



2014

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Recommended Citation

The Honey Trap: How Pesticide Regulations Hold the Key to Honey Bee Survival, 2 Tex. A&M J. Real Prop. L. 301 (2014).

Available at: <https://scholarship.law.tamu.edu/journal-of-property-law/vol2/iss1/3>

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THE HONEY TRAP: HOW PESTICIDE REGULATIONS HOLD THE KEY TO HONEY BEE SURVIVAL

By Deborah A. Humphreys†

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I. INTRODUCTION

Honey bees are vital to the pollination of United States crop production, pollinating more than ninety flowering crops. Approximately one-third of the human diet comes from insect-pollinated plants, and the honey bee is responsible for 80% of that pollination. However, beginning in the winter of 2006, beekeepers began reporting unusually high losses of hives with no apparent cause. In fact, since 2006, beekeepers in the United States have reported an average of 30% reduction in hives annually, leaving some areas without enough honey bees to effectively pollinate certain dependent crops. The recent disappearance of large amounts of honey bees is known as Colony Collapse Disorder (“CCD”).

Recent studies have indicated there are a host of factors that could be to blame for the honey bee disappearance, ranging from developments in chemical technology to parasitic mites. Many sources, however, point to a group of insecticides known as neonicotinoids. While credible evidence exists regarding the risk of honey bee devastation, the United States Environmental Protection Agency (“EPA”) is un-

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willing to take preventative action without more scientific certainty. However, the European Commission recently passed a ban on these insecticides believed to be a major cause of CCD. In light of certain factors, the EPA should utilize the precautionary approach to take preventative action in the form of regulations, without which, honey bees will continue to dwindle in numbers with severe consequences to crops that depend on honey bee pollination and ultimately the dependence of humans on these crops.

This Comment traces the history of honey bees in the United States, their recent disappearance, and needed action to curtail their loss. Part II explores the history of honey bees, problems related to their disappearance, and early manifestations of honey bee regulations in law and policy. Part III provides background on the recent disappearance of honey bees, known as CCD, causes of CCD, and the recent suit against the EPA for failure to take preventative action. Finally, Part IV discusses the need for action and proposed measures.

II. THE LIFE OF HONEY BEES

A. *Honey Bees in the United States*

There are over 4,000 species of native North American bees responsible for an estimated \$3 billion per year to the United States economy.¹ However, the honey bee is not among them. In fact, the honey bee was not imported to North America until the 17th century.² At that time, European settlers introduced the honey bee to the east coast of North America.³ It would take another 200 years for the honey bee to reach the west coast.⁴ Nonetheless, the honey bee is an accepted insect in our society, beloved by many. The honey bee became entrenched in the fabric of North American agriculture due to its ability to produce honey and wax⁵—something native bees are not capable of.⁶ Additionally, the honey bee poses advantages over native pollinators due to its abundance and the ease at which it can be managed on a commercial level for pollination of certain crops.⁷

The success of the honey bee in North America is largely due to inventions in the 19th century that made beekeeping commercially vi-

1. Clay Bolt, *Over 4,000 Reasons to Love (and Protect) North America's Native Bees*, NAT'L GEOGRAPHIC, Jan. 6, 2014, <http://newswatch.nationalgeographic.com/2014/01/06/over-4000-reasons-to-love-and-protect-north-americas-native-bees/>.

2. *Id.*

3. *Honey Bees and Colony Collapse Disorder*, AGRIC. RESEARCH SERV., U.S. DEP'T OF AGRIC., <http://www.ars.usda.gov/News/docs.htm?docid=15572#public> (last modified Sept. 8, 2014).

4. Brenda Kellar, *Honey Bees Across America*, <http://www.orsba.org/htdocs/download/Honey%20Bees%20Across%20America.html> (last visited Mar. 17, 2014).

5. *Id.*

6. *Urban Bee Legends*, UC BERKELEY URBAN BEE LAB, <http://www.helpabee.org/urban-bee-legends.html> (last visited Oct. 1, 2014).

7. *Honey Bees and Colony Collapse Disorder*, *supra* note 3.

able.⁸ These inventions included the movable frame hive, the wax-comb foundation, the centrifugal honey extractor, and the bee smoker, which still support commercial beekeeping today.⁹ Before these inventions, beekeepers had little capability for managing their colonies. More recent developments, including the cross breeding of selected lines to produce hybrid bees,¹⁰ marked a new era in bee breeding, allowing beekeepers to increase genetic diversity, which can improve disease resistance and worker productivity.¹¹ The viability of commercial beekeeping and the efficient pollination of one race of honey bee, *Apis mellifera*, led to the specialized agriculture role the honey bee performs.¹²

Today, over 130 crops are dependent on honey bees for pollination, adding more than \$15 billion in crop value annually¹³ and performing more than 80% of pollination on most of our commercial crops.¹⁴ Honey bees also provide us with honey, wax, and other products that are critical to United States agriculture.¹⁵ Additionally, certain crops, such as the almond, are completely dependent on the honey bee for pollination, requiring an estimated 60% of all managed honey bee colonies in the United States.¹⁶ Because of the specialized role that the honey bee plays, a reduction in the number of honey bees would have a devastating effect on United States agriculture, including the inability to support the industry of commercial pollination.

B. *Pollination in Agriculture*

Among all pollinators, the honey bee is unique. It is arguably the most important insect to the human food chain.¹⁷ Our diverse food

8. Everett Oertel, *History of Beekeeping in the United States*, in BEEKEEPING IN THE UNITED STATES AGRICULTURE HANDBOOK NUMBER 335 (1980), available at <http://www.beesource.com/resources/usda/history-of-beekeeping-in-the-united-states/>.

9. *Id.* (explaining that the movable frame hive allowed bees passage between and around combs by keeping space open in the hive; the wax comb foundation made possible the production of high-quality combs of predominantly worker cells; the centrifugal honey extractor made possible large-scale production of extracted honey; and the bee smoker made it possible to control bees by blowing smoke over the hive).

10. *See id.*

11. *See id.*

12. *See id.*

13. *See* Kim Kaplan, *USDA Releases 2010 Honey Bee Colony Collapse Disorder Progress Report*, AGRIC. RESEARCH SERV., U.S. DEP'T OF AGRIC. (Dec. 17, 2010), <http://www.ars.usda.gov/is/pr/2010/101217.htm>.

14. *Hard Times for Honey Bees: Colony Collapse Disorder*, UNIV. OF ARK. DIV. OF AGRIC., <http://www.uaex.edu/farm-ranch/special-programs/beekeeping/hive-pests-diseases.aspx#ccd> (last visited Dec. 12, 2013).

15. *What Honey Bees Do For Us*, PA. APICULTURE, INC., <http://www.nationalhoneybeeday.com/whathoneybeesdo.html> (last visited Dec. 12, 2013).

16. *Honey Bees and Colony Collapse Disorder*, *supra* note 3.

17. Alexei Barrionuevo, *Bees Vanish, and Scientists Race for Reasons*, N.Y. TIMES, Apr. 24, 2007, <http://www.nytimes.com/2007/04/24/science/24bees.html?pagewanted=all>.

supply is heavily dependent upon the honey bee for pollination.¹⁸ In fact, the Agriculture Research Service (“ARS”), the United States Department of Agriculture’s (“USDA”) internal research agency, estimates that “one mouthful in three in our diet directly or indirectly benefits from honey bee pollination.”¹⁹ The honey bee is responsible for pollinating the majority of the fruits, vegetables, nuts, and field crops we consume.²⁰ In addition, cows graze on clover and alfalfa, both of which are pollinated by the honey bee, meaning our supplies of beef and dairy are also highly dependent upon the honey bee.²¹ The honey bee also pollinates non-crop plants essential to the reproduction of the plants themselves.²² The honey bee is so vital to the health of American agriculture that a report released by the USDA and the EPA in late 2012 states that honey bee “pollination contributes to crop production worth \$20 billion–\$30 billion in agricultural production annually.”²³

While other pollinators exist in nature, none perform like the honey bee.²⁴ Unlike most other pollinators, when honey bees sip nectar to fuel their flight, they “actively gather large amounts of pollen” transferring it widely between flowers.²⁵ This supports the finding that “a hive of honey bees can cross-pollinate twenty-five million flowers in a single day.”²⁶

C. *Problems for Honey Bees*

The loss of honey bees is not a new phenomenon.²⁷ Large die-offs of honey bee colonies has occurred in the past.²⁸ In fact, since the 1950s, the number of honey bees has been declining, while the amount of crop acreage requiring honey bee pollination is at an all time high.²⁹ The introduction of mites and pathogens over the past few decades

18. *Hard Times for Honey Bees: Colony Collapse Disorder*, *supra* note 14.

19. *Honey Bees and Colony Collapse Disorder*, *supra* note 3.

