Call to Action:
Reigning in Use and Impacts of Neonicotinoid Insecticides in Connecticut

CLCC

March 22, 2025

Louise Washer, President NRWA; Co-founder Pollinator Pathway; Coalition Chair CPR

Mia Park, IPPM Specialist, Xerces Society for Invertebrate Conservation

Robert LaFrance, Policy Director, Audubon Connecticut

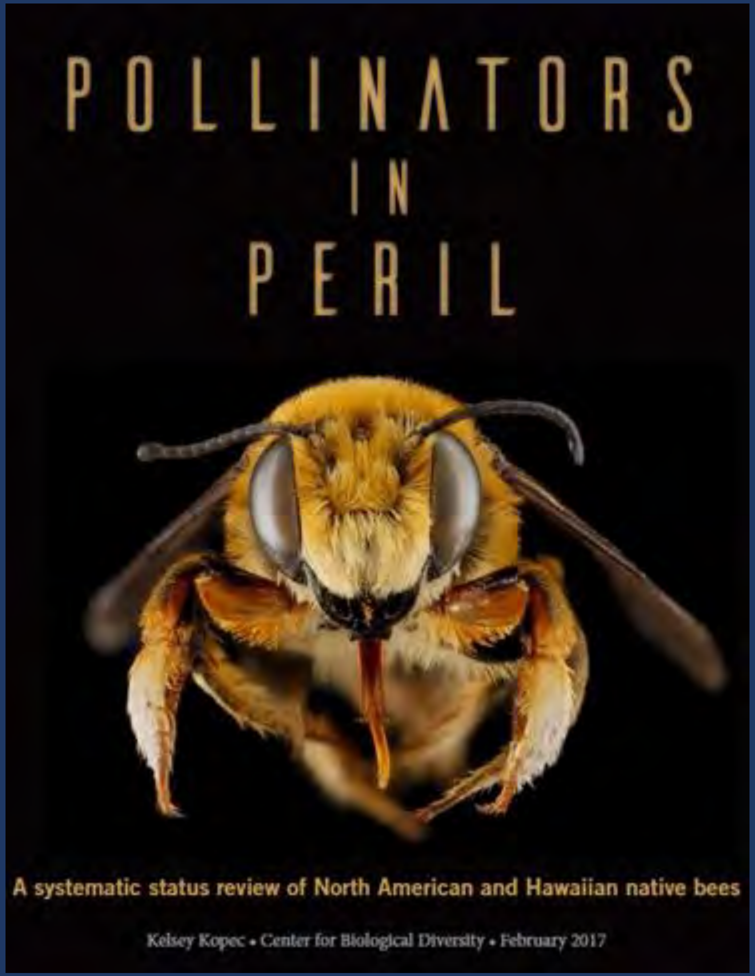
Connecticut CPR Pesticide Reform

Join us at CTPesticideReform.org

American Bird Conservancy
Audubon Connecticut
Aspectuck Land Trust
Beyond Pesticides
Clean Water Action
Connecticut Audubon Society
Connecticut Butterfly Association
CT League of Conservation Voters
CT Ornithological Association
Conservation Law Foundation
East Norwalk Blue
Estuary Magazine
Farmington Land Trust
Farmington Valley Trout Unlimited
Friends of the Earth
Great Meadows Conservation Trust
Greenwich Pollinator Pathway
Greenwich Sustainability Committee
Hamden Land Trust
Hartford Audubon
Huneebee Project
Individual Concerned Connecticut Voters
Inter-Religious Eco-Justice Network
Long Island Soundkeeper
Norwalk River Watershed Assoc.
NRDC
Nutmeg Chapter Trout Unlimited
Peabody Museum of Natural History
Pollinator Pathway National
Pollinator Pathway Stamford
Protect Our Pollinators, Newtown
Quercus Works Gardens
Rivers Alliance
Save the Sound
Schonberger Apiery
Sierra Club Connecticut
Surfrider Connecticut
Sustainable Fairfield County
The Bee Conservancy
West River Watershed Coalition
Trout Unlimited
Wildlife in Crisis
Xerces Society

What brings us here today?

- Biodiversity crisis
  - 90% decline in monarchs in last 20 yrs[1]
  - 96% decline in North American bumble bees[2]
  - 76% decline in **all flying insects** since 1989 in Germany[3]
  - > 50% North American birds in decline[4]
- Neonics are a key factor
  - 200 endangered species are jeopardized[5]
- CDC found neonics in 50% of population
- Inadequate federal oversight



1. National Wildlife Federation; 2. University of Illinois; 3. Krefeld Entomological Society, Dusseldorf 2017; 4. Audubon Society 2022; 5. EPA 2022

Outline

1. Intro to neonicotinoids
2. Harm to pollinators
3. Harm to birds and other wildlife
4. Neonics in CT & harm to human health
5. Call to action

Outline

1. Intro to neonicotinoids
2. Harm to pollinators
3. Harm to birds and other wildlife
4. Neonics in CT & harm to human health
5. Call to action

Mia Park, Ph.D.
mia.park@xerces.org
xerces.org

1. Intro to Neonics

Neonicotinoids: high risk

- **Synthetic, systemic** insecticide chemically similar to nicotine
- 1990's less toxic alternative

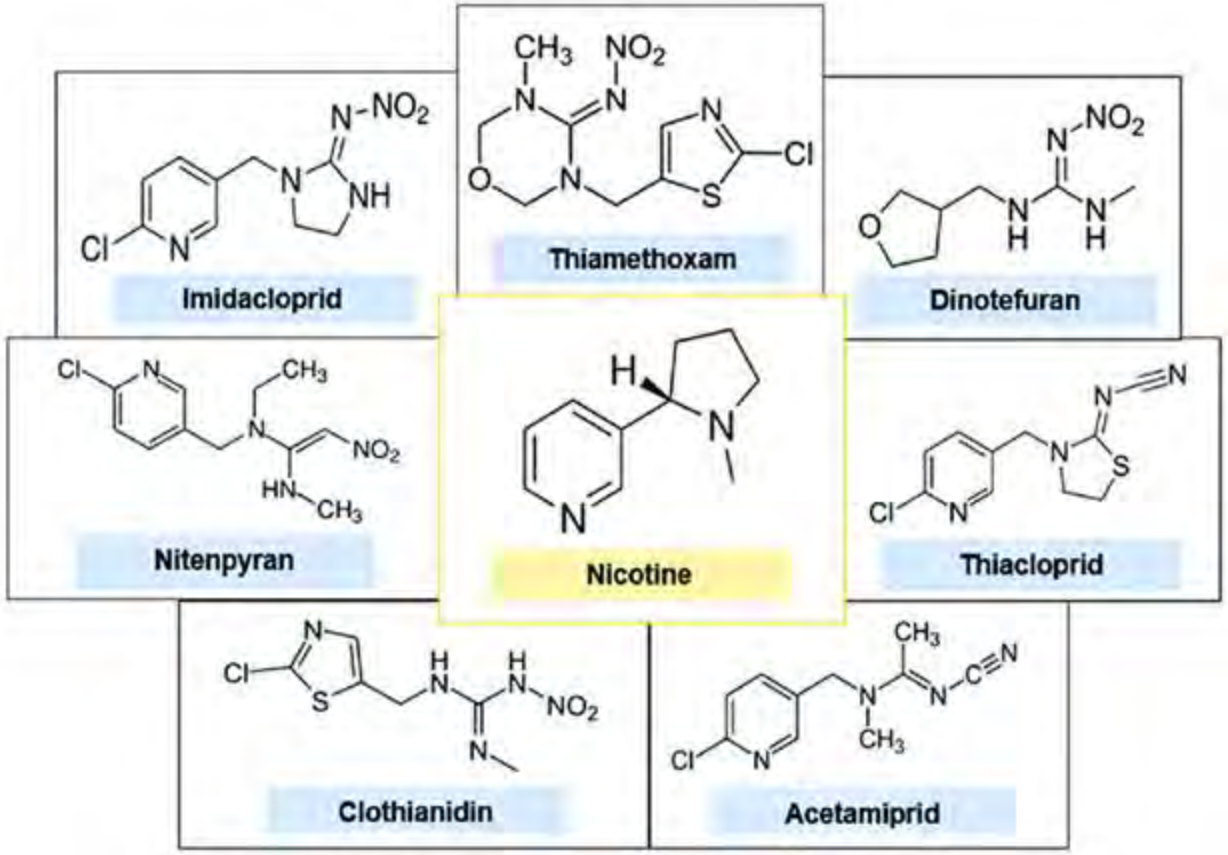


Figure taken from Costas-Ferreira, Carmen & Faro, Lilian. (2021 CC BY 4.0

Neonicotinoids: high risk

- **Synthetic, systemic** insecticide chemically similar to nicotine
- 1990's less toxic alternative
- One of the most bee-toxic insecticides. Nitroguanidine neonic LD_{50}s: 3.2-3.9 ng/bee

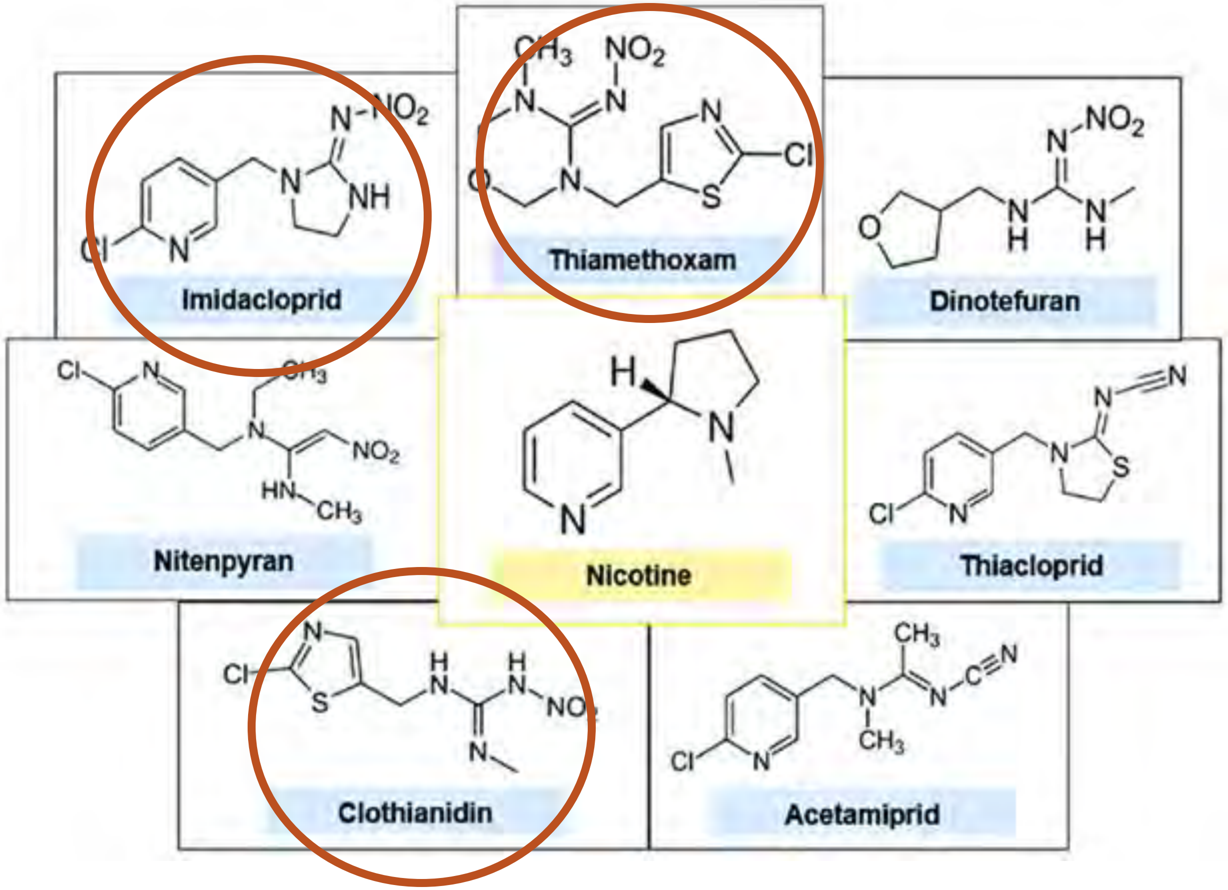


Figure taken from Costas-Ferreira, Carmen & Faro, Lilian. (2021 CC BY 4.0

Neonicotinoids: high risk

- **Synthetic, systemic** insecticide chemically similar to nicotine
- 1990's less toxic alternative
- One of the most bee-toxic insecticides. Nitroguanidine neonic LD_{50}s: 3.2-3.9 ng/bee

A single neonic-coated seed contains enough active ingredient to kill a songbird or more than 150,000 bees.

Photo: United Soybean Board

Neonicotinoids: high risk

- **Synthetic, systemic** insecticide chemically similar to nicotine
- 1990's less toxic alternative
- One of the most bee-toxic insecticides. Nitroguanidine neonic LD_{50}s: 3.2-3.9 ng/bee
- Water soluble
- Persistent

Photo: www.dtnpf.com/, Pamela Smith

Where Are Neonicotinoids Used?

