



Pesticides Wreak Havoc on Ecosystems

ADDING TO THE BODY OF SCIENCE: ECOSYSTEM DECLINE

In taking a holistic approach to protecting ecosystems and the state of the environment, the question of pesticides' contribution to overall decline looms large. Studies in 2021 show a pattern of alarming adverse effects and decline. We can see this in the plummeting numbers of monarch butterflies, the decline of honey bees (2021 saw the second highest honey bee loss in 15 years) and native bees, and the diseases and ecological threats facing hummingbirds, wild and farmed salmon populations, sea lions, manatees, giant pandas, turtles, bats, soil invertebrates, and freshwater bacteria, zooplankton, and aquatic insects (threatening the freshwater aquatic food web). A study

of marine life shows a direct relationship between the adverse health of marine organisms and pesticide-intensive forestry practices in coastal areas.

While it is often reported that eagles have made a comeback after the disastrous decline in their population from DDT in the 1970s, a study in 2021 unraveled a "mystery" of mass declines in bald eagles and other top-level avian predators due to vacuolar myelinopathy, a neurological illness, likely introduced by brominated herbicides that are used to manage so-called invasive species.

Scientists continue to document the devastating effects associated with neonicotinoid (neonic) insecticides, which are systemic and move

through the vascular system of plants and then are expressed through pollen, nectar, and guttation droplets, causing indiscriminate poisoning. A study documents the death of pollinators forcing farmers in Kenya to resort to hand pollinating. EPA itself published a biological evaluation that finds the three most commonly used neonic insecticides are likely causing the greatest share of harm to endangered species and their habitat. Pesticides are associated with reduced fertility in perennial plants, and the nondisclosed “proprietary” ingredients in these products are harming pollinators. Despite these ecosystem disasters, the U.S. Fish and Wildlife Service proposed dropping 1.5 tons of rodenticides on the Farrallon Islands National Wildlife Refuge off the Northern California coast to control rodents, which will unleash secondary poisonings.

Resistance is a reemerging theme that challenges the wisdom of the broad use of toxic chemicals in agriculture, forestry, and land management, with the science in 2021 documenting antibiotic resistant bacteria (greater abundance of genes associated with antibiotic resistance) in agricultural soils after being sprayed with glyphosate, glufosinate, or dicamba. These resistant bacteria move throughout the environment, ultimately creating deadly vulnerabilities for all organisms, including humans. Similarly, fungal resistance to antimicrobial pesticides is

documented as raising a parallel threat. Mosquito and deer tick resistance to insecticides is resulting from pesticide use, reenforcing the shortsightedness of a toxic chemical rather than a preventive approach to insect management. Similarly, weed resistance to new herbicides has become more pervasive in chemical-intensive agriculture, forcing chemical-intensive farmers to stay on the treadmill of more toxic chemistries.

On the disposal end of synthetic pesticide and fertilizer dependency is the reporting of a predictable accident in Florida from an overflowing toxic waste lagoon, created in large part by the synthetic fertilizer industry’s waste products.

Meanwhile, a study on the value of a healthy ecology shows that uncultivated field margins contain almost twice as many beneficial insects as cropped areas around farm fields. The study finds that these predators and parasitoids overwinter in diverse vegetation and provide a critical ecosystem service when spring pest imbalances emerge. The depth and breadth of the published studies documenting destruction caused by pesticides in this section offers an opportunity to see beyond the problems associated with individual pesticides, but to systems of land and insect management that effectively ignore the critical importance and economic value of healthy ecosystems to a livable future.