20. See *Vanishing Bees*, NATURAL RES. DEF. COUNCIL, <http://www.nrdc.org/wildlife/animals/bees.asp> (last modified Aug. 25, 2008).

21. See Marla Spivak et al., *The Plight of the Bees*, 45 ENVTL. SCI. & TECH. 34 (2011).

22. *Hard Times for Honey Bees: Colony Collapse Disorder*, *supra* note 14.

23. *USDA and EPA Release New Report on Honey Bee Health*, U.S. DEP’T OF AGRIC. (May 2, 2013), <http://www.usda.gov/wps/portal/usda/usdamediafbcontentid=2013/05/0086.xml&printable=true>.

24. Spivak et al., *supra* note 21, at 34 (“Butterflies, some beetles, flies, hummingbirds, and even some bats provide some pollination services.”).

25. *Id.*

26. ROWAN JACOBSEN, *FRUITLESS FALL: THE COLLAPSE OF THE HONEY BEE AND THE COMING AGRICULTURAL CRISIS* 10 (2008).

27. *Hard Times for Honey Bees: Colony Collapse Disorder*, *supra* note 14.

28. *Id.*

29. Spivak et al., *supra* note 21, at 34.

coupled with decreasing supplies of nectar and pollen³⁰ have placed great stress on honey bees and beekeepers.

Disease has always been a source of death for the honey bee dating back to the 1800s.³¹ With the advent of large-scale homogeneous crops after World War II, the lack of diverse nutritional resources has also taken a toll on the honey bee's health.³² Additionally, in the 1980s, two parasites of the honey bee were first introduced to the United States: the tracheal mite and the varroa mite.³³ While the honey bee has developed resistance to the tracheal mite, the varroa mite remains a significant threat.³⁴ The varroa mite reduces the lifespan of the honey bee by transmitting viruses.³⁵ Where the mites do not kill the bee, the viruses will.³⁶ The varroa mite is so devastating that it can destroy an entire colony of honey bees in a matter of months.³⁷ In addition to mites, the fungal gut parasite, *Nosema ceranae*, is also a source of stress on the honey bee, but to date, scientists are unsure how the parasite kills colonies.³⁸

In addition to pests, diseases, and nutritional deficiencies, commercial beekeepers also have to manage annual hive losses. Throughout the 1990s and early 2000s, commercial beekeepers experienced average hive mortality rates of approximately 15–20% per year.³⁹ Due to these annual losses, the need for mobile pollination services has increased.⁴⁰ While some level of annual hive mortality is expected, commercial beekeepers have experienced sharp increases in annual hive loss rates since 2006.⁴¹ With the increased need for honey bee pollination and the decrease in the number of honey bee colonies, keeping up with the demand for pollinators has taken a toll on commercial beekeepers and their bees.⁴²

30. See Deane Morrison, *Trouble in Pollen Nation*, UMNEWS, Apr. 11, 2007, http://www1.umn.edu/news/features/2007/UR_133735_REGION1.html.

31. Spivak et al., *supra* note 21, at 34.

32. *Id.* at 35.

33. *Id.*

34. *Id.*

35. *Id.*

36. Spivak et al., *supra* note 21, at 35.

37. *Id.*

38. *Id.*

39. J. Kim Kaplan, *Colony Collapse Disorder: An Incomplete Puzzle*, 62 AGRIC. RESEARCH 6, 4 (July 2012), <http://www.ars.usda.gov/is/AR/archive/jul12/colony0712.pdf>.

40. *Hard Times for Honey Bees: Colony Collapse Disorder*, *supra* note 14.

41. Kaplan, *supra* note 39, at 4 (“... beekeepers began reporting losses of 30 to 90 percent of the hives in their apiaries with no apparent cause.”).

42. Barrionuevo, *supra* note 17 (“Bee colonies have been under stress in recent years as more beekeepers have resorted to crisscrossing the country with 18-wheel trucks full of bees in search of pollination work.”).

D. *Legal History of Regulations in the United States*

Courts have generally upheld the validity of statutes and other regulations relating to beekeeping and apiaries as a valid exercise of the governing authorities' police power.⁴³ Specifically, statutes regulating the beekeeping industry to prevent the spread of bee diseases are in accord with a state's general police power to destroy diseased animals to prevent the spread of disease and protect the public health and welfare.⁴⁴ Courts have rejected challenges contending that because bee diseases do not harm human beings, statutes regulating apiaries to prevent bee diseases are not a valid exercise of police power.⁴⁵

Federal law authorizes the Secretary of the USDA to prohibit or restrict the importation or entry of honey bees and honey bee semen into or through the United States,⁴⁶ in addition to providing punishment for unlawful honey bee importation.⁴⁷ The authority prescribes such regulations in order to prevent the introduction and spread of diseases and parasites harmful to honey bees, the introduction of genetically undesirable germ plasm of honey bees, and the introduction and spread of undesirable species or subspecies of honey bees and the semen of honey bees.⁴⁸ Federal law also provides the Secretary the authority to eradicate and control undesirable species and subspecies of honeybees.⁴⁹ Programs for honey research, promotion, and consumer information also exist under federal law.⁵⁰

III. THE RECENT DISAPPEARANCE OF HONEY BEES

A. *Colony Collapse Disorder*

While honey bee parasites and diseases have continued to be an issue for beekeepers with occasional bee disappearances and dwindling of colonies in some years, the recent disappearance of honey bees has hit bee populations hard. Beginning in the winter of 2006, some beekeepers began to report unusually high losses of 30–90% of their hives with no apparent cause.⁵¹ Of those beekeepers who reported colony losses, as many as 50% reported colonies that demonstrated symptoms inconsistent with any known causes of honey bee death: sudden loss of a colony's worker bee population with very few

43. State *ex rel.* Jones v. Prettyman, 385 N.W.2d 489, 491–492 (N.D. 1986).

44. *Id.*

45. Graham v. Kingwell, 24 P.2d 488, 489 (Cal. 1933).

46. 7 U.S.C.A. § 281 (West 2014).

47. *Id.* § 282.

48. *Id.* § 281.

49. *Id.* § 284.

50. *Id.* §§ 4601–4613.

51. Kaplan, *supra* note 39, at 4.

dead bees found near the colony.⁵² The queen and brood (young) remained, and the colonies had relatively abundant honey and pollen reserves.⁵³ However, hives cannot sustain themselves without worker bees and would eventually die.⁵⁴ This combination of events, resulting in the loss of a bee colony, is known as CCD.⁵⁵ Since 2006, CCD is responsible for an average of 30% reduction in hives annually in the United States.⁵⁶

Testing to determine the primary cause of CCD has proved difficult, and CCD remains a dire situation not only for the fate of honey bees and the ecosystems that depend on them for pollination, but also for the farmers who require the commercial beekeeper's hives to pollinate their crops.⁵⁷ While there have been many theories about the cause of CCD, including parasites, mites, and bee management stress, no theory has been as prevalent as pesticide poisoning.⁵⁸ The situation for the honey bee is so dire that the ARS has indicated that if losses continue at the current level, "it could threaten the economic viability of the bee pollination industry."⁵⁹

B. *Pesticides as a Cause of CCD*

Pesticides serve a great purpose in the United States aiding the production of crops, but not without significant downsides. United States agriculture requires honey bees for pollination of some 55 of the more than 200 crops grown to produce commercial quantities of seeds and fruits, while more than 806 million pounds of pesticides are used annually to control crop pests.⁶⁰ Inadvertently, pesticide applications adversely affect approximately 20% of all domestic honey bee colonies in the United States each year.⁶¹ This inflicts serious economic losses both to beekeepers and to growers whose crops depend on bee pollination.⁶²

52. See Kim Kaplan, *USDA/AIA Survey Reports 2010/2011 Winter Honey Bee Losses*, AGRIC. RESEARCH SERV., U.S. DEP'T OF AGRIC. (May 23, 2011), <http://www.ars.usda.gov/is/pr/2011/110523.htm>.

53. See *id.*

54. See *id.*

55. See *id.*

56. See *id.*

57. See Spivak et al., *supra* note 21, at 35.

58. *Pesticide Issues in the Works: Honeybee Colony Collapse Disorder*, U.S. ENVTL. PROT. AGENCY (May 15, 2012), <http://epa.gov/pesticides/about/intheworks/honeybee.htm>.

59. *Honey Bees and Colony Collapse Disorder*, *supra* note 3.

60. Arnold L. Aspelin & Arthur H. Grube, *Pesticide Industry Sales and Usage: 1996 and 1997 Market Estimates*, U.S. ENVTL. PROT. AGENCY, 3 (Nov. 1999), http://www.epa.gov/pesticides/pestsales/97pestsales/market_estimates1997.pdf.