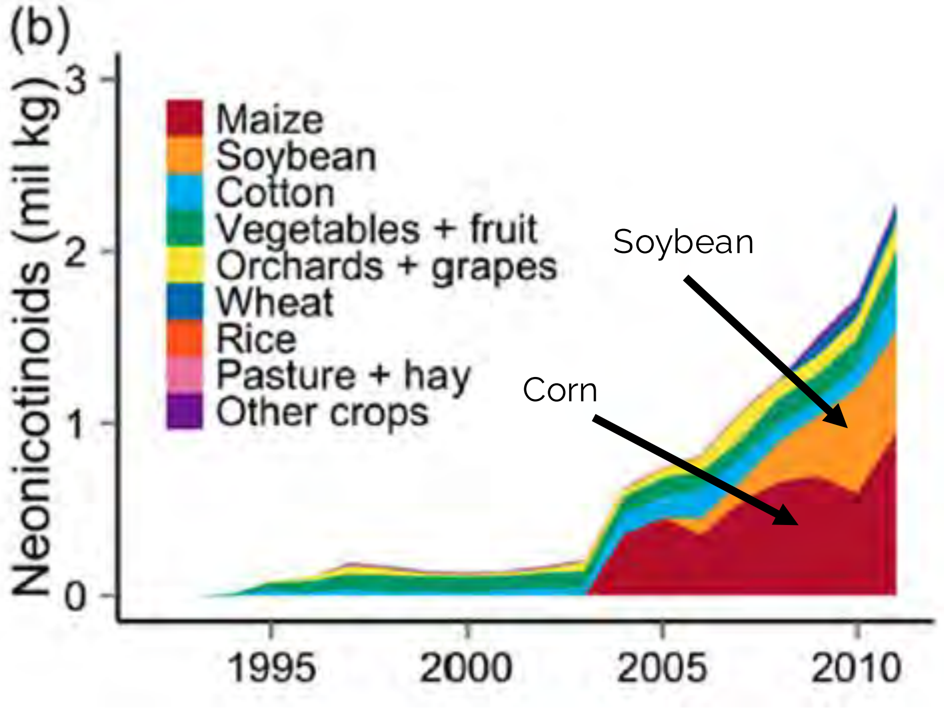
Most widely used insecticide in US & world

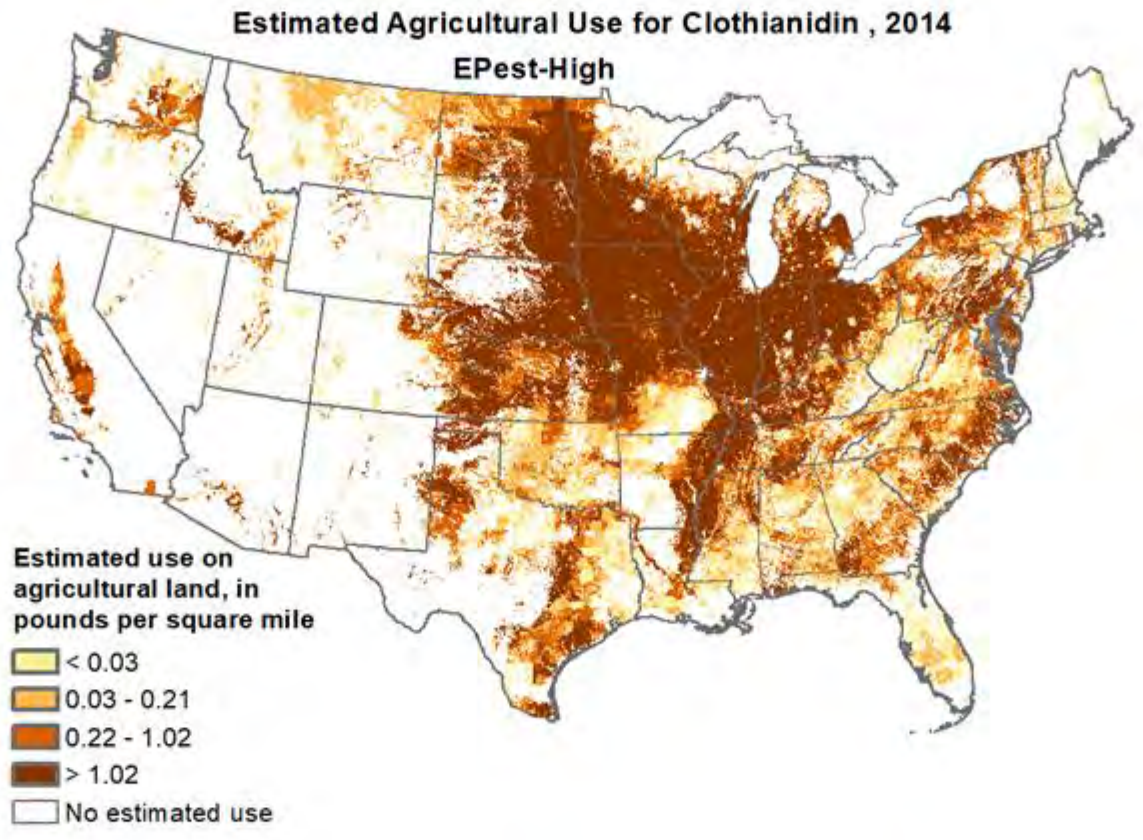
Pets

de Montaigu *et al*. 2025

Neonic use in USA:
Primarily in corn & soybean via seed treatments

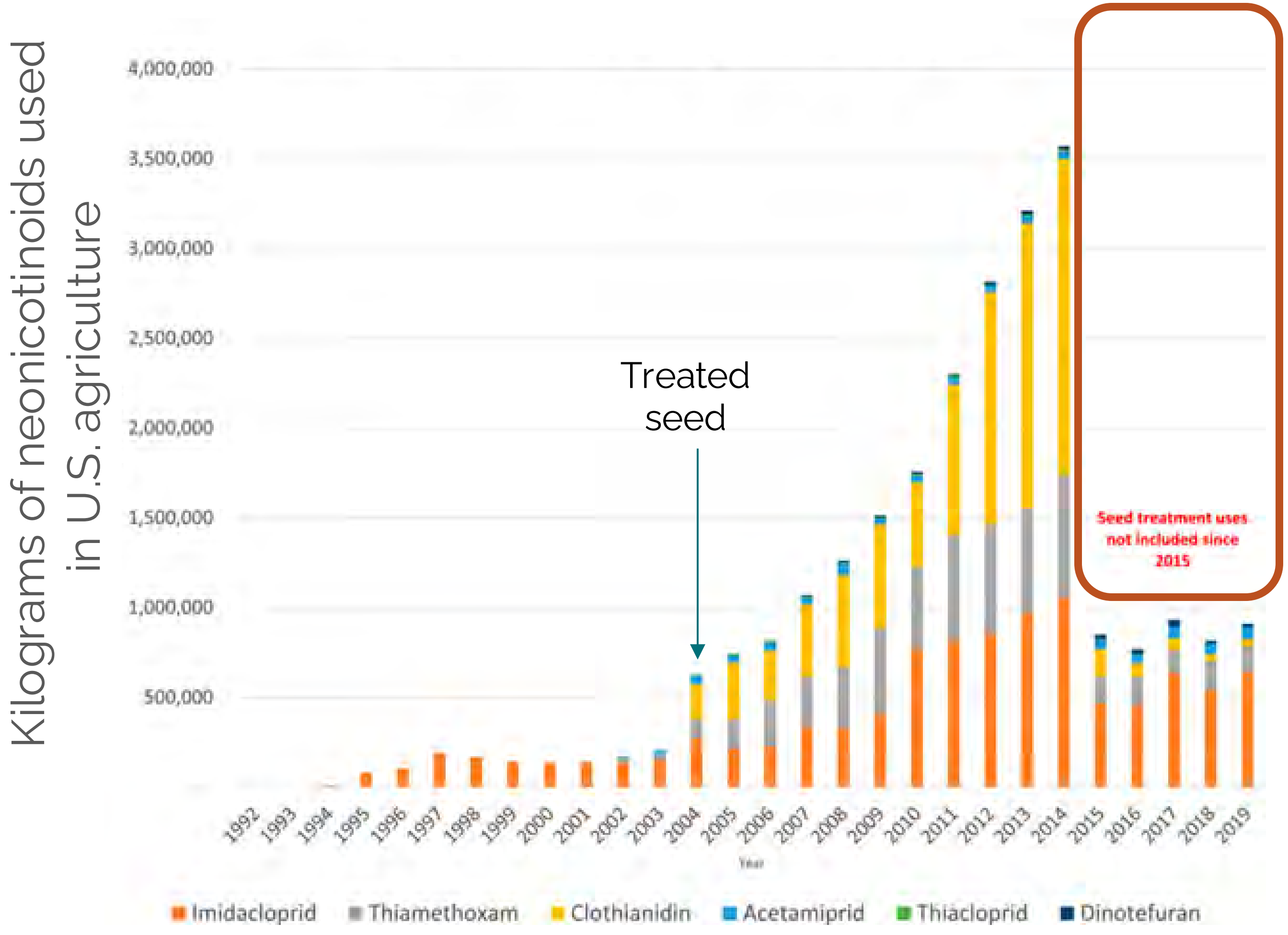
- 80-100% cornfields
- 50-80% soybean fields





Douglas & Tooker 2015 *Env. Sci. &*

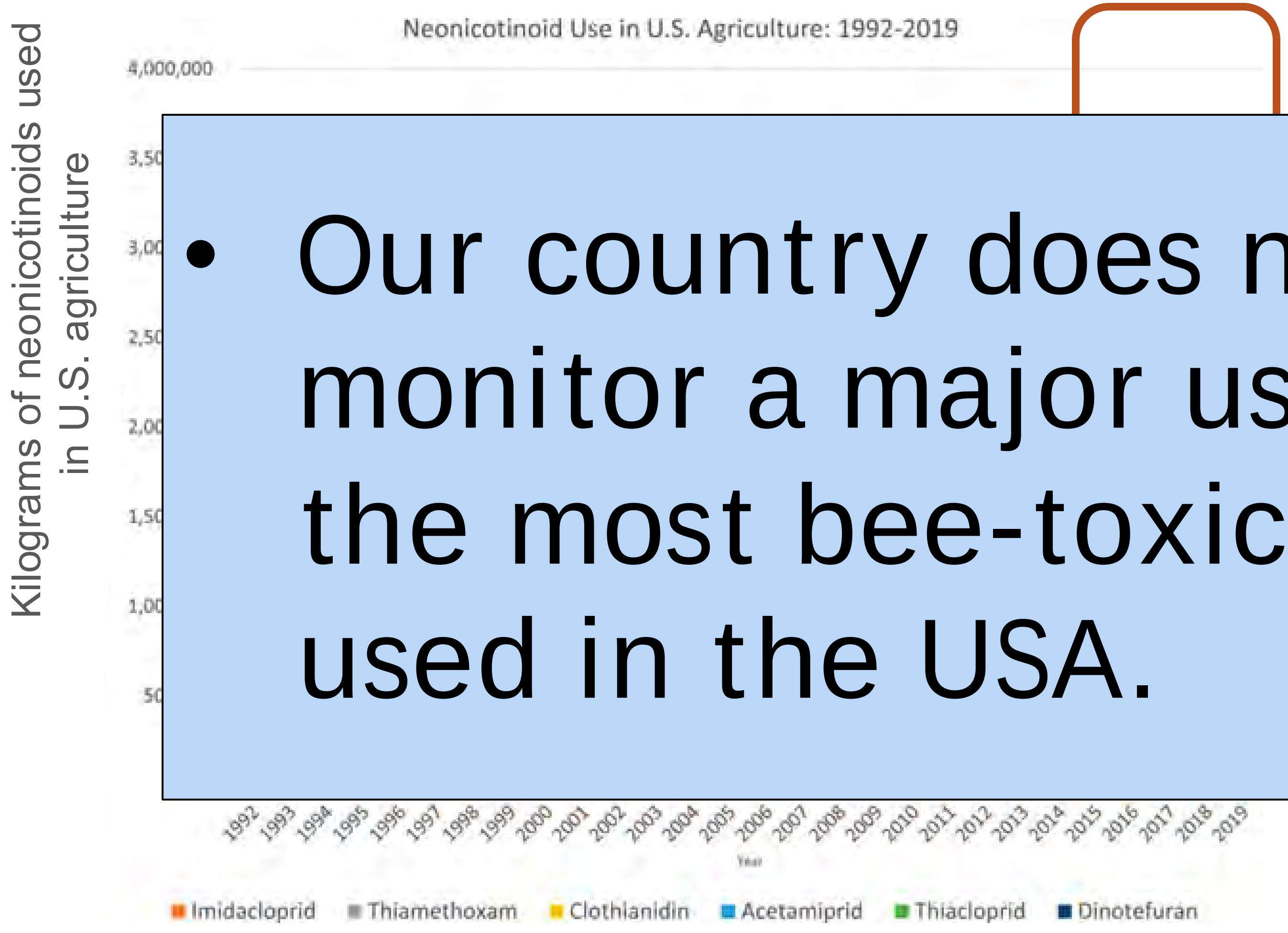
Neonic use in USA:
Primarily as seed treatments



Sass et al. 2024 *Frontiers in Toxicology*

Neonic use in USA:

Primarily as seed treatments



- Our country does not currently monitor a major use of one of the most bee-toxic insecticides used in the USA.