Long-Term Roundup Exposure Found to Harm Keystone Wildlife Species

JANUARY 6, 2021 | Long-term exposure to formulated Roundup (glyphosate) results in significant harm to wildlife species that form the bottom of aquatic food chains, according to a study published in *Microbiome* by researchers at University of Birmingham, UK. The

water flea *Daphnia spp.* often functions as a keystone species in lakes and ponds, and because of its ecological importance is frequently used as an indicator species in toxicity tests performed by pesticide regulators. Coauthor Luisa Orsini, PhD notes that most of this testing is flawed by limitations in its scope. “The problem is that much of the evidence is rooted in outdated toxicity tests which only look at the number of animals that die on exposure to extremely high concentrations

of these chemicals,” Dr. Orsini said. “These tests also overlook the pathological effects arising from long-term exposure to low doses. What we’re proposing is that toxicity is measured by looking at what happens to the animal at a molecular and fitness level following long-term exposure, which encompasses the entire animal life cycle.” Dr. Orsini and her research team exposed populations of *Daphnia magna* to the maximum contaminant level (1 mg/L), set by the U.S. Environmental Protection Agency (EPA) for both the formulated product Roundup and technical grade glyphosate over the course of the animal’s life. The team then investigated a range of impacts and adverse changes that occurred as a result, including fitness burden, genotoxicity (damage to DNA), and alterations within the water flea’s gut microflora. A control population received no chemical exposure. Changes in fitness were seen for every trait except mortality. Roundup delayed average age of sexual/reproductive maturity, reduced size at maturity, decreased the total number of offspring produced, and increased developmental failure—as determined by the number of aborted eggs, and juveniles borne dead. [Suppa, Antonino et al. Roundup causes embryonic development failure and alters metabolic pathways and gut microbiota functionality in non-target species. *Microbiome*. 8(170), 2020.]

Monarch Butterfly Near Extinction—Calls for Urgent Federal Action

JANUARY 27, 2021 | Lowest ever recorded! That’s the result of a [yearly winter monarch count](#) along the California coast, overseen each year by the conservation group Xerces Society. In 2020, citizen scientists counted only 2,000 butterflies. The findings indicate that many on the planet today are likely to experience, within their lifetimes, a world where western monarchs are extinct—unless the federal government acts now. Western monarchs migrate



from the Pacific Northwest to overwintering grounds along the California coast, where they remain in relatively stationary clusters that are easy to count. In the 1980s, roughly 10 million monarchs overwintered along the coast. By the 1990s, that number fell into the low single digits, roughly 1.2 million. Five years ago counts were at roughly 300,000. By 2019, numbers crashed below 30,000. [Xerces, 2021.]

Persistent Organic Pollutants like Organochlorine Pesticides Pose Health Risk to Rare Giant Panda Subspecies

JANUARY 28, 2021 | Persistent organic pollutants (POPs)—including banned pesticides—present a health risk to the endangered Qinling Panda (*Ailuropoda melanoleuca qinlingensis*), the rarest subspecies of giant pandas, according to a Chinese study published in *Environmental Pollution*. Organochlorine compounds (OCs), such as organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs), are persistent organic pollutants banned by the Stockholm Convention treaty in 2001 (U.S. is not a signatory) and are primary pollutants of concern (UNEP, 2009) because of their persistence, toxicity, and adverse effects on environmental and biological health. Although various studies demonstrate the volatile, toxic nature of POPs, much less research evaluates the impact that POPs have on biodiversity over

time. The globe is currently going through the [Holocene Extinction](#), Earth’s 6th mass extinction, with one million species of plants and animals at risk. With the increasing rate of biodiversity loss, advocates say it is essential for government agencies to research how previous and ongoing use of POPs can impact present-day species. Likewise, collaborative, global monitoring of POPs can help leaders identify the effect on vulnerable species of the chemicals’ long-range transport and the most effective unified global strategy. Researchers note, “We provide data for health risk assessment that can guide the identification of priority congeners [different forms of the same chemical structure] and recommend a long-term monitoring plan. This study proposes an approach to ecotoxicological threats whereby giant pandas may be used as sentinel



species for other threatened or endangered mammals. By highlighting the risks of long-distance transmission of pollutants, the study emphasizes the importance of transboundary cooperation to safeguard biodiversity.” [Zhao, Yan et al. Organochlorine compounds pose health risks to the Qinling Giant Panda (*Ailuropoda melanoleuca qinlingensis*), *Environmental Pollution*. 273:116427, 2021.]