61. David Pimentel & Michael Burgess, *Environmental & Economic Costs of the Application of Pesticides Primarily in the United States*, in 3 INTEGRATED PEST MANAGEMENT, PESTICIDE PROBLEMS 47, 56 (2014).

62. See *id.*

Pesticides are broadly defined in the United States Code as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.⁶³ Pesticides used to kill insects are known as insecticides, and those used to kill weeds are known as herbicides.⁶⁴ There are over 18,000 pesticide products in use in the United States, which vary greatly in toxicity.⁶⁵ The EPA regulates the registration of pesticides under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (“FIFRA”).⁶⁶ The EPA also regulates pesticides in conjunction with the Food and Drug Administration (“FDA”) and the USDA under authority of the Federal Food, Drug, and Cosmetic Act (“FFDCA”).⁶⁷ Regulations under the FFDCA pertain to pesticide chemical residue in or on a food.⁶⁸ FIFRA requires the EPA to regulate the sale and use of pesticides in the United States through product registration and labeling.⁶⁹ Registration of a pesticide requires the submission of scientific data by the applicant.⁷⁰ Based on the data submitted, the EPA must consider whether the proposed pesticide would cause “unreasonable adverse effects on the environment.”⁷¹ FIFRA defines “unreasonable adverse effects on the environment” as “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.”⁷² Issues affecting registration of pesticides can include tendency to persist in the environment over time and its ability to accumulate in an animal.⁷³ Additionally, the EPA specifically takes into account unintended consequences to bees, and requires studies to determine toxicity on individual bees.⁷⁴

The honey bee is exposed to these registered pesticides through contact within their own hive—those that are applied to protect bees from diseases—as well as exposure to pesticides applied as a spray on soil or seed treatment and spray drift.⁷⁵ Many pesticides are known to

63. 7 U.S.C.A. § 136(u) (West 2014).

64. *Types of Pesticides*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/pesticides/about/types.htm> (last updated Aug. 5, 2014).

65. Linda-Jo Schierow et al., *Bee Health: The Role of Pesticides*, CONG. RESEARCH SERV. REPORT FOR CONG., 13 (Dec. 11, 2012), <http://beyondpesticides.org/pollinators/documents/CongressionalReportPollinators.pdf>.

66. 7 U.S.C.A. §§ 136(b) & 136a (West 2014).

67. 21 U.S.C.A. § 346a (West 2014).

68. *Id.* §§ 321(hh) & 346a(b).

69. 7 U.S.C.A. § 136a (West 2014).

70. *Id.* § 136a(c)(1)(F).

71. *Id.* § 136a(c)(5)(D).

72. *Id.* §136(bb).

73. Schierow, et al., *supra* note 65, at 14.

74. *Id.*

75. See Daniela Laurino et al., *Toxicity of Neonicotinoid Insecticides to Honey Bees: Laboratory Tests*, in 64 BULLETIN OF INSECTOLOGY 107, 107 (Mar. 24, 2011), <http://www.bulletinofinsectology.org/pdfarticles/vol64-2011-107-113laurino.pdf>.

be acutely toxic to bees, showing both sub-lethal and lethal effects.⁷⁶ According to the National Research Council of the National Academy of Sciences, “[t]he application of pesticides, especially insecticides used to control crop pests, kills or weakens thousands of honey bee colonies in the United States each year.”⁷⁷ While pesticides have historically been known to kill honey bee colonies, one group of insecticides has been blamed heavily for CCD—neonicotinoids.⁷⁸

Neonicotinoids are systemic pesticides that, regardless of application, once taken in by the plant spread to all parts, including pollen, nectar, and flowers.⁷⁹ In the United States, the most common neonicotinoids include clothianidin, imidacloprid, and thiamethoxam.⁸⁰ Additionally, neonicotinoids accounted for almost 25% of the global pesticide market, and imidacloprid was the largest selling insecticide in the world in 2009.⁸¹ Bees can be exposed to neonicotinoids in many ways, especially for honey bees living and foraging near agricultural fields planted with corn or soybeans.⁸² The highest potential exposure to the pesticides appeared to occur during planting season, when bee mortality was also high.⁸³ When tested, clothianidin was detected in all dead and dying bees but in no healthy bees.⁸⁴

Neonicotinoids are insect neurotoxins that vary in strength of effect exerted on honey bees.⁸⁵ They are related to nicotine and were developed as an alternative to highly toxic (to humans) organophosphate insecticides.⁸⁶ Effects on individual bees may be lethal or sub-lethal depending on dose and other conditions of exposure.⁸⁷ The EPA has determined that clothianidin “has the potential to be highly toxic on both a contact and an oral basis” to honey bees.⁸⁸

A recent study indicates sub-lethal effects of neonicotinoid pesticides on honey bee foraging behavior that may impair the navigational and foraging abilities of honey bees.⁸⁹ Other studies have found impaired brood development⁹⁰ and increased susceptibility to

76. *Id.*

77. NAT'L RESEARCH COUNCIL, STATUS OF POLLINATORS IN NORTH AMERICA 79 (2007), available at http://www.nap.edu/openbook.php?record_id=11761&page=R1.

78. See Laurino et al., *supra* note 75.

79. United Nations Env't Program, *Global Honey Bee Colony Disorders and Other Threats to Insect Pollinators*, 7 (2010), http://www.unep.org/dewa/Portals/67/pdf/Global_Bee_Colony_Disorder_and_Threats_insect_pollinators.pdf.

80. Schierow, *supra* note 65, at 18.

81. *Id.*

82. *Id.*

83. *Id.* at 18–19.

84. *Id.* at 19.

85. See Laurino et al., *supra* note 75.

86. Schierow et al., *supra* note 65, at 20.

87. See Laurino et al., *supra* note 75.

88. Schierow et al., *supra* note 65, at 20.

89. See Laurino et al., *supra* note 75.

90. Judy Y. Wu et al., *Sub-lethal effects of Pesticide Residues in Brood Comb on Worker Honey Bee (*Apis mellifera*) Development and Longevity*, PLOS ONE 6(2), 4

various diseases (such as the common gut pathogen *Nosema ceranae*) in honey bees exposed to sub-lethal levels of varying pesticide residues.⁹¹

By 2012, officials in France and elsewhere in Europe had concluded that the neonicotinoid group of insecticides were either causing or contributing to the decline of bee populations.⁹² In early January 2013, the European Food Safety Authority (“EFSA”) issued a report, requested by the European Commission, on the affects of neonicotinoids on the lives of bees.⁹³ The report identified a “number of risks posed to bees.”⁹⁴ Prompted by the report, the European Commission proposed restrictions on three insecticides in the neonicotinoid family.⁹⁵ While some countries voluntarily restricted or banned neonicotinoid insecticides, the Commission’s proposal went further than any national measures, and would apply to all twenty-seven members of the European Union (“EU”).⁹⁶ Pesticide companies argued that the evidence offered was inconclusive.⁹⁷ As a result, the proposed ban failed in March 2013 due to lack of support from Britain and Germany.⁹⁸

However, in April 2013 the proposal once again came up for a vote. The member-states failed to reach a binding agreement, which allowed Tonio Borg, Health and Consumer Commissioner for the European Commission, to exercise his right to make the final decision and approve the ban.⁹⁹ Pesticide companies objected, saying that the data was insufficient and that the ban would equal setbacks for technology and for farmers.¹⁰⁰ Despite objections, the ban took effect December 1, 2013, and restricts the use of three neonicotinoid pesticides on

(Feb. 23, 2011), available at <http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0014720&representation=PDF>.

91. Jeffery S. Pettis et al., *Crop Pollination Exposes Honey Bees to Pesticides Which Alters Their Susceptibility to the Gut Pathogen *Nosema ceranae**, PLOS ONE 8(7), 1 (July 24, 2013), available at <http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0070182&representation=PDF>.

92. Press Release, European Food Safety Auth., EFSA Identifies Risks to Bees from Neonicotinoids (Jan. 16, 2013), available at <http://www.efsa.europa.eu/en/press/news/130116.htm>.

93. *Id.*

94. *Id.*

95. Matthew Dalton, *EU Proposes Limits on Insecticides Suspected in Bee Deaths*, WALL ST. J., Jan. 31, 2013, online.wsj.com/news/articles/SB10001424127887323926104578276040318770624.

96. *See id.*

97. Damian Carrington, *Bee-Harming Pesticides Escape Proposed European Ban*, GUARDIAN, Mar. 15, 2013, <http://www.theguardian.com/environment/2013/mar/15/bee-harming-pesticides-escape-european-ban>.

98. *See id.*

99. David Jolly, *Europe Bans Pesticides Thought Harmful to Bees*, N.Y. TIMES, Apr. 29, 2013, http://www.nytimes.com/2013/04/30/business/global/30iht-eubees30.html?_r=1&.