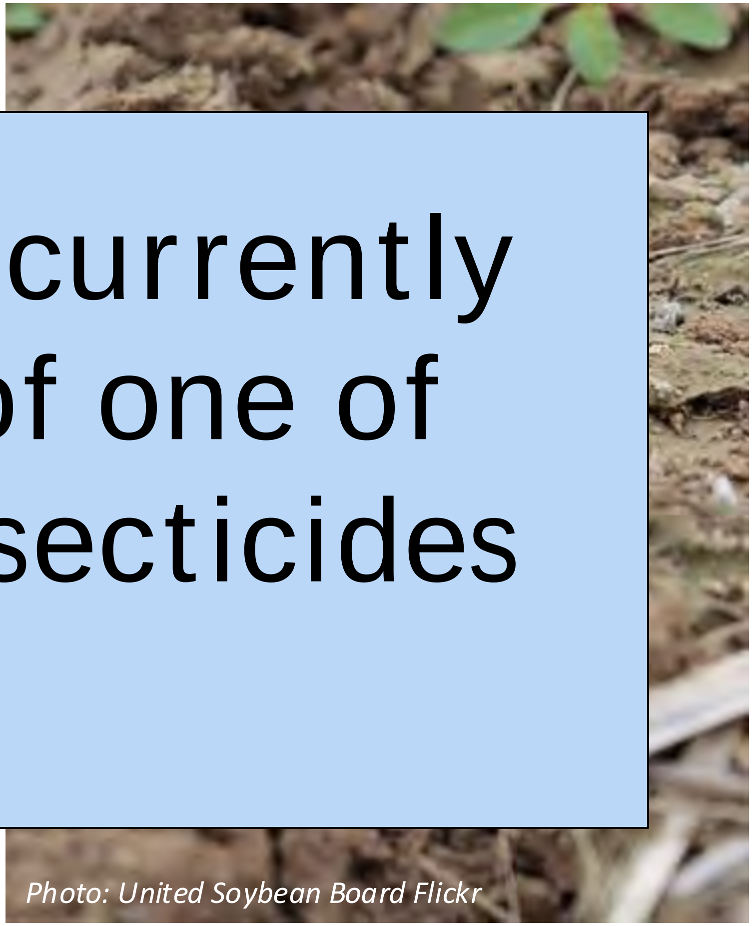
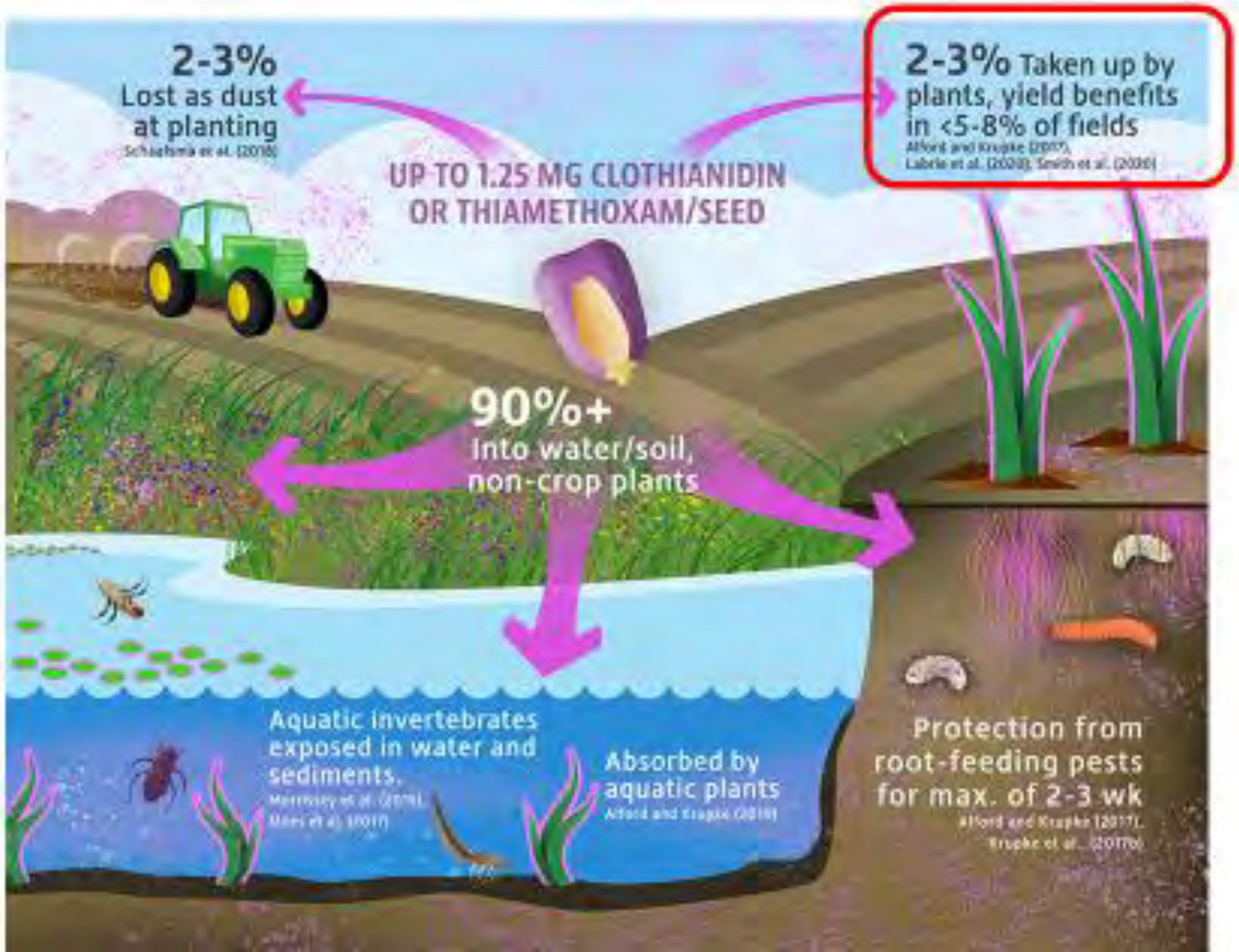


Photo: United Soybean Board Flickr

Sass et al. 2024 *Frontiers in Toxicology*

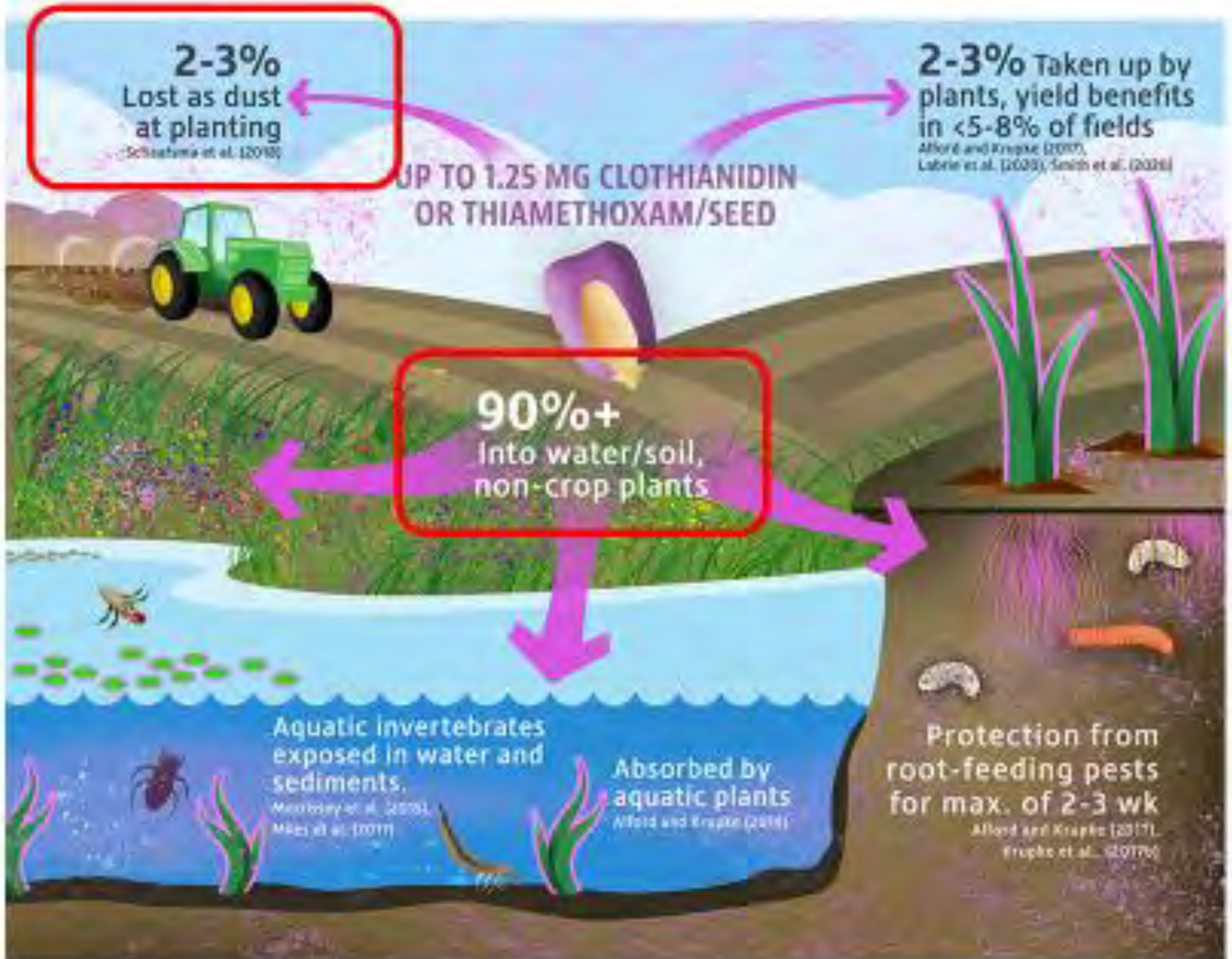
Widespread harm of seed treatments:
Only 2-3% goes to crop,



Purple represents fate of neonicotinoid in crop plants and the environment

Krupke & Tooker 2020

Widespread harm of seed treatments:
97-98% into the environment



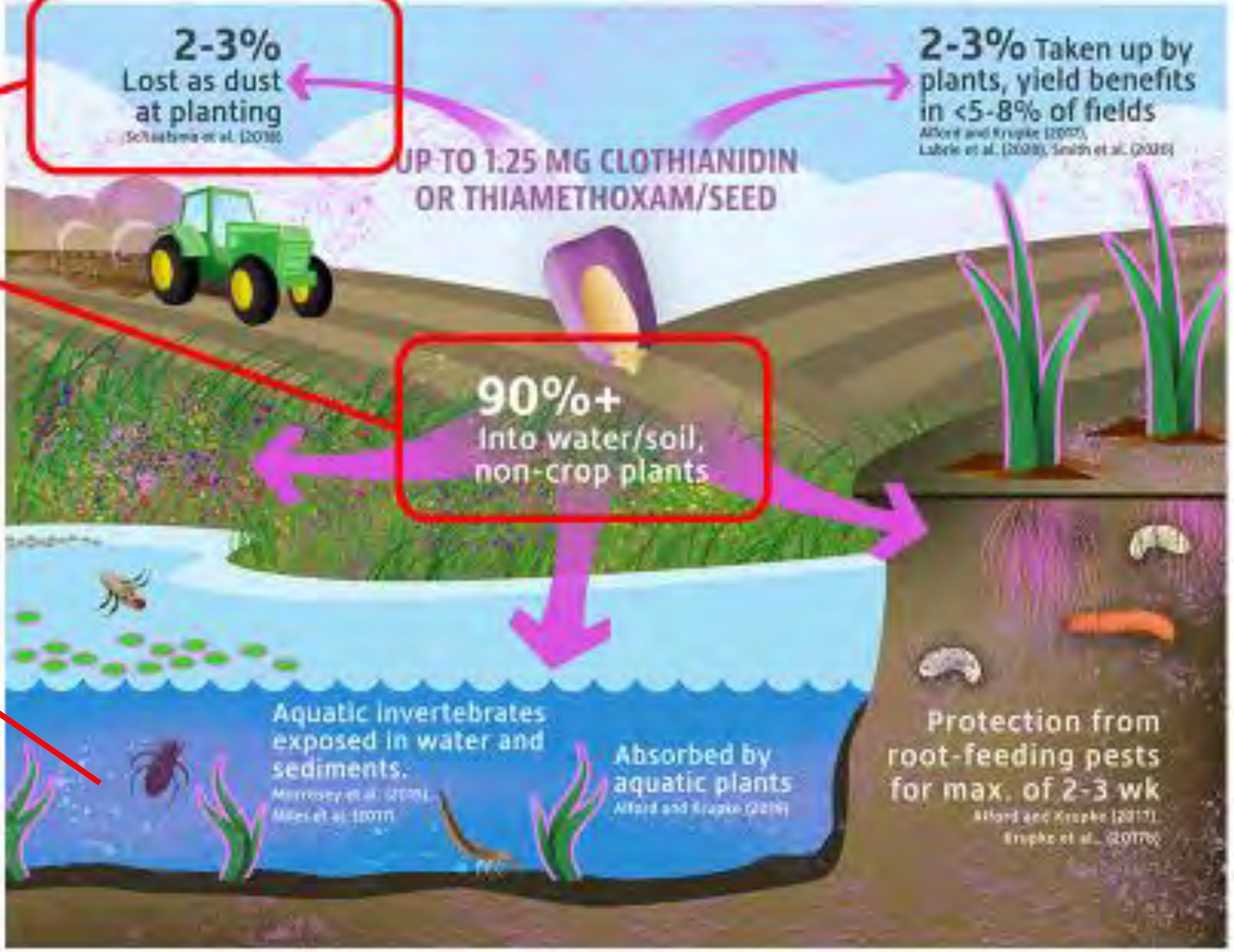
Purple represents fate of neonicotinoid in crop plants and the environment

Soluble!
Persistent!

Krupke & Tooker 2020

Widespread harm of seed treatments:

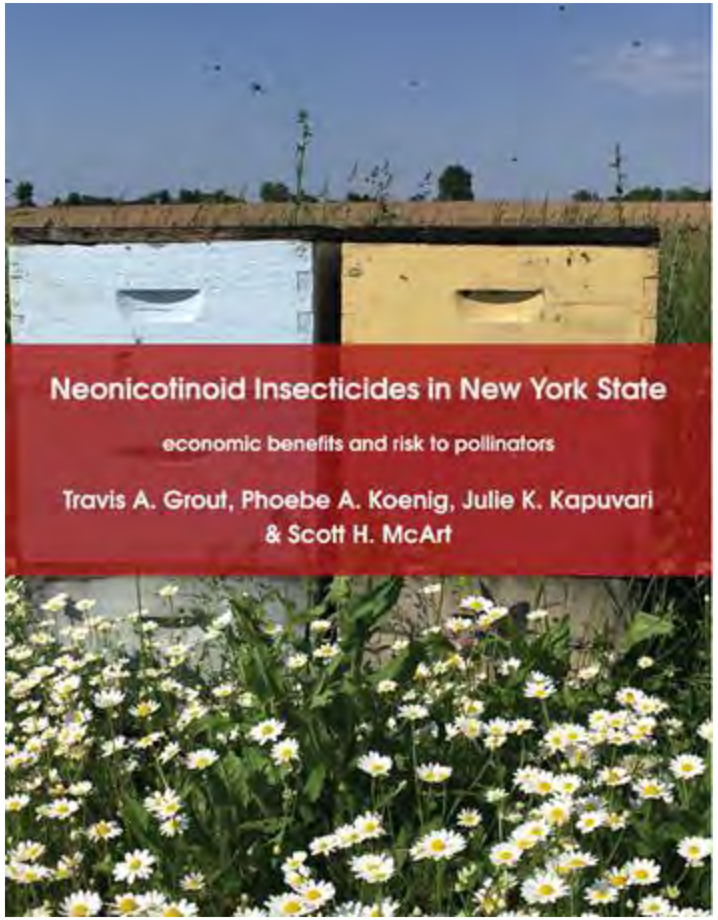
Exposure in dust, non-crop flowers, run-off…down food chains



Purple represents fate of neonicotinoid in crop plants and the environment

Krupke & Tooker 2020

Neonic Seed Treatments:
Low yield benefit in corn and soy



You're welcome for using some of my slides!

2020 report by Cornell University

- Reviewed 5000 paired field trials
- 87-93% no benefit in corn, > 80 studies
- 82-89% no benefit in soy, >120 studies
- Here, treated seed = crop insurance

Cornell University, Neonic Report 2020.

Where Are Neonicotinoids Used?

