe restrictions on farmers or burdensome costs to taxpayers.

Additionally, educational and outreach programs aimed at informing farmers, pesticide applicators, and community members about the risks neonicotinoids pose to endangered pollinators may prove effective and financially efficient. Collaborative efforts between researchers, scientists, and local governments could spur individuals to undertake conservation efforts on their own. These programs are easily tailored to meet the community's needs and address concerns unique to the area.

Regardless of what measures are enacted, immediate action is necessary to protect the Rusty-Patched Bumblebee from neonicotinoid contamination.

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