100. *Id.*

plants that are attractive to bees.¹⁰¹ The ban is set to last for two-years, at which time Commission officials can re-examine approval of the pesticides based on “relevant scientific and and technical developments.”¹⁰² Under the ban, pesticides will still be allowed for use in specific circumstances where the threat to bees is minimal.¹⁰³

Alarminglly, the EPA still has not addressed the risks of neonicotinoids on honey bees. In fact, at the same time of the EU ban on neonicotinoids, the United States EPA approved a new pesticide known to be “highly toxic” to honey bees; a systemic pesticide known as sulfoxaflor (considered by many to be a fourth-generation neonicotinoid).¹⁰⁴ The decision to approve the pesticide came at a time when the United States honey bee population had reached a fifty-year low.¹⁰⁵ Moreover, the EPA approved the pesticide just after the USDA issued a report highlighting the continual large-scale death of honey bees,¹⁰⁶ and despite the agency’s own scientists labeling the pesticide as “very highly toxic” to honey bees.¹⁰⁷ The EPA’s approval of sulfoxaflor forms the basis of the complaint in *Pollinator Stewardship Council v. U.S. Envtl. Prot. Agency*¹⁰⁸ discussed in Section III D.

C. Governmental Response to CCD

In June 2007, the USDA announced its action plan designed to help combat the devastating effects of CCD on a federal government level.¹⁰⁹ Four main components were addressed: (1) survey and data collection needs; (2) analysis of samples to determine the prevalence of parasites, diseases or pesticide exposure; (3) experiments to analyze the possible causes of CCD; and (4) mitigation and prevention through developing ways to improve bee health.¹¹⁰ Various research arms of the USDA and the entomology departments of several universities across the nation are involved in the Colony Collapse Steering Committee.¹¹¹ The Committee will consider the report’s recommendations and update the CCD Action Plan, which will out-

101. *Id.*

102. *Id.*

103. *Id.*

104. *U.S. Approves New Pesticides Linked to Mass Bee Deaths as EU Enacts Ban*, RT.COM, May 12, 2013, <http://rt.com/usa/new-pesticides-linked-bee-deaths-130/>.

105. *Id.*

106. NAT’L HONEY BEE HEALTH STAKEHOLDER CONFERENCE STEERING COMM., *Report on the National Stakeholders Conference on Honey Bee Health*, U.S. DEP’T OF AGRIC., 1 (2012), <http://www.usda.gov/documents/ReportHoneyBeeHealth.pdf>.

107. Brief for Petitioner at 1, *Pollinator Stewardship Council v. U.S. Envtl. Prot. Agency*, No. 13-72346 (9th Cir. Dec. 6, 2013), 2013 WL 6632180.

108. *See id.*

109. CCD STEERING COMMITTEE, *Colony Collapse Disorder Action Plan*, AGRIC. RESEARCH SERV., U.S. DEP’T OF AGRIC., 1 (June 20, 2007), http://www.ars.usda.gov/is/br/ccd/ccd_actionplan.pdf.

110. *Id.*

111. *Id.*

line major priorities to be addressed in the next five to ten years and serve as a reference document for policy makers, legislators, and the public, and will help coordinate the federal strategy in response to honey bee losses.¹¹² The USDA also implemented a four-year long Managed Pollinator Coordinated Agricultural Project (“CAP”) providing more funding for honey bee research that began in 2008,¹¹³ including \$4 million for research on the health of managed honey bees.¹¹⁴

The Pollinator Protection Act of 2007 was introduced to the House of Representatives in March 2007 as House Bill 1709 to authorize resources for the research of CCD in an effort to prevent heavy reliance on imported food from becoming a reality.¹¹⁵ The Bill included allocation of funds for research, new personnel and facility improvements, and identifying and combating causes of CCD.¹¹⁶ A similar version of the Pollinator Protection Act, the Pollinator Habitat Protection Act of 2007, was introduced to the Senate in July 2007 as Senate Bill 1694 with minor changes to the funding scheme.¹¹⁷ Both Bills sought to increase habitat for both native and managed pollinators and encourage practices that protect the nation’s pollinators.¹¹⁸

The Pollinator Protection Act and the Pollinator Habitat Protection Act were incorporated into one version of the Farm, Nutrition, and Bioenergy Act of 2007.¹¹⁹ Unfortunately, conservation budgets were cut and economic incentives for farmers who managed their land in a bee-friendly manner were cut from the final version of the Bill.¹²⁰ This final version of the Bill, which eventually became the Food, Conservation and Energy Act of 2008, also known as the 2008 Farm Bill, was passed into law over President Bush’s veto in June 2008.¹²¹ The five-year Farm Bill authorizes—but does not guarantee—\$20 million

112. NAT’L HONEY BEE HEALTH STAKEHOLDER CONFERENCE STEERING COMM., *supra* note 106, at vii.

113. Jennifer Martin, *USDA Announces New Funding for Bee Health and Protection*, U.S. DEP’T OF AGRIC., (Sept. 11, 2007), <http://www.csrees.usda.gov/newsroom/news/2007news/pollinatorcap.html>.

114. *Id.*; see also Keith S. Delaplane, *Managed Pollinator CAP*, UNIV. OF GA., <http://www.beecdcap.uga.edu/index.html>.

115. Pollinator Protection Act, H.R. 1709, 110th Cong. § 2(2)–(4) (2007).

116. *Id.*

117. Pollinator Habitat Protection Act of 2007, H.R. 2913, 110th Cong. § 2(a) (2007).

118. *Id.*

119. Farm, Nutrition, and Bioenergy Act of 2007, H.R. 2419, 110th Cong. § 11315 (2007).

120. Alison Benjamin, *Last Flight of the Honeybee?*, GUARDIAN, May 30, 2008, <http://www.theguardian.com/environment/2008/may/31/animalwelfare.environment>.

121. See McCLATCHY-TRIBUNE, *Bee Colony Loss Considered a ‘Crisis,’* BALTIMORE SUN, June 27, 2008, http://articles.baltimoresun.com/2008-06-27/news/0806260197_1_bee-colony-colony-collapse-disorder-bee-related; 7 U.S.C.A. § 5925 (West 2014).

in new funding for bee related studies.¹²² The Bill also made it possible for additional research to be funded through other accounts, and required the USDA to report on the status of any pollinator research.¹²³ The funding seems miniscule when compared to the more than \$43 billion that was allocated to subsidize such crops as corn, cotton, soybeans, and wheat at a time when prices for these crops were at record highs,¹²⁴ and honey bee numbers were plummeting.¹²⁵ Though the 2008 Farm Bill was the first farm bill to directly prioritize pollinators in USDA administered programs,¹²⁶ let alone mention the word “pollinator,”¹²⁷ it did not live up to its full potential—funding for the bee health research provision was never fully appropriated.¹²⁸

The Agriculture Act of 2014, the 2014 Farm Bill, was signed into law on February 7, 2014.¹²⁹ The Bill reauthorized and expanded many of the existing Farm Bill provisions. Once again, pollinator protection was a pressing issue. Section 11315 was offered as an amendment to the Farm Bill in an effort to ensure the long-term viability of populations of honey bees, wild bees, and other beneficial pollinators.¹³⁰ The amendment bore a striking resemblance to the Pollinator Protection and Pollinator Habitat Protection Acts of 2007. The amendment passed the House by an overwhelming margin of 273–149, and included over fifty-eight businesses and organizations in support of the provision.¹³¹ A nearly identical version was introduced to the Senate, but was never brought up for a vote.¹³² Unfortunately, the Bill dropped the provision that would have funded research into protecting pollinators,¹³³ leaving honey bees on the losing end yet again.

In 2013, the EPA took steps to change pesticide labels to limit applications to protect bees and to be more clear and precise.¹³⁴ The EPA is taking immediate steps to require new labeling on neonicotinoid

122. McCLATCHY-TRIBUNE, *supra* note 121.

123. *Id.*

124. See Martin Khor, *New US Farm Bill Will Anger the World*, THIRD WORLD NETWORK, May 19, 2008, <http://www.twinside.org.sg/title2/gtrends/gtrends206.htm>.

125. McCLATCHY-TRIBUNE, *supra* note 121.

126. Spivak et al., *supra* note 21, at 37.

127. McCLATCHY-TRIBUNE, *supra* note 121.

128. Spivak et al., *supra* note 21, at 37.

129. Agriculture Act of 2014, H.R. 2642, 113th Congress (2014).

130. Letter from the Honorable Debbie Stabenow et. al., to Senate Conferees (Oct. 23, 2013), *available at* http://pollinatorstewardship.org/wp-content/uploads/2013/11/PollinatorProtection_SenateConfereesLetter_10.23.13.pdf.

131. *Id.*

132. Amanda Peterka, *Bees Get Short Shrift in Farm Bill*, AM. BEEKEEPING FED’N, Feb. 5, 2014, <http://abfnet.org/displaycommon.cfm?an=1&subarticlenbr=271>.