Groups Urge Endangered Species Listing for American Bumblebee after 89% Population Decline

FEBRUARY 10, 2021 | Pollinator advocates are [petitioning the U.S. Fish and Wildlife Service](#) (USFWS) to list the American bumblebee (*Bombus pensylvanicus*) under the *Endangered Species Act*. The petitioners are the Bombus Pollinator Association of Law Students at Albany Law School and the Center for Biological Diversity. Like many other wild pollinators, the American bumblebee has undergone dramatic reductions in recent decades. According to petitioners, the last 20 years saw an 89% decline in the pollinator's population. Declines of the American bumblebee have occurred throughout its range, which encompasses 47 of the lower 48 states. However, there are also particularly hard-hit regions. In New York, for instance, the pollinators have experienced a stunning 99% decline in relative abundance. Midwestern populations are also severely affected. Losses have followed in lockstep with declines in the [rusty patched bumblebee](#), which was listed as endangered in 2017. While the rusty patched has lost 90% of its midwestern range, the American bumblebee has experienced 83% declines. The petitioners note that the American bumblebee declined across a larger land area, and in several states where it was once the most populous pollinator. [Center for Biological Diversity, 2021.]

Aggressive Cancer in Sea Lions Linked to Ocean Pollution and Herpesvirus Precursor, Implications for Human Health

JANUARY 11, 2021 | California sea lions (*Zalophus californianus*) are experiencing high rates of urogenital carcinoma (UGC) cancer incidence from the combined effect of toxic "legacy" pesticides like DDT and the viral infection Otarine herpesvirus-1 (OtHV1), according to a study in [Frontiers in Marine Science](#). Previous research documents the role herpesvirus infection, genotype, and organochlorine pesticides play in sea lion cancer development. However, synergism (collaboration) between a viral infection and toxic chemical



exposure increases cancer development odds. Pollution of the oceans with toxic chemicals lacks adequate regulation, is widespread and only getting worse. More than 80 percent of ocean pollution comes from land-based, anthropological activities. A recent study, published in [Annals of Public Health](#), finds toxic chemicals from pesticides, heavy metals, plastics, and other sources readily contaminate the ocean, especially near coastal regions where chemical inputs occur in higher concentrations. Scientists for this study assess cancer incidence among 394 California sea lions for 20 years. Using a stepwise regression model, scientists find herpesvirus condition, exposure to contaminants, and blubber depth aid in UGC cancer development, but not the genotype.

The risk of developing UGC is nearly 44 times higher in sea lions with herpesvirus infections. Furthermore, UGC risk increases 1.48-fold per every unit of contaminant concentration within blubber. [Gulland, Frances et al. *Persistent Contaminants and Herpesvirus OtHV1 Are Positively Associated with Cancer in Wild California Sea Lions (Zalophus californianus)*. *Frontiers in Marine Science*. December 2020.]

Herbicide Use in "Regenerative" No-Till Contaminates Waterbodies

FEBRUARY 19, 2021 | *Vermont Public Radio* (VPR) reports on revelations from a retired state scientist, Nat Shambaugh, who finds that farmers' efforts to reduce agricultural runoff from fields into waterbodies, by planting cover crops, has resulted in significant increases in the use of herbicides to kill off those crops. So as one kind of pollution is reduced, another has become intensified. In Vermont and elsewhere, there has been much attention paid to nutrient pollution of waterbodies and waterways from agricultural runoff, largely because phosphorous and nitrates from fertilizers lead to [contaminated drinking water](#), as well as to blooms of algae (some of which have their own toxic byproducts) and hypoxic dead zones in waterbodies. The most notorious of these dead zones in North America are at the mouth of the Mississippi River, as it empties into the [Gulf of Mexico](#), and in [Lake Okeechobee in Florida](#). Less



attention has been given generally to the problem of [pesticide residues and metabolites in agricultural runoff](#), which also threaten drinking water sources, ecosystem health, and biodiversity. The report from VPR indicates that the increases in herbicide use may well be contaminating the state's watery gem, Lake Champlain, and questions whether the state's Agency of Agriculture is acting sufficiently on its policy to reduce pesticide use. The Vermont official in charge of pesticide regulation has explained the idea behind this shift to chemical "no-till" (cover cropping plus herbicide kill-off of that crop). As dairy farmers instituted cover cropping to reduce nutrient runoff from their silage corn fields, they would adopt genetically engineered (GE) corn seed plus the herbicide Roundup, with which the GE seed must be paired, as a "trade" of one toxic chemical (atrazine) for another (glyphosate/Roundup). [Vermont Public Radio, As Farmers Plant cover Crops to Reduce Runoff, Report Says They Also Use More Herbicides, 2021.]