In CT: 30,000 ac corn and 300,000 ac turf grass/golf course

Photos: USDA/Lance Cheung; Flickr/Krista Guenin; Xerces Society/Rich Hatfield

Pesticides: urban & residential landscapes

- Often used for cosmetic reasons
- Higher application rates in urban areas than in agricultural areas.
- Can wash off from grass, patios, and impervious surfaces

Photo: Matthew Shepherd

2. Harm to Pollinators

⅓ Food, > 80% of the world's plants

Pollinators are the glue holding our ecosystems together

Photos: Bryan E. Reynolds (2); Sarah Foltz Jordan; David Cappaert; Bruce Newhouse; Mace Vaughan; Sara Morris; Stephanie McKnight (2); Alina Harris

Pollinator Declines:
Honey Bees

When most people think of a pollinator, they think of a honey bee

- Managed & introduced
- Will not go extinct
- > 60% loss last 6 mos!
- Many stressors, including pesticides

Photo: Waugsberg; Wikimedia Commons

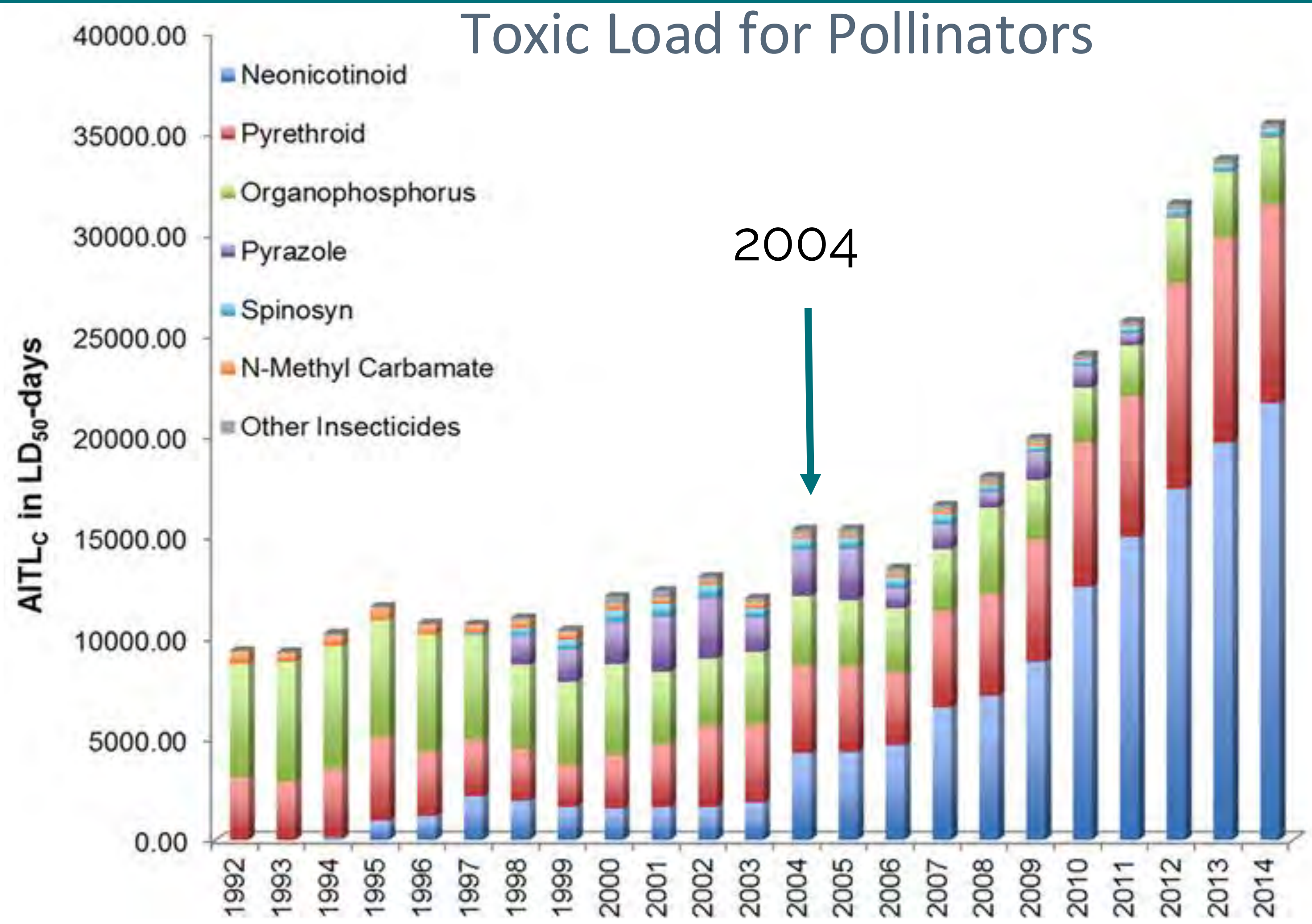
Pollinator Declines:
Wild bees and butterflies

390 bee & 121 butterfly species in CT

Photos: Ryan Hodnett, **wikimedia commons; Rollin Coville, Betsy Betros, Jason Gibbs, Emily May**

- 32% native bees are in decline in CT
- 25% fewer wild bee species than 30 yrs ago
- 30% bumble bees are threatened or endangered
- 22% butterflies declines in US from 2000 to 2020

Modern environment more toxic to bees than in the past

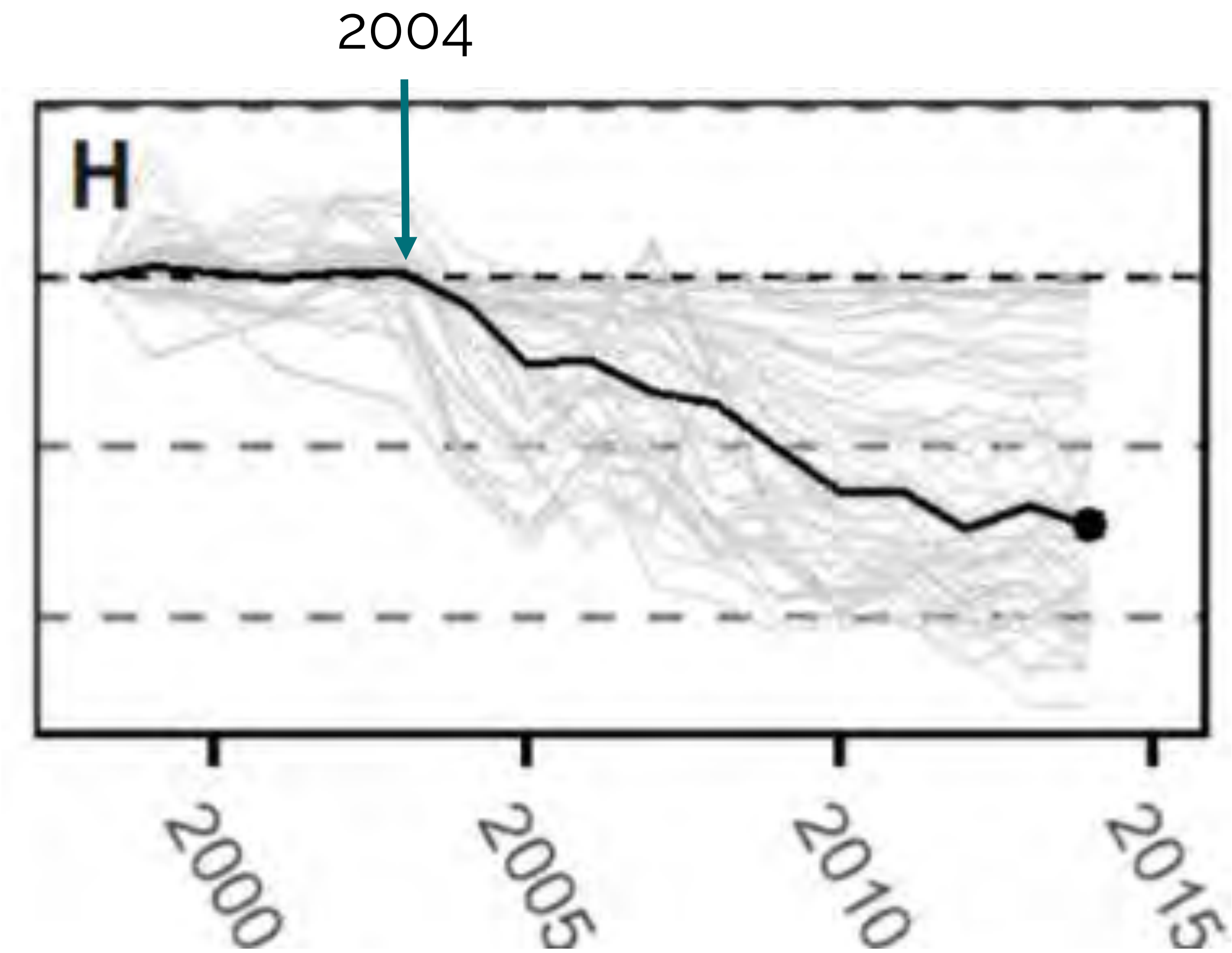


- Neonics making landscapes more toxic!
- 2004- treated seed introduced

DiBartolomeis et al. 2019

Neonics are a key driver of declines:
Butterflies in the Midwest

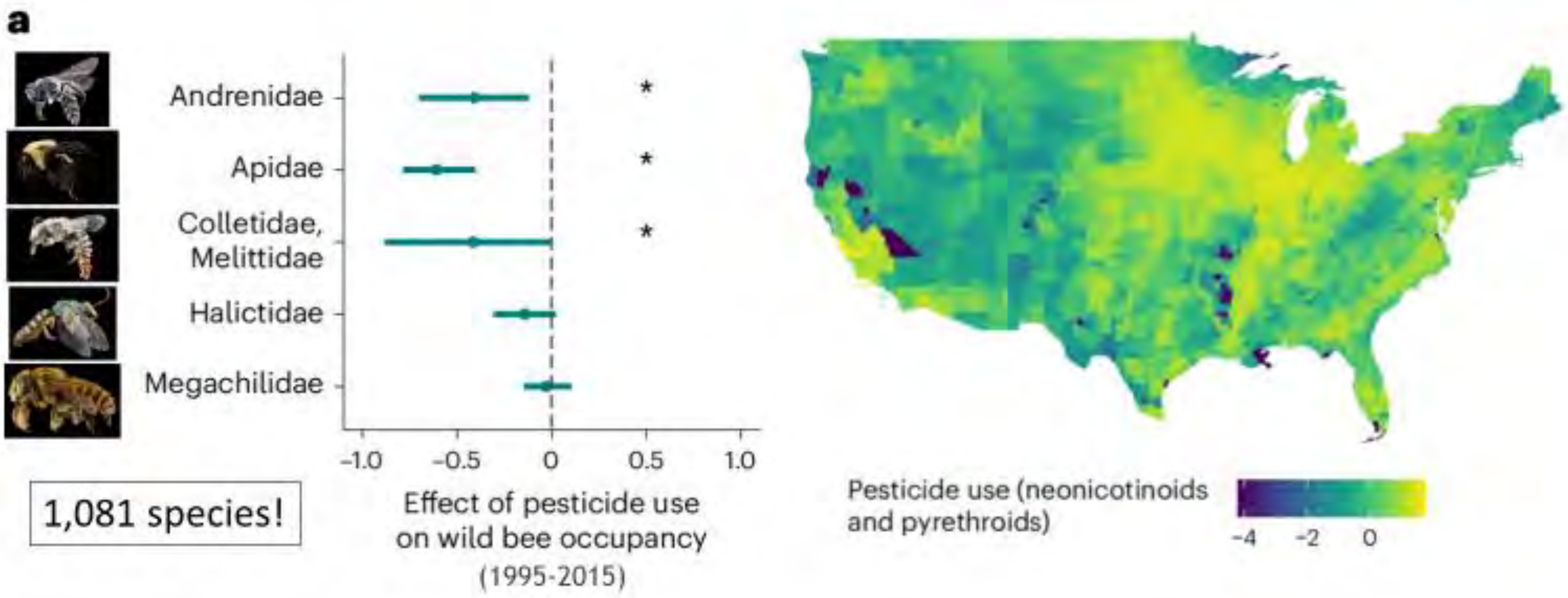
Monarch butterfly
(*Danaus plexippus*)



Van Deynze *et al.* PLOS One 2024

Neonics are a key driver of declines:

Continent-wide declines of wild bees in US



Guzzman et al. 2024 *Nature Sustainabilit*

Neonics are a key driver of declines:
Seed treatments reduced colony growth

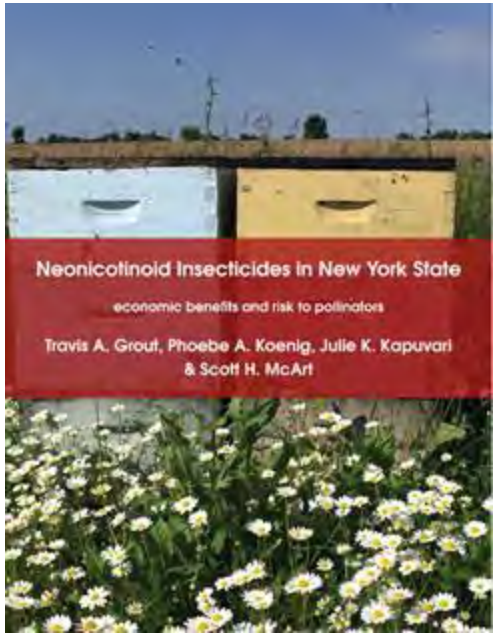


Photo: JIM CONRAD, Wikimedia Commons

Exposure in and near corn predicted to impact

Physiology: 74%

Behavior: 58%

Reproduction: 37%

Grout et al. 2020

Neonics are a key driver of declines:
Seed treatment effects on wild bees

Fewer wild bees

50% fewer wild bees around fields with neonic treated seeds

Fewer nests

100% reduction in mason bee nests next to seed-treated canola fields

Fewer bumbles

40% fewer males & workers. **70%** fewer queens next to neonic treated seed fields