133. Katie Valentine, *What the New Farm Bill Means for Energy and the Environment*, THINKPROGRESS, Jan. 29, 2014, <http://thinkprogress.org/climate/2014/01/29/3218151/farm-energy-environment/>.

134. *Pollinator Protection: EPA Actions to Protect Pollinators*, U.S. ENVTL. PROT. AGENCY, <http://www2.epa.gov/pollinator-protection/epa-actions-protect-pollinators> (last updated Sept. 11, 2014).

pesticides to improve protection for bees,¹³⁵ with a goal to have the labels on as many products as possible for the 2014 use season.¹³⁶ In January 2014, the EPA also awarded almost half a million dollars in funding to three universities for projects to reduce pesticide risk, including risks to bees.¹³⁷ The grants aim at improving Integrated Pest Management (“IPM”) practices to reduce the use of potentially harmful pesticides and lower risk to bees all while controlling pests and saving money.¹³⁸

D. CCD in the Courts

The first major attempt to address CCD in the courts involved commercial beekeepers Jeffrey Anderson and Steven Ellis. The beekeepers brought suit against the State of Minnesota, Department of Natural Resources (“DNR”), and International Paper, Co., Inc., asserting claims of trespass, nuisance, common-law negligence, and negligence per se for spraying pesticides on tree groves owned or managed by the defendants which led to the death of plaintiffs’ honey bees being kept on neighboring land.¹³⁹ The District Court entered summary judgment for the Minnesota DNR on all claims except for the negligence claim related to pesticide overspray.¹⁴⁰ The beekeepers appealed, and the Minnesota Court of Appeals reversed the denial of the dismissal of the overspray claim and affirmed the remaining claims, thereby granting summary judgment to the Minnesota DNR on all claims.¹⁴¹ The Supreme Court of Minnesota granted review and found that the beekeepers had a right to sue a private property owner who sprayed a popular pesticide made with the chemical carbaryl on their land, but did so knowing honey bees were foraging there and would be killed by the poison.¹⁴² The Court then sent the case back to the District Court at which point the pesticide users offered to settle and the Minnesota DNR opted to stop using the pesticide.¹⁴³ Though the suit was successful, hives once again began dwindling in the late

135. *Id.*

136. Letter from Steven Bradbury, Director, U.S. Env’tl. Prot. Agency, to Registrants of Nitroguanidine Neonicotinoid Products (July 22, 2013), *available at* <http://www2.epa.gov/sites/production/files/2013-11/documents/bee-july2013-letter.pdf>.

137. News Release, EPA, EPA Awards Almost Half a Million in Funding to Three Universities for Projects to Reduce Pesticide Risk Including Risks to Bees (Jan. 8, 2014), *available at* <http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceac8525735900400c27/a5c495f5bc4d4ba285257c5a005aaa35!OpenDocument> (announcing grants to Louisiana State, Penn State and Univ. of Vermont).

138. *Id.*

139. *Anderson v. State, Dep’t of Natural Res.*, 674 N.W.2d 748, 751–52 (Minn. Ct. App. 2004).

140. *Id.* at 752–53.

141. *Id.* at 760.

142. *Anderson v. State, Dep’t of Natural Res.*, 693 N.W.2d 181, 187–90 (Minn. 2005).

143. *Id.* at 192.

2000s and Ellis was forced to return to the courts—this time to sue the United States EPA.¹⁴⁴

In March 2013, several beekeepers, including Ellis, and environmental groups, filed suit against the EPA for failing to protect honey bees (*Ellis v. Bradbury*).¹⁴⁵ Plaintiffs include four commercial beekeepers and non-profit agencies Center for Food Safety, Beyond Pesticides, the Sierra Club, Pesticide Action Network North America, and the Center for Environmental Health who collectively filed the suit in federal court in late March against the EPA to stop the use of pesticides containing two active ingredients that are believed to be killing bee colonies.¹⁴⁶ The suit not only attempts to eliminate the use of neonicotinoid pesticides containing the ingredients clothianidin and thiamethoxam, which damage the central nervous system of insects, but to challenge the way the EPA approves pesticides.¹⁴⁷ If successful, the suit could change the way pesticides are marketed in the United States.

Complaints against pesticide registration must be brought to the EPA.¹⁴⁸ As explained in Section III B, FIFRA tasks the EPA with regulating the use and sale of pesticides to protect humans and the environment.¹⁴⁹ When registering pesticides, the EPA can “conditionally” approve products when it comes to putting pesticides on the market.¹⁵⁰ Essentially this conditional approval allows for pesticide use with the understanding that additional scientific data is needed before final registration can be approved.¹⁵¹ According to the complaint, plaintiffs contend this process has been abused.¹⁵² For the EPA, the complaint represents one of the first major attempts to address the CCD phenomenon through the courts.

While the EPA has not specifically addressed the suit, it states on its website that the cause of CCD is unclear and could range from “varroa mites” and “Israeli Acute Paralysis virus” to “bee management stress” and pesticides, among other problems.¹⁵³ According to the complaint, thiamethoxam and clothianidin were conditionally registered in 2000 and 2003 respectively.¹⁵⁴ There are no set deadlines for conditionally registered products to be reviewed, and more than a decade later, the requirement for basic scientific studies on the impact

144. Complaint at 1, *Ellis v. Bradbury*, No. C131266 (N.D. Cal. Mar. 21, 2013), 2013 WL 1164622.

145. *Id.*

146. *Id.*

147. *Id.*

148. 7 U.S.C.A. § 136a(c)(1)(F)(iii) & (2)(B)(iii) (West 2014).

149. *See id.* §§ 136a(c)(5)(D) & 136(bb).

150. *Id.* § 136a(c)(7)(A)–(C).

151. *Id.*

152. Complaint, *Ellis*, *supra* note 144, at 2.

153. *Pesticide Issues in the Works: Honeybee Colony Collapse Disorder*, *supra* note 58.

154. Complaint, *Ellis*, *supra* note 144, at 28.

of the insecticides has gone unmet.¹⁵⁵ Among the outstanding studies, the complaint contends that the EPA has not fulfilled its stated requirement to “complete [a] worker bee life cycle study . . . as well as an evaluation of exposure and effect to the queen.”¹⁵⁶ The suit also argues that the EPA has denied that certain uses of clothianidin pose an “imminent hazard” to honey bees and made this final determination without considering new data about bee kills.¹⁵⁷ Additionally, the suit claims that the EPA repeatedly failed to publically announce new or changed uses of the pesticides.¹⁵⁸ If this claim is found to be true, it could provide some relief for beekeepers. When it was found in recent similar cases that the EPA failed to meet public notice requirements, those pesticide registrations were in part withdrawn.¹⁵⁹

On July 2, 2013, new litigation filed by the National Pollinator Defense Fund, Inc. was filed in the Ninth Circuit Court of Appeals against the United States EPA (*Nt'l Pollinator Defense Fund, Inc. v. U.S. Env'tl. Prot. Agency*).¹⁶⁰ On November 6, 2013, an order was granted to amend the list of parties by substituting Pollinator Stewardship Council (“PSC”) for the National Pollinator Defense, Inc., to reflect the organization’s legal name change (*Pollinator Stewardship Council v. U.S. Env'tl. Prot. Agency*).¹⁶¹ According to Petitioners’ brief filed December 6, 2013, the lawsuit adds to *Ellis v. Bradbury* and challenges the EPA’s May decision to approve sulfoxaflor.¹⁶² As discussed in Section III B, sulfoxaflor is a systemic pesticide (considered by many to be a fourth-generation neonicotinoid) associated with CCD worldwide.¹⁶³ The PSC is a group of beekeepers filing suit, requesting the court vacate the EPA’s decision to register sulfoxaflor.¹⁶⁴ The PSC claims the EPA violated FIFRA when it failed to show its registration of sulfoxaflor would not cause any “unreasonable adverse effects on the environment.”¹⁶⁵ FIFRA defines “unreasonable adverse effects on the environment” as “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.”¹⁶⁶ The PSC

155. *Id.*

156. *Id.* at 27.

157. *Id.* at 18–19.

158. *Id.* at 23–24.

159. Complaint, *Ellis*, *supra* note 144, at 27.

160. Complaint, *Nt'l Pollinator Defense Fund, Inc. v. U.S. Env'tl. Prot. Agency*, No. 13-72346 (9th Cir. July 2, 2013).

161. Order, *Pollinator Stewardship Council v. U.S. Env'tl. Prot. Agency*, No. 13-72346 (9th Cir. Nov. 16, 2013).

162. Brief for Petitioner, *Pollinator Stewardship Council*, *supra* note 107, at 5.

163. *U.S. Approves New Pesticides Linked to Mass Bee Deaths as EU Enacts Ban*, *supra* note 104.