Hummingbirds Harmed by Pesticides Killing Off Bees, Butterflies, and Other Pollinators

FEBRUARY 23, 2021 | The same pesticides implicated in the worldwide decline of insect pollinators also present significant risks to their avian counterparts, hummingbirds. Well-known for their nectar-fueled hovering flight

powered by wings beating over 50 times per second, hummingbirds display unique reactions to toxic pesticides. Researchers at the University of Toronto published in [Scientific Reports](#) findings that a hummingbird's exposure to systemic neonicotinoid insecticides for even a short period of time can disrupt the high-powered metabolism of this important and charismatic animal. Scientists began their experiment by trapping 23 wild ruby-throated hummingbirds and housing them in an animal care facility. One group of birds acted as a control and received no pesticide exposure, while the rest were assigned either low, middle, or high exposure (1 part per million [ppm], 2ppm, and 2.5ppm, respectively) to the neonicotinoid [imidacloprid](#). Scientists determined these amounts based upon probable nectar contamination in the real world. The pesticide was incorporated into the sugar solution provided to the birds over the course of three days. Within two hours of exposure to the pesticides, hummingbird metabolism dropped significantly. While the control group increased energy expenditure between 1% to 7%, the low exposed group displayed a 6% average decline, the medium a 10% decline, and the high exposure group showed 25% reduced energy expenditure. [English, Simon et al. Neonicotinoid pesticides exert metabolic effects on avian pollinators. *Scientific Reports*. 11:2914, 2021.]

Glyphosate and Other Weed Killers Create Antibiotic Resistant Bacteria in Agricultural Soils

FEBRUARY 24, 2021 | Soil sprayed with weed killers *glyphosate*, *glufosinate*, or *dicamba* are likely to contain higher amounts of antibiotic resistant bacteria, according to research published in [Molecular Biology and Evolution](#). Each year in the U.S., at least two million people develop an antibiotic resistant infection and over 23,000 die. Authors



of the study say widespread herbicide use is likely playing a role. "Our results suggest that the use of herbicides could indirectly drive antibiotic resistance evolution in agricultural soil microbiomes, which are repeatedly exposed to herbicides during weed control," said Ville Friman, PhD of the University of York in the United Kingdom. Scientists began their investigation by looking at changes to soil communities in [soil microcosms](#) over the course of roughly two months. Microcosms were grouped by the herbicide applied, while a control microcosm remained unexposed. Contrary to the pesticide industry's claim that these chemicals break down quickly and become inert by binding to soil particles, large proportions of the herbicides remain in the soil at the end of the 60-day experiment, stemming back from the first application. For glyphosate, 18% remained, glufosinate 21%, and dicamba 34%. Although no significant changes to bacterial diversity, abundance, or richness were observed, researchers found that herbicide-exposed soils contain a greater abundance of genes associated with antibiotic resistance, as well as a higher number of mobile genetic elements. [Liao, Han-peng et al. Herbicide Selection Promotes Antibiotic Resistance in Soil Microbiomes. *Molecular Biology and Evolution*. 38(6):2337–2350. 2021.]

Implications for Human Health: Glyphosate-Related Soil Erosion Re-Releases Toxic Pesticides from Soil

MARCH 4, 2021 | A study in *Environmental Science and Technology* finds that glyphosate use stimulates soil erosion responsible for releasing the banned, toxic pesticide chlordecone (Kepone), which was used in banana production in the French West Indies (Martinique and Guadeloupe). For years, an unknown pollution source continuously contaminated water surrounding the islands. However, researchers from the University of Savoie Mont Blanc in France have found that chlordecone—extensively used on banana farms from 1972 to 1993—is the contamination culprit in combination with the most popular herbicide **glyphosate**, which is ubiquitous in the environment. Researchers note, “[Chlordecone] fluxes drastically increased when glyphosate use began, leading to widespread ecosystem contamination. As glyphosate is used globally, ecotoxicological risk management strategies should consider how its application affects persistent pesticide storage in soils, transfer dynamics, and widespread contamination.” [Sabatier, Pierre et al. Evidence of Chlordecone Resurrection by Glyphosate in French West Indies. *Environmental Science and Technology*. 55(4):2296–2306, 2021.]