Data: Rundlof et al (2015) Photos: Emily May

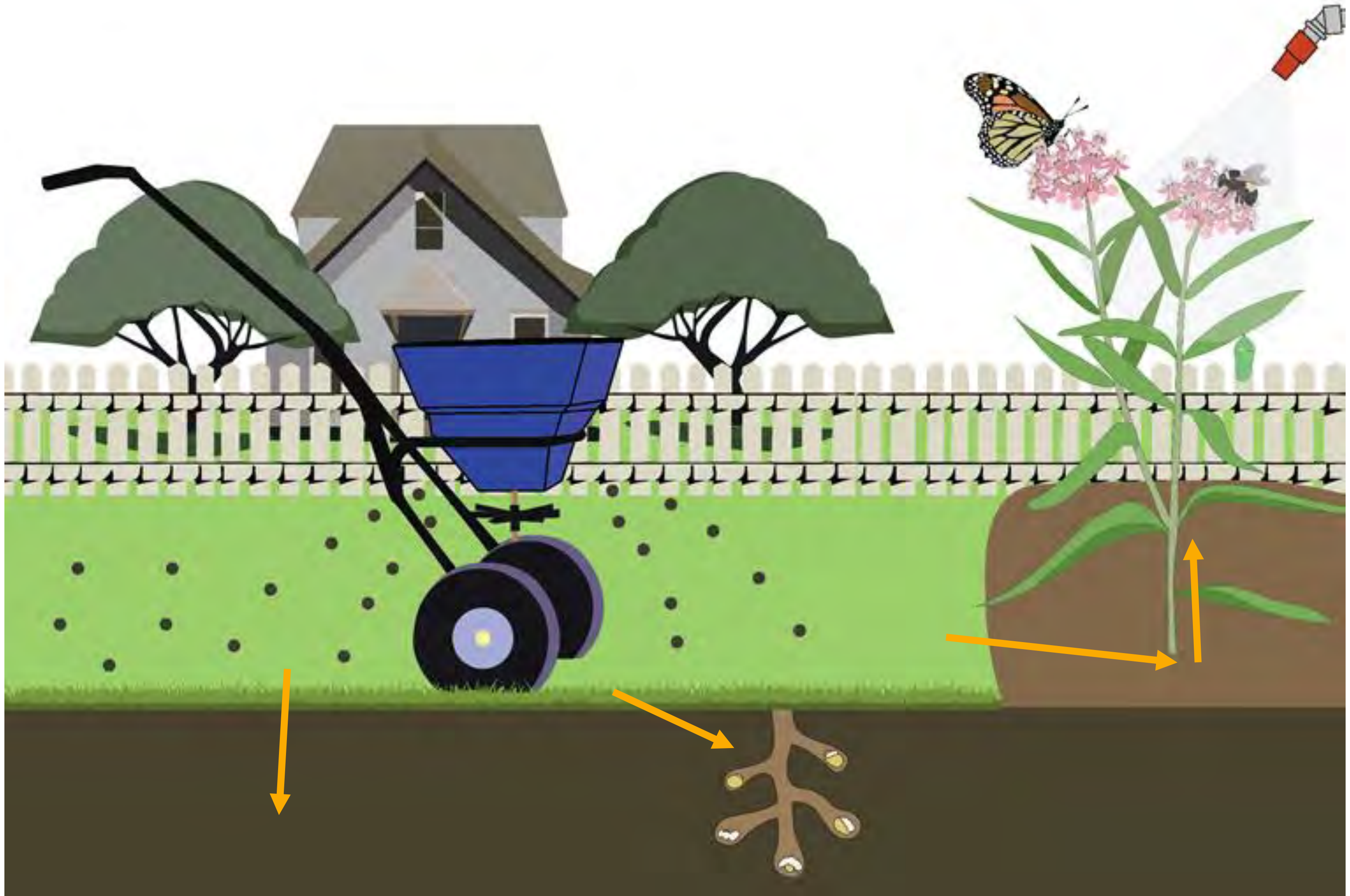
Harm to Pollinators in Non-Ag Areas:

Label rates for ornamental use can be much higher

Photo: Josh Kulla Sara Morris

- Labeled application rates are higher: 12-100 times higher than equivalent ag use (Hopwood 2018)
- 50,000 bumble bees killed when linden trees were treated by trained applicators in OR.
- Neonics still present in *Rhododendron* 6 mos after drench.

Harm to Pollinators in Non-Ag Areas:
Multiple exposure pathways



Neonics harm pollinators:
Summary

Clytus ruricola, BugGuide.net

- Neonics are highly toxic to bees.
- The majority of neonic use in the US (corn & soy seed treatments) provide little yield benefit.
- Studies link neonics to widespread pollinator decline.
- Non-ag uses are not monitored and can be more harmful.

Pollinator Conservation

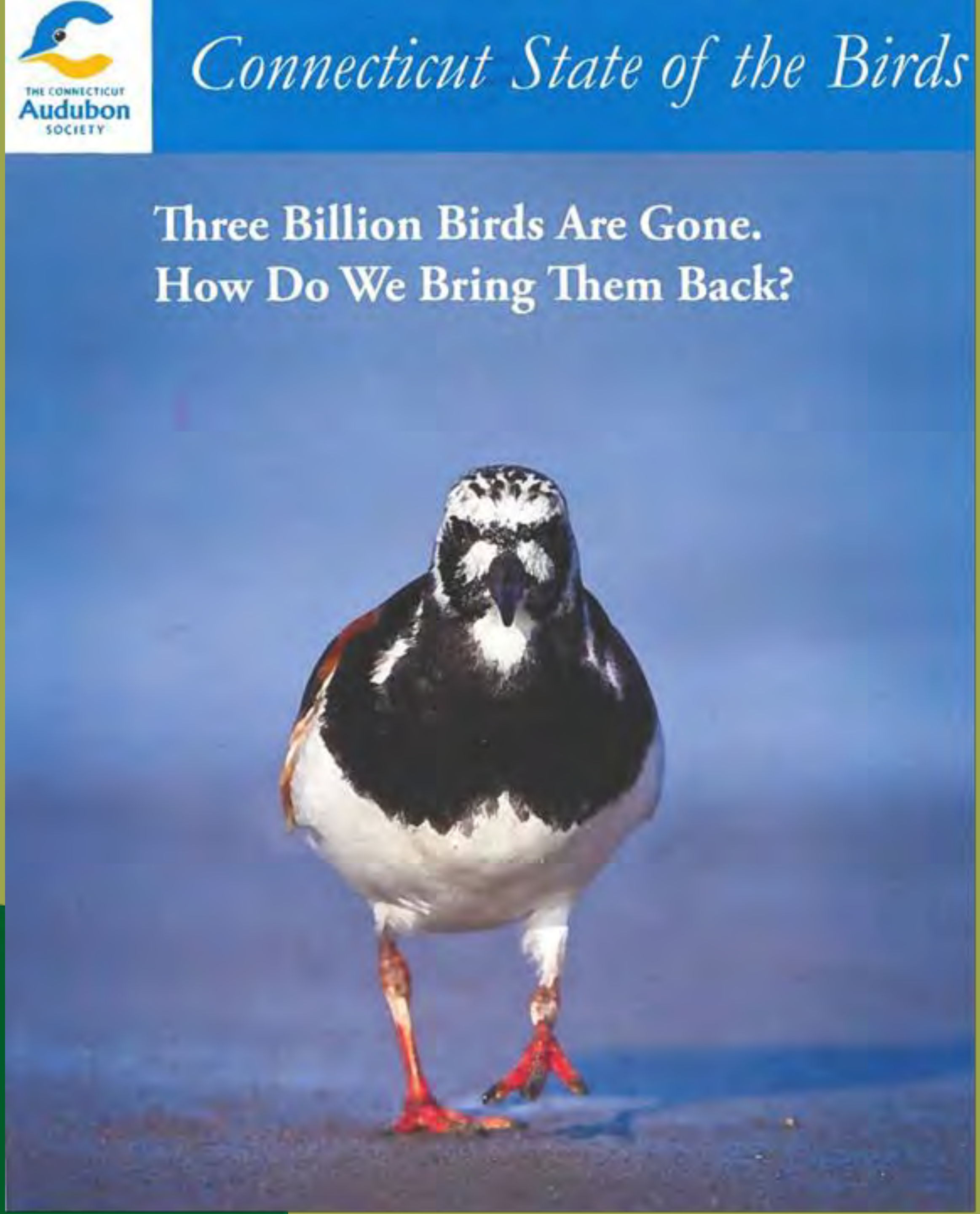
We know enough to act, and we need all hands on deck!

For resources: xerces.org

Outline

Robert LaFrance
Robert.LaFrance@ctaudubon.org

1. Intro to neonicotinoids
2. Harm to pollinators
3. Harm to birds and other wildlife
4. Neonics in CT & harm to human health
5. Call to action

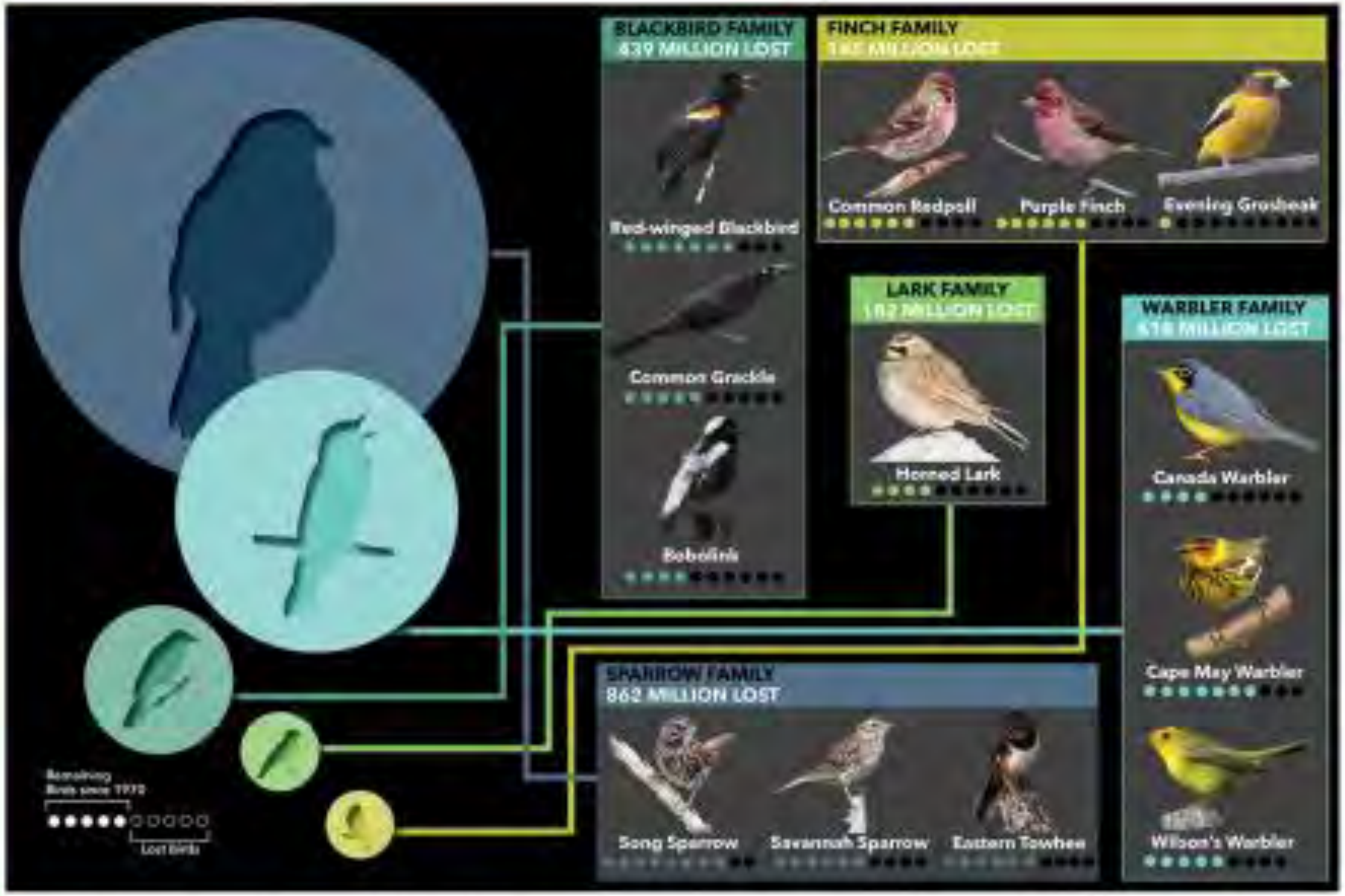

THE CONNECTICUT
Audubon
SOCIETY
Connecticut State of the Birds
Three Billion Birds Are Gone.
How Do We Bring Them Back?


THE CONNECTICUT
Audubon
SOCIETY
Connecticut State of the Birds
The Next Conservation Frontier:
Protecting Birds from Insecticides

Protect Birds, Bees, Food & Water From Neonicotinoid Pesticide Contamination

AN EPA STUDY FROM MAY 2023 SHOWS THAT NEONICS LIKELY PUSH *OVER 200 THREATENED AND ENDANGERED SPECIES* TOWARD EXTINCTION—OR ABOUT 11% OF THE ENTIRE ENDANGERED SPECIES LIST.

Photo courtesy of US Fish and Wildlife Service



The circles show total losses within 5 common bird families. For representative species within each family, losses are shown using dots. Colored dots represent the proportion of population still living; black dots represent the proportion of lost birds since 1970. *Graphic by Jillian Ditner. Photo credits appear at the end of this article.*

Image from AllAboutBirds.org.

Photo credits:
Steep Losses Among Major Bird Families: Bird photos, clockwise beginning with Common Redpoll, by Eric Gofreed, Henry Trombley, Brendan Klick, Bryan Calk, Andy Eckerson, Donald Jones, Davey Walters, David Turgeon, Steven Mlodinow, Gordon Johnston, Volker Hesse, David Turgeon, and (Horned Lark in center) Darren Clark, all via Macaulay Library.

Are declines in insects and insectivorous birds related?

"In fact, **<u>terrestrial bird species that rely on insects during at least part of their annual life cycle (304 species) declined more than 2.9 billion</u>** individuals in the last 50 years, while terrestrial birds that do not rely on insects (64 species) gained 26.2 million individuals, more than a 111-fold difference," (Tallamay & Shriver, 2021).