164. Brief for Petitioner, *Pollinator Stewardship Council*, *supra* note 107, at 6.

165. See 7 U.S.C.A. § 136a(c)(5)(D) (West 2014).

166. *Id.* §136(bb).

claims the EPA did not meet this obligation when it failed to explain how the benefits of the use of sulfoxaflor outweigh any risks.¹⁶⁷

On December 13, 2013, the Center for Food Safety, along with several other nonprofit, public interest organizations, filed a brief of amici curiae in support of petitioners to assist the court in making a determination on the case by providing additional law, data, arguments, and facts not included in the petitioners' brief.¹⁶⁸ The amici curiae focuses on whether the EPA's registration of sulfoxaflor was supported by substantial evidence given that the EPA offered only that sulfoxaflor has "some benefits . . . when compared to the alternatives," and ignored the potential costs of registration.¹⁶⁹

There is no indication as to how the courts may rule as this is a case of first impression (*Anderson* dealt with negligence for spraying pesticides¹⁷⁰). Just as important is the question of how the EPA will weigh its legal obligations. If the courts find that the EPA has not met its obligation to regulate the sale and use of pesticides according to FIFRA, it could mean a number of things for the EPA, including a new pesticide approval process. If the courts find that the EPA has met its obligations under FIFRA, it could be devastating for the future of honey bees. Given that on the one hand, neonicotinoids are used on corn, cereals, and sugar beets (among other major agricultural crops), and on the other that one-third of our diet is dependent on bee pollination,¹⁷¹ the stakes are enormous.

V. PROPOSED MEASURES

A. *The Need for Action*

The United States had as many as 6 million honey bee colonies in 1947, with declines since that time to about 4 million in 1970 and 3 million in 1990.¹⁷² Today's colony strength is about 2.5 million.¹⁷³ Since the onset of CCD, losses for commercial beekeepers ranged from approximately 28–33% between 2007 and 2011 and were reported as 22% in 2012.¹⁷⁴ These losses far exceed the historical rate (approximately 10–15%) and represent a threat to both beekeepers and to agricultural crops that rely upon pollination by the honey bee.¹⁷⁵ A 30% loss of the 2.5 million colonies would leave only 1.75

167. Brief for Petitioner, *Pollinator Stewardship Council*, *supra* note 107, at 36–37.

168. Brief for Center for Food Safety et. al. as Amici Curiae Supporting Petitioners at 1, *Pollinator Stewardship Council v. U.S. Evtl. Prot. Agency*, No. 13-72346 (9th Cir. Dec. 13, 2013), 2013 WL 6729427.

169. *Id.* at 19–21.

170. *Anderson*, 693 N.W.2d at 185.

171. *Hard Times for Honey Bees: Colony Collapse Disorder*, *supra* note 14.

172. NAT'L HONEY BEE HEALTH STAKEHOLDER CONFERENCE STEERING COMM., *supra* note 106, at 5.

173. *Id.*

174. *Id.* at 6.

175. *Id.* at 1.

million colonies, a number that is unsustainable and would reap havoc on the United States agriculture system as we know it, as evidenced by the 1.5 million to 1.7 million colonies currently needed to pollinate almonds alone.¹⁷⁶ Monetarily, since 2006, an estimated 10 million bee hives valued at \$200 each have been lost at a total replacement cost of \$2 billion.¹⁷⁷ This cost has been borne by beekeepers alone.¹⁷⁸

The EPA has recently taken action to protect pollinators.¹⁷⁹ As part of this action plan, the EPA is taking immediate steps to change pesticide labels to better protect bees by providing clearer application instructions.¹⁸⁰ The EPA explains it is taking steps to “change pesticide labels to limit applications to protect bees and to be more clear and precise.”¹⁸¹ As a point of clarification, these labels pose no penalties, but merely provide clarification that “pesticide products can kill bees and pollinators,” and instruct the user to minimize the exposure and drift of the product to bees. How exactly to go about preventing “exposure” and “drift” to bees is not explained, but rather left to the consumer to determine.¹⁸²

Additionally, the label also states to “follow application restrictions found in the directions for use.”¹⁸³ These *separate* restrictions from the label “prohibit certain pesticide use when bees are present.”¹⁸⁴ However, there is no current regulation of these restrictions, and as discussed in Section III B, once neonicotinoids pesticides are taken in by a plant, they spread to the entire plant, making exposure to honey bees possible long after the pesticide has been sprayed.¹⁸⁵ The EPA’s “actions to protect pollinators,” also includes a component to work and collaborate with partners, and to develop new technologies based on *future* research.¹⁸⁶

Despite the EPA’s action to protect pollinators, in February 2014, the EPA unconditionally approved another pesticide known to be “highly toxic” to bees despite concerns from beekeepers and environmental groups.¹⁸⁷ Cyantraniliprole is a systemic insecticide like neonicotinoids that works by impairing the regulation of muscle

176. *Id.* at 5.

177. NAT’L HONEY BEE HEALTH STAKEHOLDER CONFERENCE STEERING COMM., *supra* note 106, at 1–2.

178. *Id.* at 2.

179. *See Pollinator Protection: EPA Actions to Protect Pollinators*, *supra* note 134.

180. THE NEW EPA BEE ADVISORY BOX, <http://www2.epa.gov/sites/production/files/2013-11/documents/bee-label-info-graphic.pdf> (last visited Mar. 12, 2014).

181. *Pollinator Protection: EPA Actions to Protect Pollinators*, *supra* note 134.

182. THE NEW EPA BEE ADVISORY BOX, *supra* note 181.

183. *Id.*

184. *Id.*

185. *See Laurino et al.*, *supra* note 75.

186. *Pollinator Protection: EPA Actions to Protect Pollinators*, *supra* note 134.

187. *As Bees Decline, EPA Registers Another Toxic Insecticide*, BEYOND PESTICIDES, Feb. 7, 2014, <http://www.beyondpesticides.org/dailynewsblog/?p=12741> (“ . . . EPA has given the green light for cyantraniliprole . . .”).

contractions causing paralysis and eventual death in insects.¹⁸⁸ Despite these findings, the EPA has registered cyantraniliprole as a seed treatment although it is considered “highly toxic on acute and oral contact basis” for bees.¹⁸⁹ The EPA’s registration of a new active ingredient that shows a propensity for endocrine disruption in honey bees is cause for alarm.

Protection of the honey bee is essential given their importance in the ecosystem and the food chain, in addition to the multiple services they provide to humans. The EPA is responsible for improving human health and the environment, and therefore plays an important role in ensuring honey bee survival. Additionally, FIFRA requires the EPA to regulate the sale and use of pesticides in the United States through product registration and labeling.¹⁹⁰ As discussed, the EPA has not adequately dealt with the issue, and with honey bee die offs remaining at unsustainable rates over the past eight years,¹⁹¹ time is of the essence. The need for urgency was stressed by entomologist Jeff Pettis, research leader of the Bee Research Laboratory of the USDA-ARS,¹⁹² when he recently stated, “We are one poor weather event or high winter bee loss away from a pollination disaster.”¹⁹³

B. *Needed Pesticide Regulation*

Many state agriculture departments, including those of Oregon, Washington, Idaho, and California, recognize that pesticides pose a great risk to honey bees, and have imposed regulations to reduce harm to bees as a result.¹⁹⁴ State regulations include: restricting the spraying of bee-pollinated crops during bloom times¹⁹⁵ and at certain times of day when pesticide applications are known to be toxic to bees;¹⁹⁶ improving communication between beekeepers and growers applying pesticides;¹⁹⁷ and prohibiting pesticides that are toxic to bees in designated areas that contain bee-pollinated crops.¹⁹⁸ However, while states can try to prevent the spread of CCD with pesticide regulation, state regulation is not enough.

The EPA and its extensions should take the lead in implementing regulations that protect honey bees from pesticides on a national

188. *Id.*

189. *Id.*

190. 7 U.S.C.A. §136a (West 2014).

191. *Honey Bees and Colony Collapse Disorder*, *supra* note 3.

192. Kaplan, *supra* note 39, at 4.

193. NAT’L HONEY BEE HEALTH STAKEHOLDER CONFERENCE STEERING COMM., *supra* note 106, at 5.

194. Loulsa Hooven et al., *How to Reduce Bee Poisoning From Pesticides*, OR. STATE UNIV. PAC. N.W. EXTENSION, 4 (Sept. 2013), <http://www.orsba.org/htdocs/download/pnw591r.pdf>.

195. CAL. CODE REGS. tit. 3, §§ 6654 & 6656 (2014).

196. *Id.* § 6650(b)–(c).

197. *Id.* § 6652(a).