Solitary Wild Bees Harmed by Neonicotinoid Pesticides Applied by Soil Drenching

MARCH 2, 2021 | Populations of solitary ground nesting bees decline after exposure to neonicotinoid insecticides, according to a study in *Scientific Reports*. In addition to ground nesting bees, neonicotinoids have been shown to harm **butterflies, hummingbirds, songbirds, aquatic species** and **mammals**, including **humans**. As independent science continues to look beyond the effects of these systemic chemicals on honey bees and bumblebees, advocates maintain that it has become increasingly clear that the high hazards presented by neonicotinoids necessitate their complete elimination. “Farmers need to protect their crops from pests, but they also absolutely need to protect pollinators from the unintended effects of pesticides,” said study coauthor Susan Willis Chan, PhD. “The data on this particular [neonicotinoid] product are so clear that there’s really no question about what has to happen. We have to find something else.” Researchers focused their investigation on how various systemic pesticides affect the hoary squash bee (*Eucera pruinosa*), a ground nesting bee found throughout North America that feeds entirely on pollen from cucurbits (including squash, cucumber, pumpkin, gourds, etc). The hoary squash bee provides essential pollinator services for these crops throughout the U.S. and Canada. Neonicotinoids and other systemic insecticides are often applied in an attempt to manage cucumber beetles, which consume these crops and can spread disease to susceptible plants. [Chan, Willis et al. Population decline in a ground-nesting solitary squash bee (*Eucera pruinosa*) following exposure to a neonicotinoid insecticide treated crop (*Cucurbita pepo*). *Scientific Reports*. 11:4241, 2021.]



Ecosystem Health: Pesticide Use from Forest Management Practices Threatens Essential West Coast Marine Organisms

MARCH 11, 2021 | A Portland State University (PSU) study, published in *Toxics*, finds that pesticides from the forestry industry threaten clams, mussels, and oysters (bivalves) along the Oregon state coast. Bivalves are excellent indicator species, signaling environmental contamination through their sedimentary, filter-feeding diet. However, continuous pesticide inputs—from various forestry management regimes—into watersheds along Oregon’s coastal zone endanger these species in downstream rivers and estuaries (river mouths). Although research demonstrates many forestry practices (e.g., road building, planting, clearcutting, thinning) have cumulative effects on the ecosystem, there is a lack of studies addressing the overall impact of multiple chemical mixtures and application on watersheds and subsequent aquatic transport. The study results detect 12 different chemical compounds (two herbicides, three fungicides, and seven insecticides) in both water and bivalve samples—five of which are current-use pesticides in forest management. Although pesticide concentration and type vary by season, organism, and watershed location, 38 percent of bivalve samples harbor pesticide concentrations high enough to accumulate in tissues. *Indaziflam* (a current-use herbicide in Oregon forestry) is present in seven percent of bivalve samples.



Kenyan Farmers Are Resorting to Hand Pollination After Pesticide Use Kills Off Local Pollinators

MARCH 24, 2021 | The worst predictions of scientists and advocates are playing out in the fields of eastern Kenya, as chemical-intensive farming there threatens the future of food production. According to *Radio France Internationale* (RFI), Kenyan farmers have resorted to pollinating their crops by hand after pesticide use killed off most of the pollinators they rely on. “We are mostly affected by pesticides because they have killed most pollinators which pollinate our crops—this has affected our food production compared to previous years,” said Joseph Mbithi, a farmer in Mbakoni village, Makueni County, Kenya to RFI. Crop yields in the region have tapered off over the last two years, and farmers like Mr. Mbithi are pointing to pesticide use as the cause, citing past reliance on the herbicide *Roundup* (glyphosate) and the organophosphate insecticide *malathion*. “Pollinators such as bees and butterflies are not around due to chemicals which we spray in our farms,” he told RFI. [Radio France Internationale, 2021.]