Scissor-Tailed Flycatchers

96%

of all terrestrial birds eat insects

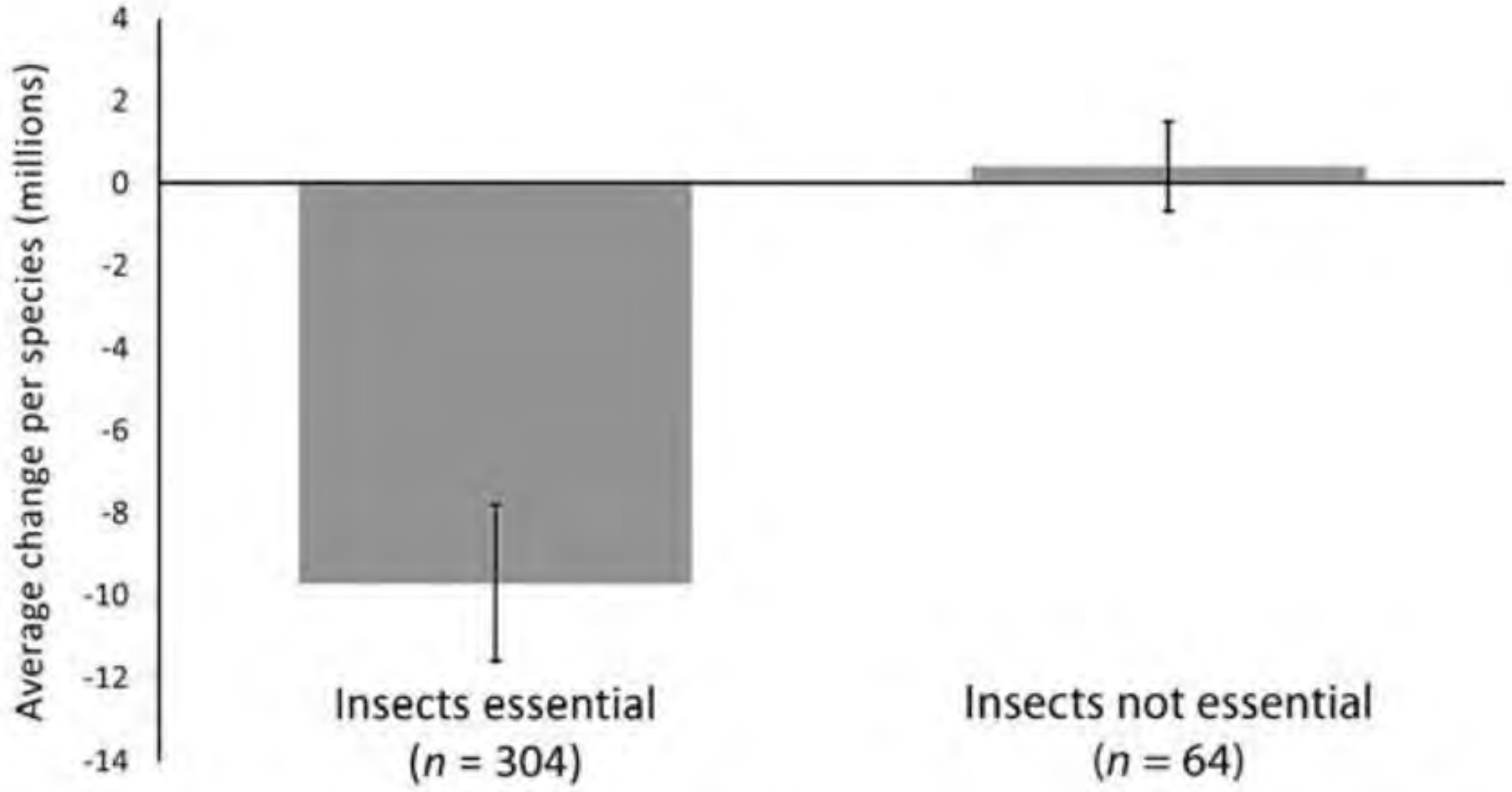


FIGURE 1. The average change in population size over the last 50 years of terrestrial North American bird species for which insects are an essential part of the diet at some point in their life history and bird species that never rely on insects for food. Statistical intervals = standard deviations. Data from Rosenberg et al. (2019). Bird species in each category are listed in Supplementary Material Table S1.

Neonics and Birds

1992: Imidacloprid First Registered in US

2004: Neonic Use Begins to Increase in US

2011: Neonic use doubles from previous year

2013

2015: USGS Stops Tracking Use of Pesticide-coated Seeds

2023

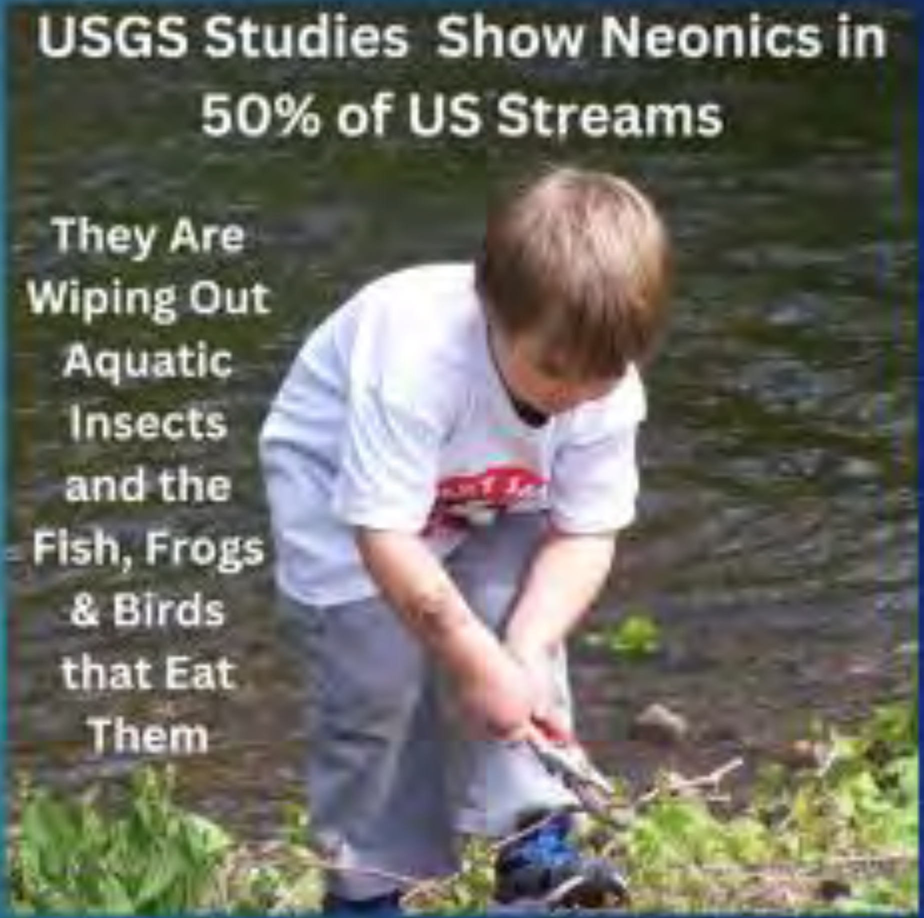
2023: EPA Opens BEs and ANPRM on Neonic and Neonic Seeds

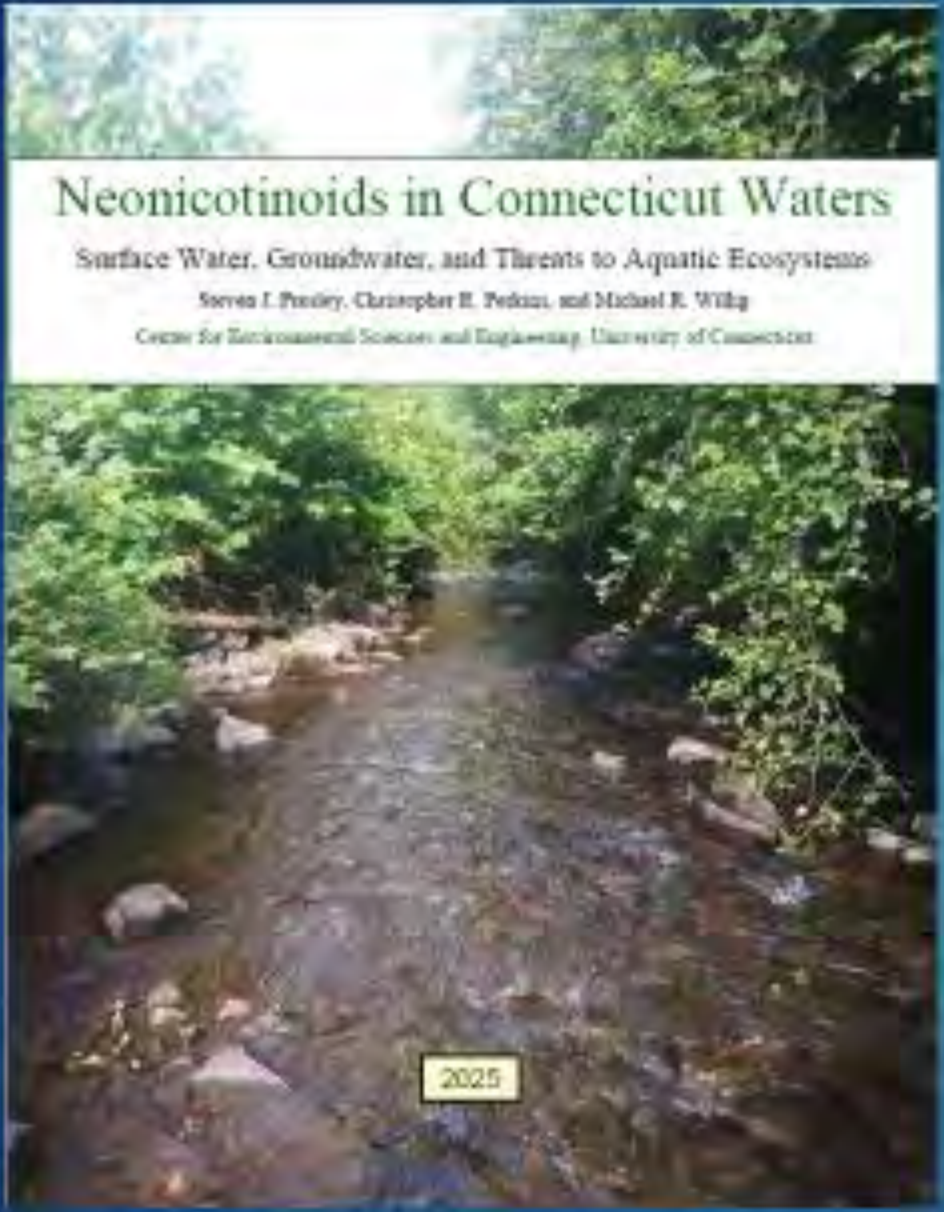
Let's compare bird declines to pesticide use

Neonics Destroy Food Chains Hollowing Out Ecosystems

Neonics Are Linked to:

- Sharp declines in bee and other insect populations
- The loss of 3 billion birds
- Congenital defects in white-tailed deer
- Impacts on aquatic food chains--killing the insects that feed the fish, frogs, birds, and other animals.





Neonicotinoid Pesticide Contamination

WATER QUALITY MONITORING BY THE US GEOLOGICAL SURVEY (USGS) SHOWS THAT NEONICOTINOIDS **FREQUENTLY AND CONSISTENTLY APPEAR IN CONNECTICUT'S SURFACE WATERS AT LEVELS EXPECTED TO CAUSE SIGNIFICANT HARM TO THE STATE'S AQUATIC ECOSYSTEMS** AND WHICH ALSO REPRESENT THE POTENTIAL FOR HUMAN HEALTH HARMS.

Outline

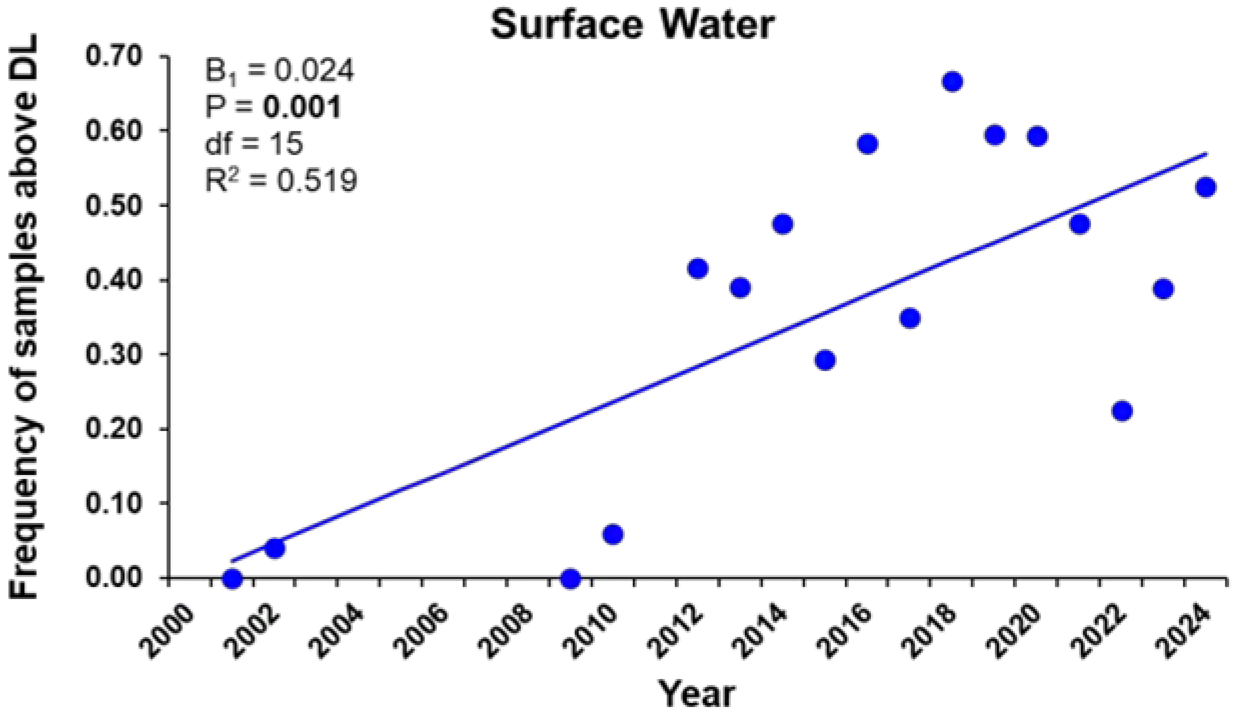
Louise
Washer
lbwasher@gmail.com
ctpesticidereform.org

1. Intro to neonicotinoids
2. Harm to pollinators
3. Harm to birds and other wildlife
4. Neonics in CT & harm to human health
5. Call to action