198. *Id.* § 6656(a).

level. As the agency tasked with health and the environment, and the regulators of pesticide registration, the survival of the honey bee falls squarely on the shoulders of the EPA. Just as the identification of the risks of neonicotinoids on bees led to an ultimate ban of these pesticides by the EC, the EPA has a responsibility to do the same in the United States.

While the EPA still questions the role pesticides play in CCD,¹⁹⁹ current research indicates pesticides are in fact linked to CCD,²⁰⁰ making pesticide regulation important to keeping the managed bee population at strong levels. Even if pesticides are not a factor in CCD, bees are often poisoned by the spraying of insecticides on blooming plants pollinated by bees,²⁰¹ and restricting their use around bees could mean less colony losses in a time when the decline of bees has become a major concern. Preventable deaths should not be allowed to occur while our need for bees to pollinate crops grows and the number of managed colonies declines.

As previously discussed, the EPA has taken some steps to protect pollinators. While these measures do not solve all of the dangers that pesticides present, they are a step in the right direction. Along with additional measures, these actions could form the framework of a national pesticide regulation plan. While a complete ban on pesticides may not be necessary, certain measures are.

First, the EPA should improve its recent change to pesticide labels to include application restrictions on the label, as well as the implementation of penalties for misuse. Currently, the question of liability for damages to honey bees has often been addressed in the context of pesticides drifting from a landowner's property to a beekeeper's property, as well as classical nuisance.²⁰² Case law seems to indicate the capacity for spillover of damages caused by drifting pesticides with a growing recognition that drift damage is not simply a matter of poor aim or miscalculation of wind direction, and that damage is an inescapable component of the technology.²⁰³ However, the legal varia-

199. Pollinator Protection: EPA Actions to Protect Pollinators, *supra* note 134.

200. Dina Spector, *Scientists May Have Finally Pinpointed What's Killing All the Honeybees*, BUSINESS INSIDER, May 13, 2014, <http://www.businessinsider.com/harvard-study-links-pesticides-to-colony-collapse-disorder-2014-5>.

201. *Pesticide Issues in the Works: Honeybee Colony Collapse Disorder*, *supra* note 58.

202. See *Mace v. Roberts*, 722 P. 2d 595 (Kan. App. 1986) (Decision Without Published Opinion) (reversing directed verdict for plaintiff because defendant owed no duty of care); *Bennett v. Larsen Co.*, 114 Wis. 2d 265, 338 N.W.2d 510 (Wis. App. 1983) (no recovery); *Lundberg v. Bolon*, 67 Ariz. 259, 194 P.2d 454 (1948) (recovery).

203. See *Marino v. Platt*, 428 N.Y.S.2d 433 (N.Y. 1980) (explaining drift is inevitable in mosquito-spraying program and the village need take only reasonable precautions); *Dickinson Air Serv., Inc. v. Kadrmas*, 397 N.W.2d 55, 57 (N.D. 1986) (explaining that it is "practically impossible" to avoid drift and that the court enforces 60-day notice of claim provision); *Langan v. Valicopters, Inc.*, 567 P.2d 218, 222 (Wash. 1977) ("In the opinion of leading scientists who are working to alleviate the

tions on relief are infinite creating a true legal kaleidoscope. Causation serves as the vehicle for apportioning accountability between the source of the exposure and the victim, and in pesticide technology making the connection between the action and the damage is a demanding scientific and legal challenge. There are many links in the chain of legal causation, and case law underscores the ambiguities at every stage. As such, the uncertainties that surround liability for damages do little to deter against misuse. Enforcement of misuse of pesticides, whether it is through more clearly defined case law, fines, or a combination of measures, would create the needed incentives for users to comply with application restrictions. Additionally, educating the public on the risks of pesticides to bees, proper application of pesticides, and alternatives to pesticides should be included as a component.

Home-improvement retailers also play an important role in the sale of neonicotinoids. In February 2014, petitions with thousands of signatures were delivered to home-improvement retailers demanding they stop selling neonicotinoid pesticides.²⁰⁴ A representative from one major home-improvement store, Home Depot, stated the company is working on an alternative to neonicotinoid pesticides, and that several of the retailer's suppliers are already providing replacements.²⁰⁵ Home-improvement retailers should continue to advance these products as a replacement for neonicotinoid pesticides for home garden use. Retailers should also ensure vegetable and bedding plants are free from pretreatment with neonicotinoids. Again, educating customers on the decision to offer neonicotinoid free products is another crucial component needed for success.

Next, as previously discussed, many environmental organizations and beekeepers contend that the EPA is not living up to the pesticide registration requirements set forth in FIFRA to analyze potential unreasonable effects a pesticide may have on the environment. The courts will have the opportunity to look carefully at these claims when they review *Ellis* and *Pollinator Stewardship Council*. When reviewing these cases, the courts should consider the potential risks of pesticides to the United States agriculture industry, and hold the EPA to the strict pesticide registration standards outlined in FIFRA. Additionally, as part of pesticide registration, the EPA should implement new data requirements and risk assessment approaches for pollinators as they review the registrations of all pesticides that are toxic to bees,

dangers of crop dusting, it is impossible to eliminate drift with present knowledge and equipment . . . imposing strict liability for drift damage." (quoting *Crop Dusting: Legal Problems in a New Industry*, 6 STAN. L. REV. 69, 75 (1953)).

204. Mark Koba, *Home Depot, Lowe's Swarmed by Bee Activists*, NBC NEWS, Feb. 14, 2104, <http://www.nbcnews.com/business/consumer/home-depot-lowes-swarmed-bee-activists-n30531>.

205. *Id.*

especially neonicotinoids. This should include an assessment of sub-lethal effects potentially affecting colony health as even low-level exposure can lead to compromised immune system and impaired foraging ability.²⁰⁶

The EPA should also implement IPM practices to reduce the use of potentially harmful pesticides and lower risk to bees. IPM relies on easy-to-implement, environmentally-sensitive practices that prevent pests from becoming a threat.²⁰⁷ These practices involve monitoring and identifying pests and taking preventive action before pesticides are used. IPM makes it possible to control pests while saving money.²⁰⁸ The use of pesticides should be a last resort, and the use of neonicotinoid pesticides for cosmetic purposes on ornamental and landscape plants and other unnecessary uses need complete banishment. If pesticides are needed for certain plants that are hosts for invasive pests, methods such as targeted spraying and minimizing the number of treatments should be implemented.²⁰⁹

Additionally, when pesticides are needed, the EPA should implement regulations that do not allow the spraying of pesticides that are toxic to bees on any bee-pollinated crops during bloom season. Not only would this improve beehive health, it would also remove stressors to bees that are proven to diminish the bee's immune system.²¹⁰ Additionally, as provided for in the California state regulations,²¹¹ communication between beekeepers and growers spraying pesticides should be mandated.

Furthermore, the EPA should collaborate with the USDA to implement new technologies that reduce pesticide dust drift. Pesticide drift poses a major threat of exposure to the honey bee.²¹² A recent study identified multiple routes of exposure to neonicotinoids for honey bees living and foraging near agriculture fields planted with corn or soybeans.²¹³ The study found that not only are honey bees exposed to neonicotinoids through contact with soil and seeds treated with neonicotinoids, but also through exhaust materials when pesticides are

206. Timothy Brown et al, *Gardeners Beware: Bee-Toxic Pesticides Found in "Bee-Friendly" Plants Sold at Garden Centers Nationwide*, 3 (Aug. 2013), available at http://libcloud.s3.amazonaws.com/93/07/d/3118/Gardeners_beware_report_8-13-13-acknts.pdf.

207. *What is Integrated Pest Management?*, UNIV. OF CAL. AGRIC. & NATURAL RES., <http://www.ipm.ucdavis.edu/GENERAL/whatisipm.html> (last modified July 10, 2014).

208. *Id.*

209. *Id.*

210. Spivak et al., *supra* note 21, at 25.

211. CAL. CODE REGS. tit. 3, § 6652(a) (2014).

212. See Hopwood et al., *Are Neonicotinoids Killing Bees?*, 6-7 (2012), available at http://www.xerces.org/wp-content/uploads/2012/03/Are-Neonicotinoids-Killing-Bees_Xerces-Society1.pdf; see also Schierow et al., *supra* note 65, at 15.

213. See Schierow et al., *supra* note 65, at 18-19.

used to coat seeds.²¹⁴ “The highest exposure to the pesticides appeared to occur during planting season, when bee mortality was also high.”²¹⁵ As such, great attention should be paid to creating technologies that reduce pesticide drift.

Lastly, Congress also plays a crucial role in the survival of the honey bee. As discussed in Section III C, several versions of a pollinator protection provision have been left out of the last two farm bills. Without adequate funding, coordination, conservation, and research at the federal level, the future of the honey bee is in great jeopardy, and with it, a significant threat to agriculture as well. Congress should enact a pollinator protection provision that addresses these issues to protect the future of the honey bee.