Furthermore, water samples find current-use herbicides, *hexazinone* and *atrazine*, and banned pesticides, like DDT/DDE, contribute to aquatic contamination downstream. [Kaegan Scully-Engelmeyer, Kaegan et al. Exploring Biophysical Linkages between Coastal Forestry Management Practices and Aquatic Bivalve Contaminant Exposure. *Toxics*. 9(3):46, 2021.]

Endangered Florida Manatees Contaminated with Glyphosate/ Roundup Due to Widespread Use

MARCH 30, 2021 | Florida manatees are experiencing chronic glyphosate exposure that is likely to impact their immune system and make them more susceptible to other environmental

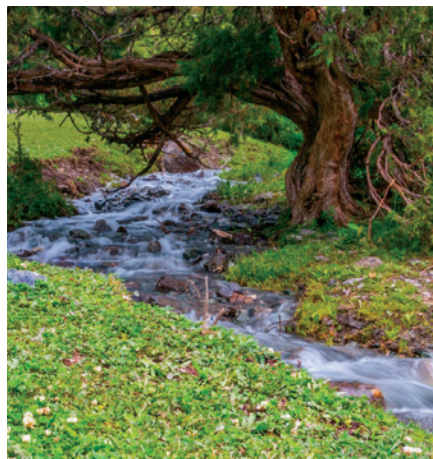


stressors such as red tide and cold stress, according to a study published in *Environment International* by a Florida-based team of researchers, led by University of Florida PhD candidate Maite De Maria. Florida manatees, a subpopulation of the West Indian manatee, are listed as threatened under the *Endangered Species Act*, as populations are under constant threat from human activity in the freshwater ecosystems they rely on. Results find glyphosate in the bodies of 55.8% of Florida manatee samples. Most concerning, the amount of pesticide increased in a straight line over the course of the study. Scientists found no correlation between the size or sex of the manatee and its glyphosate body burden. Authors of the study indicate that it is appropriate to consider glyphosate a “pseudo-persistent” (resulting from continuous runoff or exposure) pollutant, “in which new applications of the herbicide replace the molecules that are being removed,” the study reads. [De María, Maite et al. Chronic exposure to glyphosate in Florida manatee. *Environment International*. 152: 106493, 2020.]

Hazardous Pesticide Breakdown Chemicals Found in Streams Nationwide, Raising Health Concerns

MARCH 31, 2021 | Pesticide breakdown products are just as ubiquitous as their parent compounds in urban streams throughout the U.S., according to

research conducted by the U.S. Geological Survey (USGS) and published in *Environmental Science and Technology*. The first of its kind findings place an important spotlight on the long-term impacts of pesticide use on health and the environment. As new analytical methods provide evidence of dangers that were until now unable to be recorded, the data point to the need for a wholesale rethinking of the way pesticide products are approved by the U.S. Environmental Protection Agency, and community-based measures to protect local waterways. Of the active ingredients sampled, at least one pesticide was detected in 418 of 442 total stream samples, representing a 95% detection rate. Breakdown products are just as widespread, with 396 out of 442—90% of streams sites showing detects. According to the study, 102 breakdown products are detected at least once, and nearly 30 are detected in over 20% of samples. Researchers specifically point out the danger of detecting transformation products in small, headwater streams throughout the country. “The presence of pesticides and TPs [transformation products] in headwater streams is of particular interest because such streams comprise the majority of river network length and have a higher proportion of biodiversity than larger water bodies,” the study reads. [Mahler, Barbara et al. Inclusion of Pesticide Transformation Products Is Key to Estimating Pesticide Exposures and Effects in Small U.S. Streams. *Environmental Science and Technology*. 55(8):4740–4752, 2021.]