4. Neonics in CT & Harm to Human Health

Neonics in CT Surface Waters:
Present at harmful levels with chronic exposure

Mostly non-ag uses



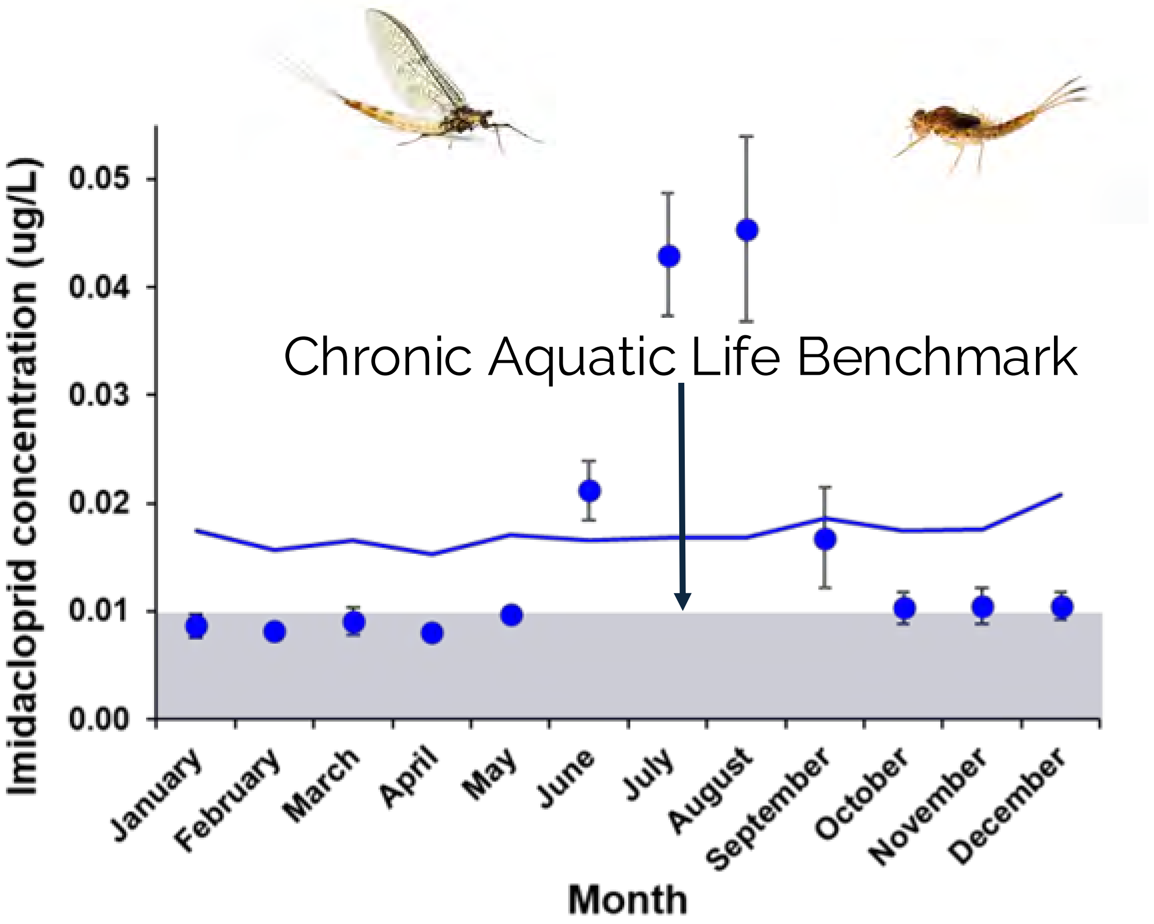
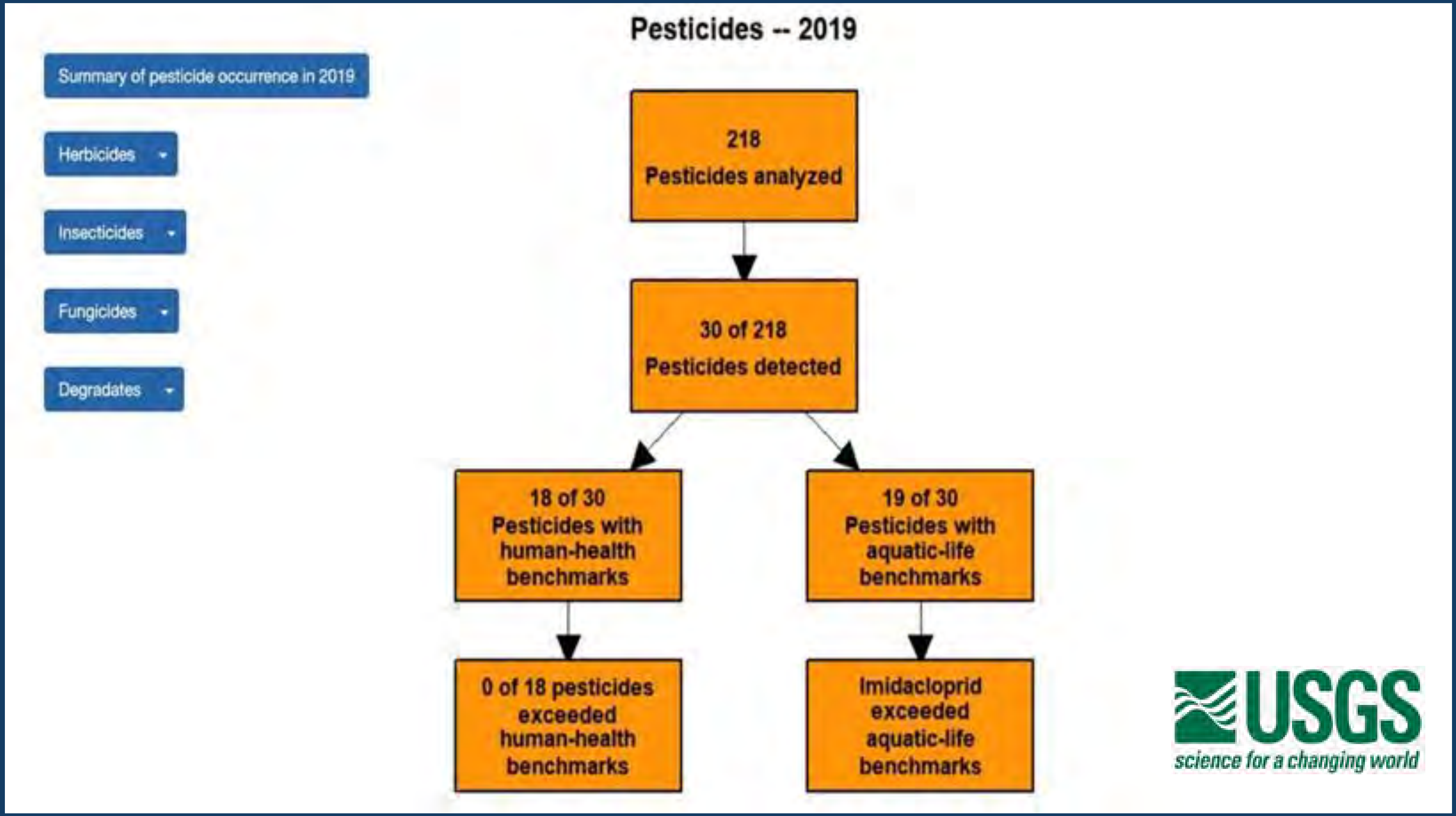


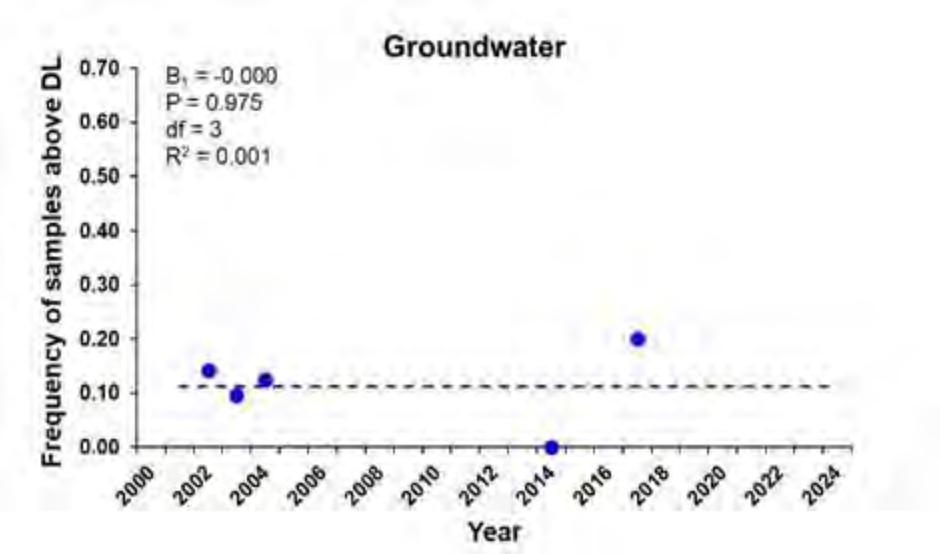
Photo: Andy Holt & GlobalP @ Getty Images/iStockphoto

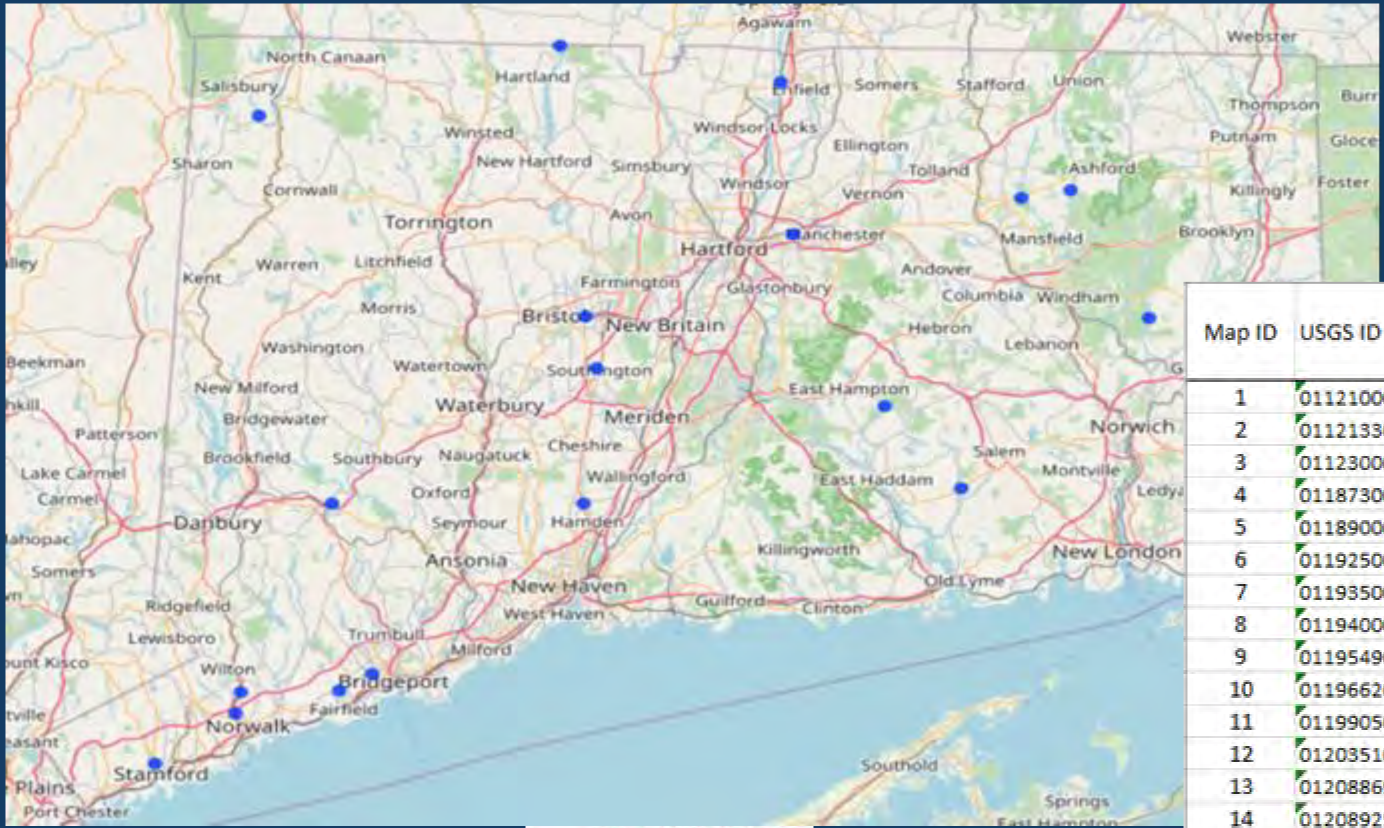
Presley et al 2025 UCONN

Neonics in the Norwalk River
An Emergency



Neonics in 56% of Connecticut Rivers at Levels Deadly to Aquatic Life And in Groundwater





Map ID	USGS ID	RIVER	Site type	# of pesticide samples collected	# of samples with imidacloprid detections	Concentration, in nanogram per Liter		
						MIN	MAX	MEDIAN
1	01121000	MOUNT HOPE RIVER	Light Urban	1	0	< MDL	< MDL	< MDL
2	01121330	FENTON RIVER	Light Urban	4	0	< MDL	< MDL	< MDL
3	01123000	LITTLE RIVER	Light Urban	1	0	< MDL	< MDL	< MDL
4	01187300	HUBBARD RIVER	Forested	4	0	< MDL	< MDL	< MDL
5	01189000	PEQUABUCK RIVER	Urban	9	9	35.2	175	60.1
6	01192500	HOCKANUM RIVER	Urban	9	9	27.8	85.9	41.6
7	01193500	SALMON RIVER	Light Urban	4	0	< MDL	< MDL	< MDL
8	01194000	EIGHTMILE RIVER	Forested	1	0	< MDL	< MDL	< MDL
9	01195490	QUINNIPIAC RIVER	Urban	9	8	10.5	56.3	31.0
10	01196620	MILL RIVER, HAMDEN	Urban	9	8	12.2	120	24.8
11	01199050	SALMON CREEK	Light Urban	4	0	< MDL	< MDL	< MDL
12	01203510	POOTATUCK RIVER	Urban	9	5	14.9	42.5	15.3
13	01208869	ROOSTER RIVER	Urban	9	9	22.7	567	122
14	01208925	MILL RIVER, FAIRFIELD	Urban	9	9	13.9	245	17.0
15	01209700	NORWALK RIVER	Light Urban	9	6	17.4	109	36.7
16	01209901	RIPPOWAM RIVER	Urban	9	7	16.0	270	47.6

USGS
science for a changing world

Human Health Impacts

Nicotine-like, they affect the neurological system

- Studies show harms to heart and brain development in prenatally exposed children, decreased sperm quality and quantity, decreased testosterone, altered insulin regulation, and changes in fat metabolism.

- A 2022 peer-reviewed study from the University of Illinois found neonicotinoids in 95% of the pregnant women who participated in the study.

- The CDC found neonics in 50% of the population with the highest concentrations found in children.