While pesticides may or may not be a cause of CCD, any action that would help prevent a loss of bee colonies would aid in keeping the country’s healthy bee population steady and strong enough to pollinate our food supply. Whether or not pesticides are a cause of CCD, growers and beekeepers need to be aware of pesticide applications and the locations of bee hives so that a good working relationship that keeps bees healthy and crops producing develops between the two industries. Additionally, adequate funding to protect nature’s great pollinator and coordination on the federal level will undoubtedly improve conditions for the working bee.

C. *The Precautionary Principle*

As previously discussed, the bulk of available scientific literature suggests that neonicotinoids are a substantial contributing factor in the decline of pollinator populations. However, with the risk of any regulation relatively substantial for crops susceptible to invasive pests, policy makers will need to rely heavily on scientific data to justify any decision to regulate neonicotinoids. Furthermore, the EPA is unlikely to act in light of the uncertainties surrounding the causation of CCD. However, the precautionary principle could serve as the guiding doctrine enabling the EPA to take action.

The precautionary principle reflects the classic adage: better safe than sorry.²¹⁶ It asserts that regulators and decision makers should act in anticipation of environmental harm, without regard to the certainty of the scientific information pertaining to the risk of harm.²¹⁷ An important component of the precautionary principle is that while the harm may be uncertain, the extent of potential harm is significant.²¹⁸

214. *Id.* at 19.

215. *Id.* at 18–19.

216. Gregory D. Fullem, Comment, *The Precautionary Principle: Environmental Protection in the Face of Scientific Uncertainty*, 31 WILLAMETTE L. REV. 495, 497–98 (1995).

217. *Id.* at 498.

218. *Id.*

That is, the greater the possible (even unsubstantiated) impact, the greater the need for precaution. Thus, the principle allows for the reduction or prevention of environmental impacts even before the threshold of risk is reached.²¹⁹

The precautionary principle ultimately shifts the burden of proof from requiring concrete evidence of harm, to halting activities when potential adverse effects are not fully understood.²²⁰ Under the doctrine, traditional notions of economic analysis and scientific proof carry less weight, and

[i]nstead, emphasis is placed on: 1) the vulnerability of the environment; 2) the limitations of science to accurately predict threats to the environment, and the measures required to prevent such threats; 3) the availability of alternatives (both methods of production and products) which permit the termination or minimization of inputs into the environment; and 4) the need for long-term, holistic economic considerations, accounting for, among other things, environmental degradation and the costs of waste treatment.²²¹

In essence, the doctrine recognizes the limitations of science to provide insights to protect the environment effectively.²²² While the precautionary principle establishes a standard by which policy makers can assess the risk of harm, it does not address all issues attributed to uncertainty.²²³ The principle involves a question of degree, and policy makers must still choose what level of environmental degradation is acceptable, and at what cost.²²⁴

Nonetheless, the precautionary principle has withheld legal scrutiny, albeit much less in the United States as compared to Europe, and both policy makers and the judiciary have incorporated the precautionary principle since the 1970s.²²⁵ The legislative precautionary approach and the concept of “margin of safety”²²⁶ reflect an implicit incorporation of the doctrine in our environmental laws.²²⁷ The courts have also recognized the precautionary principle beginning with a circuit court decision under the Clean Air Act emphasizing the

219. *Id.*

220. *Id.*

221. Ellen Hey, *The Precautionary Concept In Environmental Policy and Law: Institutionalizing Caution*, 4 GEO. INT'L ENVTL. L. REV. 303, 308 (1992).

222. *Id.* at 308–09.

223. *Id.* at 309.

224. *Id.* at 310.

225. Fullem, *supra* note 217, at 508.

226. *See, e.g.*, 42 U.S.C. § 7409(b)(1) (2014) (stating the National Ambient Air Quality Standards are to set for “allowing an adequate margin of safety”); *Id.* § 7412(b) (stating standards for hazardous air pollutants are to provide an “ample margin of safety”); 33 U.S.C. § 1317(a)(4) (2014) (stating water pollution standards for toxic pollutants likewise are to provide an “ample margin of safety”).

227. *See* Fullem, *supra* note 217, at 509 (noting that standards found in the Clean Air Act, Clean Water Act, and other environmental statutes are consistent with the precautionary principle).

need to take action even in the presence of uncertainty about environmental effects.²²⁸ Additionally, the EPA has historically applied the precautionary principle in rulemaking, incorporating conservative assumptions in many of its assessment risks.²²⁹

With a burgeoning presence in United States environmental law, one can make the argument that the precautionary principle provides a credible foundation for neonicotinoid pesticide regulations. Ample evidence exists to support a finding that neonicotinoids have at least a minimal relation to CCD,²³⁰ and as such, even a temporary ban to allow researchers time to better understand the potential adverse effects would be justified under the doctrine. Utilizing the precautionary principle to assess the risk of harm that neonicotinoids pose on the environment would provide the justification needed for the EPA to develop pesticide regulations. Additionally, in light of the history the precautionary principle has played in United States environmental law, the EPA should enact pesticide regulations that reflect precautionary environmental approaches, especially given the significance of potential harm.

D. *Balancing the Risks and Benefits of Regulations*

While the benefits of regulations are plenty, they do not come without inherent risks. The benefits of pesticide regulations go beyond limiting the exposure of honey bees to pesticides. A reduction in exposure to pesticides also leads to bee health as it removes one of the stressors that make honey bees more susceptible to various diseases including gut pathogens.²³¹ Additionally, reducing the use of pesticides on bee-pollinated crops could increase biodiversity in our current farm system, which could create more diverse food sources for honey bees—a factor also connected to the health of the honey bee's immune system.²³²

However, any ban or regulation on pesticides will not go unnoticed, especially given the fact that one neonicotinoid, imidacloprid, was the largest selling insecticide in the world in 2009.²³³ Large corporations have a vested interest in seeing these pesticides remain on the market. In fact, Bayer, the German chemical company responsible for the production of many neonicotinoids, has sued the European Commission

228. *Ethyl Corp. v. EPA*, 541 F.2d 1, 24–25 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976).

229. *See, e.g., Leather Indus. of Am., Inc. v. EPA*, 40 F.3d 392, 403 (D.C. Cir.1994) (noting the EPA's "blanket, highly conservative assumptions" in regulations).

230. *Honey Bees and Colony Collapse Disorder*, *supra* note 3.

231. Pettis et al., *supra* note 91, at 7.

232. Spivak et al., *supra* note 21, at 25.

233. Schierow et al., *supra* note 65, at 18.

for its ban on the pesticides.²³⁴ Additionally, the development of many United States agricultural crops is dependent on neonicotinoids.²³⁵

Lastly, societal changes have made it all but impossible to return to agricultural practices that existed before pesticides.²³⁶ A shortage of farm workers due to urban migration, coupled with the attitude of modern day shoppers who will not buy fruits or vegetables with blemishes from plant disease or insects, make agriculture production dependent upon pesticides in order to remain competitive.

However, regulating pesticide use does not require an all-or-nothing approach. Pesticide regulations can be enacted in a systematic approach in order to limit the consequences of pesticide use. Initial stages can include basic steps of honey bee protection. In the absence of desirable results, the next steps can be enacted. During this time, research and data collection can be undertaken in an effort to further support ongoing efforts. A cooperative effort such as this will minimize the risk of regulations.

V. CONCLUSION

While credible evidence has been put forth that the risk of honey bee devastation exists, the United States EPA has been unwilling to take preventative action in light of scientific uncertainty. There is no reason to wait for research to mitigate the plight of the honey bee when the effects of CCD continue to devastate this important pollinator. The EU's recent ban on neonicotinoids pesticides based on clear scientific findings from the EFSA that neonicotinoids pose huge risks to bee populations²³⁷ provides further support for action. In light of certain factors, the EPA should utilize the precautionary principle to take preventative action in the form of regulations, without which, honey bees will continue to dwindle in numbers with severe consequences to crops that depend on honey bee pollination and ultimately the dependence of humans on those crops.

234. Daniel Cressey, *EU Insecticide Ban Triggers Legal Action*, NATURE, Aug. 28, 2013, <http://blogs.nature.com/news/2013/08/eu-insecticide-ban-triggers-legal-action.html>.

235. See Hopwood et al., *supra* note 213, at 1.

236. See LEONARD P. GIANESSI & SUJATHA SANLUKA, THE VALUE OF HERBICIDES IN U.S. CROP PRODUCTION, NAT'L CTR. FOR FOOD AND AGRIC. POLICY, 58 (2003), <http://www.ncfap.org/documents/FullText.pdf> (summarizing studies conducted by the NCFAP in April 2003 concerning the effect of non-use of pesticides on American farms).

237. Press Release, European Food Safety Auth., *supra* note 92.