Invertebrates and Plants Face Increasing Threat from Pesticide Use, Despite Declining Chemical Use Patterns



APRIL 8, 2021 | Pesticide use threatens aquatic and terrestrial invertebrates and plants more than ever, despite declining chemical use and implementation of genetically engineered (GE) crops in the U.S., according to a University Koblenz-Landau, Germany study published in *Science*. Since the publication of Rachel Carson’s *Silent Spring* (1962), many environmental agencies have banned the use of pesticides like organochlorines, organophosphates, and carbamates for their devastating toxic—sometimes lethal—effects, particularly on vertebrates, including humans. However, these restrictions created a pathway for a new generation of pesticides (e.g., neonicotinoids, pyrethroids) to take hold. Although these pesticides are more target-specific, requiring lower chemical concentrations for effectiveness, they have over double the toxic effects on invertebrates, like pollinators. Invertebrates and plants are vital for ecosystem function, offering various services, from decomposition to supporting the food web. Furthermore, invertebrates and plants can act as *indicator species* (bioindicators) that scientists can observe for the presence and impact of environmental changes and stressors. Therefore, reductions in invertebrate and plant life have implications for

ecosystem health that can put human well-being at risk. Study lead author Ralf Schulz, PhD [notes](#), “[This study] challenge[s] the claims of decreasing environmental impact of chemical pesticides in both conventional and GM [genetically modified or genetically engineered (GE)] crops and call for action to reduce the pesticide toxicity applied in agriculture worldwide.” [Schulz, Ralf et al. Applied pesticide toxicity shifts toward plants and invertebrates, even in GM crops. *Science*. 372(6537):81, 2021.]



Chemical-Intensive Land Management Contributes to Toxic Lagoons Overflowing with Synthetic Fertilizer Waste

APRIL 9, 2021 | In early April 2021, the leaking, open-air, Piney Point storage pond near Tampa, Florida forced hundreds of resident evacuations over concerns that the “reservoir” would breach and flood a three-county area with what was described as a potential “20-foot wall of water.” Ultimately, controlled releases from the 480-million-gallon “pond” (into Tampa Bay) avoided such a flood, but the event underscores the “ticking bomb” nature of such open-air, [toxic-liquid-waste facilities](#), which are used by multiple industries in the U.S. Among those are, as in this case, the phosphate mining sector, and the synthetic fertilizer industry. The latter is tied directly to the chemical-intensive

agriculture crisis, and to the exact kind of waste storage facility at issue in the Florida event. As reported by *The New York Times*, the Florida storage pond contains “legacy processed water”—code for wastewater with traces of heavy metals and other toxicants—contained by walls of phosphogypsum tailings at least 70 feet high. Phosphogypsum tailings are the leftover waste when phosphate ores are processed to create phosphoric acid, an ingredient used in synthetic fertilizers. Most of the 23 million tons of phosphate mined annually in the U.S. is used in production of such fertilizers and generates enormous amounts of phosphogypsum waste. The nearly wholesale agricultural (and other land management) adoption of synthetic chemical fertilizers is contributing to multiple negative environmental and public health and safety problems. The demand for these fertilizers drives the mining of phosphate, with its toxic byproducts—toxic and radioactive waste in “process” water and phosphogypsum stacks. The processing of mined sulfur, another ingredient, causes significant emissions of sulfur dioxide into the atmosphere; this gas damages terrestrial and aquatic ecosystems through the increased acidity it causes in rainfall. Sulfur dioxide also contributes to the development and severity of human respiratory disorders. The nitrates in synthetic fertilizers degrade soil health, and are a huge cause, via agricultural runoff from fields, of nutrient deposition in waterways, which can cause multiple environmental impacts. The excess nitrogen in these fertilizers is also driving global nitrous oxide (N₂O) emissions dangerously high, exacerbating the climate crisis. Manufacturers of these fertilizers often use a nitrogen-heavy ratio of the three “NPK” inputs: nitrogen, phosphorous, and potassium. Nitrogen supports growth and photosynthesis (so plants “green up” readily), which can be achieved with organic practices.. [Tabuchi, Hiroko. “Florida Crisis Highlights a Nationwide Risk from Toxic Ponds.” *The New York Times*. April 6, 2021.]