Neonics in food

- 1999-2015 USDA Pesticide Data Program detections of neonic residues
- Imidacloprid in 12% samples across all crops.
- Some high detections:

Cauliflower 58% Celery 21% Kale 31%
Cherries 26% Grapes 29% Spinach 39%

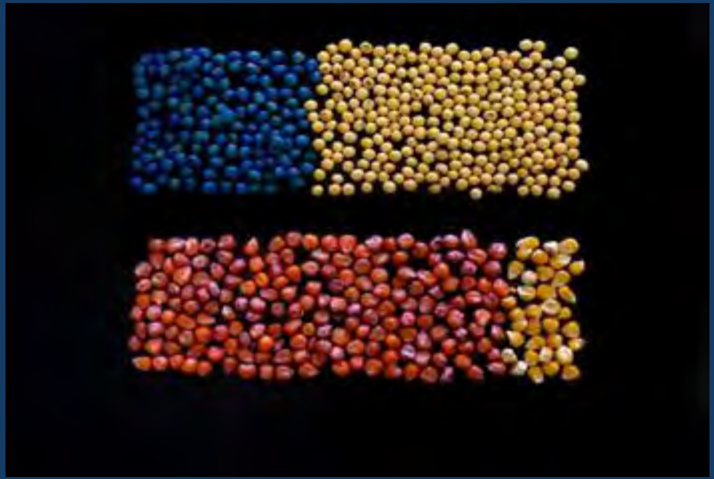
- Imidacloprid in < 6% organic produce:
    - 2 or more neonics detected in 5% apple, celery, and cherries.
- Residues below EPA tolerance levels, but additive and cumulative risks unknown.

Craddock et al. 2019 Environmental Health

5. Call to Action

Why We Need State Action Now: Regulatory Gaps

- EPA lacks sufficient resources to address the known harmful impacts of neonics in a timely manner, completing only 5% of its annual registration reviews. (EPA)
- EPA began a review of neonics in 2008 and has yet to complete it.
- EPA's risk assessments systematically underestimate the risk of neonics
  - failing to account for environmental persistence
  - cumulative and synergistic toxicity
  - how systemic insecticides expose wildlife in contaminated soil and plants
- EPA's Insecticide Strategy does not address non-agricultural uses of neonics, such as on turf grass and ornamentals, which can contribute substantially to environmental contamination
- EPA exempts neonic-treated seeds from regulation, despite evidence of extensive contamination and harm resulting from leaching and dust escaping during planting.



The Solution: Join the Regional Movement to Reduce Wasteful Uses

- Follow the Lead of New York, Vermont, New Jersey, Maine, Quebec and Ontario
- End obsolete and ineffective prophylactic uses and return to more sustainable IPM practices
- Look forward someday to Europe's example of banning all outdoor uses

Photo: Audubon Vermont

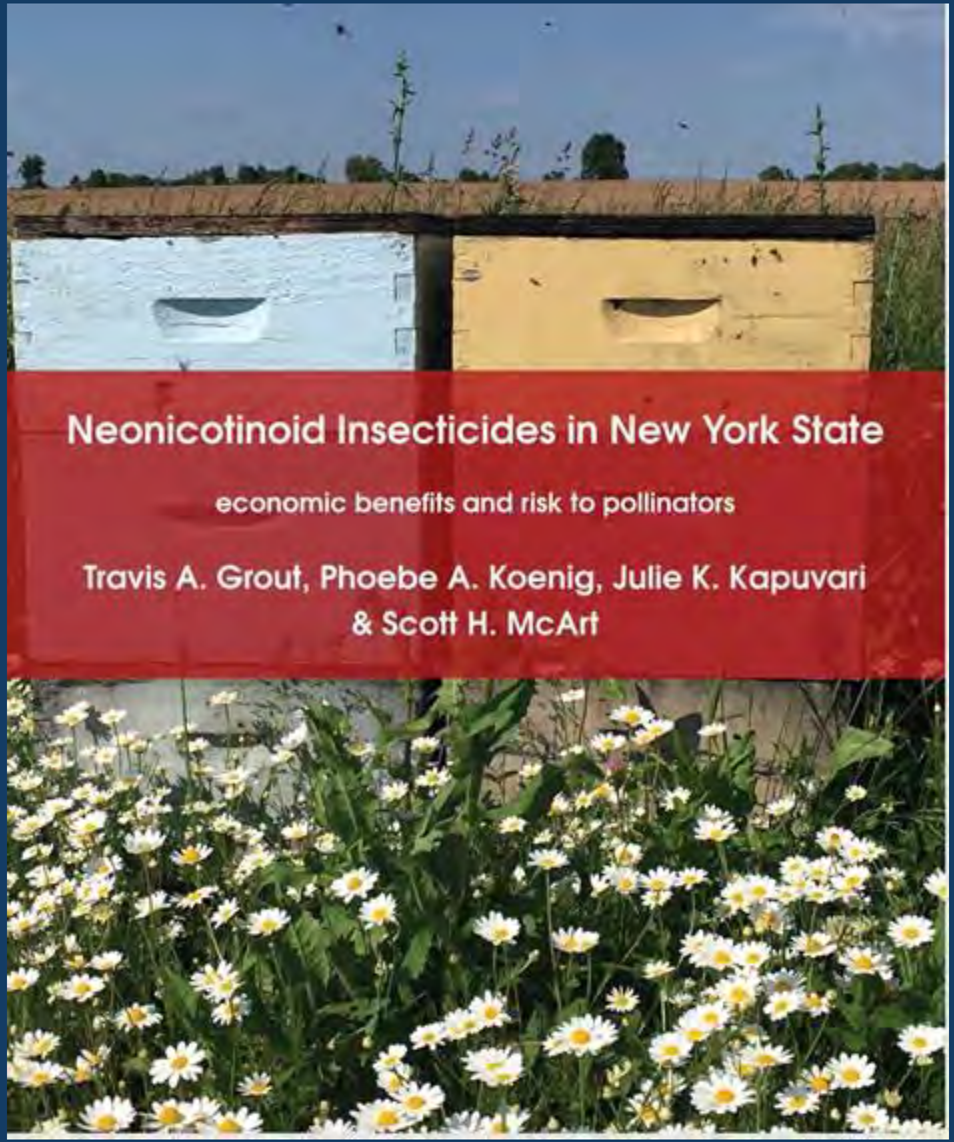
Target High Harm, Low Benefit Uses

Lawns, golf courses, and ornamental landscaping

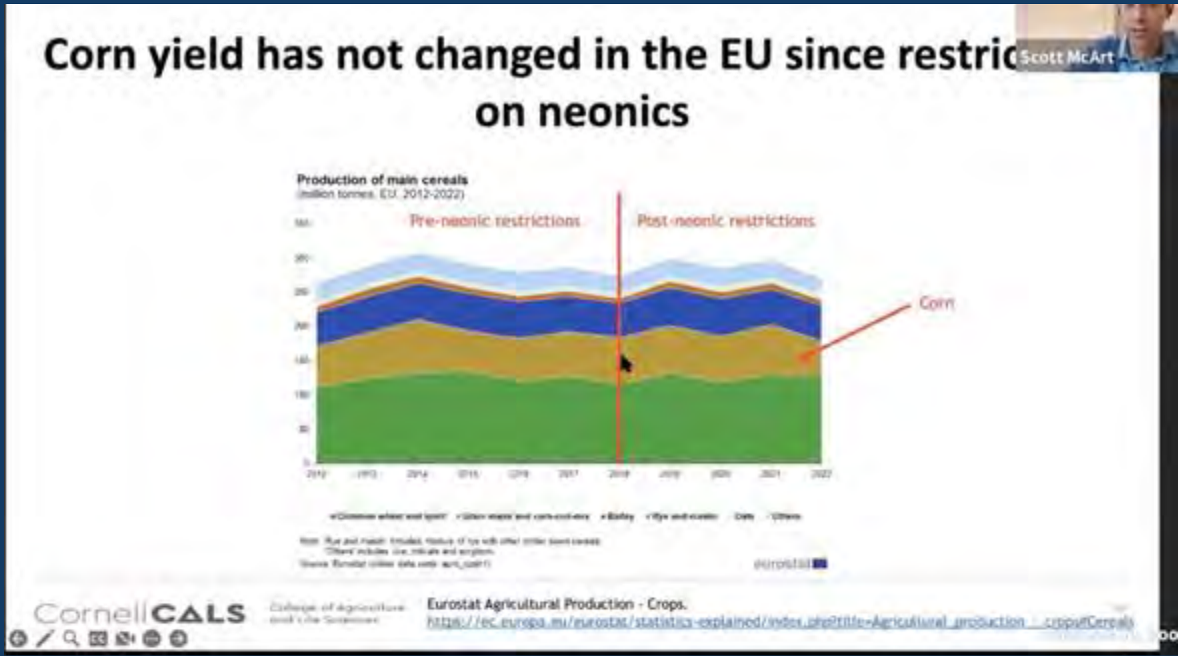
- CT Agricultural Experiment Station (CAES) study shows neonic use for grub control on turf grass is ineffective. Grubs are becoming resistant to neonics. (Clavet, 2014)

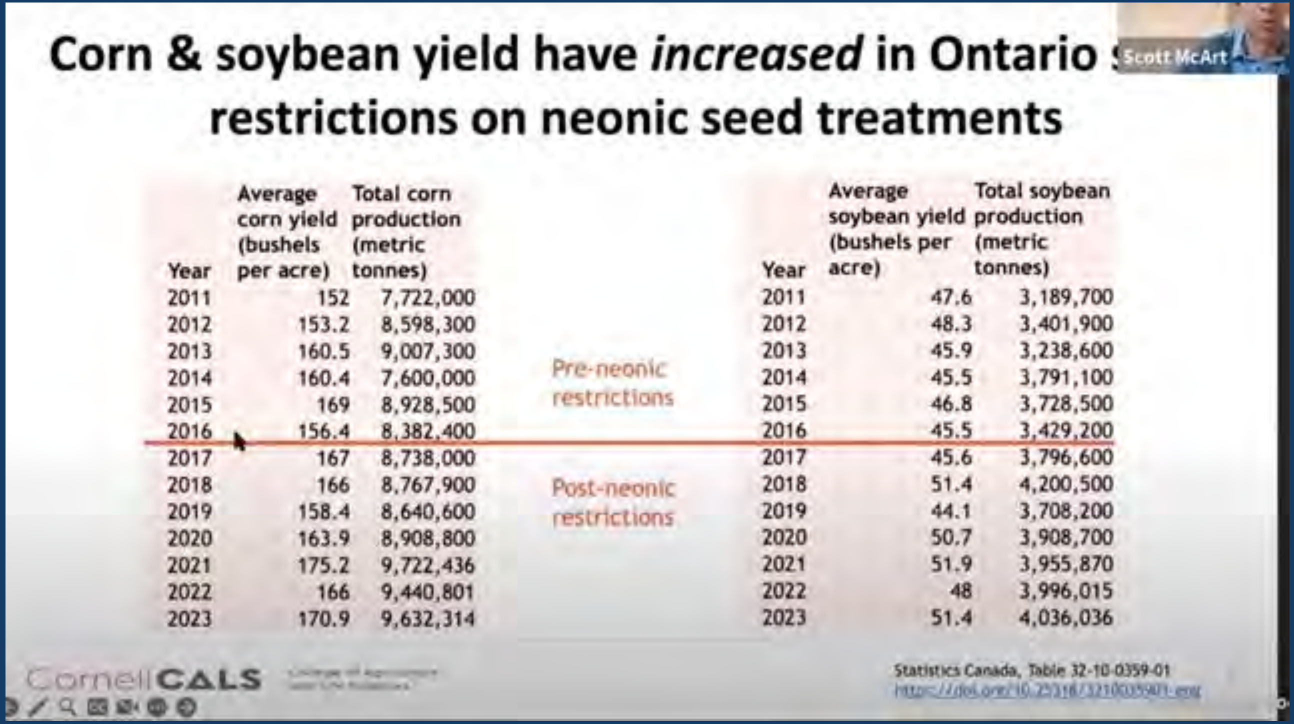
Seed treatments on row crops (corn, soy, wheat)

- The landmark Cornell report looked at 400 studies that included 5000 side-by-side field tests comparing performance of a neonicotinoid-based insecticide to that of a chemical or nonchemical alternative.
- Neonics provide consistent economic benefit in fruit and vegetable uses
- By contrast: 87-93% of field trials find no increase (or a decrease) in corn yield compared to chemical alternatives or untreated controls when neonicotinoid-treated seeds are used in corn within the state, region, or North America.



Yields have Not Declined in Europe & Canada




Corn & soybean yield have *increased* in Ontario s
restrictions on neonic seed treatments

Year	Average corn yield (bushels per acre)	Total corn production (metric tonnes)		Year	Average soybean yield (bushels per acre)	Total soybean production (metric tonnes)
2011	152	7,722,000		2011	47.6	3,189,700
2012	153.2	8,598,300		2012	48.3	3,401,900
2013	160.5	9,007,300		2013	45.9	3,238,600
2014	160.4	7,600,000	Pre-neonic	2014	45.5	3,791,100
2015	169	8,928,500	restrictions	2015	46.8	3,728,500
2016	156.4	8,382,400		2016	45.5	3,429,200
2017	167	8,738,000		2017	45.6	3,796,600
2018	166	8,767,900	Post-neonic	2018	51.4	4,200,500
2019	158.4	8,640,600	restrictions	2019	44.1	3,708,200
2020	163.9	8,908,800		2020	50.7	3,908,700
2021	175.2	9,722,436		2021	51.9	3,955,870
2022	166	9,440,801		2022	48	3,996,015
2023	170.9	9,632,314		2023	51.4	4,036,036

Cornell CALS

Statistics Canada, Table 32-10-0359-01
https://doi.org/10.25318/3210035901-eng

Slides from testimony by Cornell's Scott McArt before the Vermont legislature

Pollinator Protection Bills

House Bill 6916 is the bill advocates proposed. It limits use on

(1) turf grass, lawns, golf courses, playing fields; all outdoor ornamental plants; property owned by or leased to the state or any municipality; or corn, wheat, or soybeans.

(2) corn, soy or wheat agricultural seeds.

Senate Bill 9 includes neonics language that limits only non-agricultural use on

1) turf grass, lawns, golf courses, playing fields; non-ag outdoor ornamental plants (those not for sale)

Connecticut Has Been a Leader

- 1999 created the yellow signs warning of pesticide use
- 2010 bans the use of pesticides on school grounds
- 2015 banned pesticides from municipal playgrounds
- 2016 passes the pollinator protection act making neonics restricted use
- 2022 bans the use of chlorpyrifos on golf courses

Your Voices Matter So Much for This Next Step!

The opposition today

- Chemical Industry lobbyists
- Groundskeepers Associations
- CT Farm Bureau

Please consider calling or writing your state senator and house representative and maybe the farm bureau today!

Ask them to support this practical, science-based policy to balance the needs of farmers and the health of our environment

Bee an Influencer

"A little pressure goes a long way."

Lori Vollmer, owner of Garden Fever!
in Portland, Oregon

xerces.org

Photo: *Bombus occidentalis*- Rich Hatfield

Share your thoughts! Scan the QR codes below to fill out evaluations online for the 2025 Connecticut Land Conservation Conference

General Conference Evaluations

Workshop Evaluations