“No Pollinator is Safe”—New Evidence of Neonicotinoids Harming Wild, Ground Nesting Bees

APRIL 13, 2021 | A study is making it increasingly clear that current laws are not protecting wild, ground nesting bees from the hazards of neonicotinoid insecticides. According to research conducted under a grant from the U.S. Department of Agriculture’s [Sustainable Agriculture Research and Education \(SARE\)](#) projects, Blue Orchard Mason Bees (*Osmia spp*) are at particular risk from pesticide-contaminated soil they use to create their nest. Authors of the study note that with honey bees already in decline, pollination services provided by wild managed bees like Mason bees are growing in importance. “Wild bees such as *Osmia* are becoming increasingly popular as managed pollinators in many systems, as there is growing concern that honeybees may not be able to continue to meet the increasing demands of agricultural pollination if these trends continue,” the study reads. The study found no trend to the mason bee’s ability to distinguish between contaminated and uncontaminated soil. Embryos appeared to be resilient to the effects of pesticide exposure. However, female mason bees were harmed by soil contact exposure, with effects on fitness noted at each exposure level. At the highest exposure rate, researchers observed a 66% decline in nesting activity as females produced 40% fewer

offspring overall. Nesting activity was similarly reduced by 42% in the medium exposed group. For the lowest exposures at 50 ppb (the equivalent of adding 50 drops of pesticide in a 10,000 gallon swimming pool), the sex ratio for offspring was skewed toward male bees. This group had 50% fewer female bees than the unexposed control group. [Fortuin, Christine. Effects of Imidacloprid Soil Drench Applications on Nesting Blue Orchard Mason Bees (*Osmia lignaria*). Sustainable Agriculture and Education Projects, 2021.]

Roundup Shown to Kill Bees— But Not How You Might Expect

APRIL 20, 2021 | Roundup products manufactured by Bayer-Monsanto kill exposed bumblebees at high rates, according to a study published in the *Journal of Applied Ecology*, which points to undisclosed inert ingredients (those that typically make up a majority of the product formulation) as the



primary culprit. Roundup products have become synonymous with their main active ingredient [glyphosate](#), but Bayer-Monsanto has been quietly reformulating its flagship product with different herbicides in a likely rebranding attempt, as [glyphosate cancer lawsuits](#) drag down the company. The study reveals that these new Roundup products present the same hazards to pollinators as glyphosate-based formulations, raising important questions about the pesticide regulatory process. The “no glyphosate” formulation of Roundup being sold in the UK and European Union is differ-



Meta-Review: Pesticides Kill or Harm Soil Invertebrates Essential to Soil Health

MAY 7, 2021 | Soil health is one of the linchpins on which the food production that sustains human life—as well as biodiversity, pollinator health, and carbon sequestration—depends. A recent meta-review in *Frontiers in Environmental Science* of nearly 400 studies finds that, in 71% of the cases reviewed, pesticides kill or otherwise harm soil invertebrates that contribute mightily to soil health. The researcher writes, “A wide variety of soil-dwelling invertebrates display sensitivity to pesticides of all types. . . . [These results] support the need for pesticide regulatory agencies to account for the risks that pesticides pose to soil invertebrates and soil health.” Beyond Pesticides, concurs with that conclusion, and adds that the real solutions to noxious pesticide impacts lie in the adoption of regenerative organic approaches to all land management because they obviate any need for petroleum-based toxic chemical controls. The study also notes that research studies on pesticide impacts often “use a narrow range of surrogate species that are easy to rear, identify, or study, while smaller and more cryptic organisms are rarely analyzed. In some cases, the organisms that are the most extensively studied are known to be less sensitive to pesticides than other organisms, suggesting that we have limited knowledge of the extent of harm caused by pesticides.” [Gunstone, Tari et al. Pesticides and Soil Invertebrates: A Hazard Assessment, *Frontiers in Environmental Science*. May, 2021.]

ent than “no glyphosate” formulations being sold in the U.S. In the U.S., Bayer-Monsanto is selling a product line called Roundup® for Lawns which contains four different main active ingredients: [dicamba](#), [MCPA](#), [quinclorac](#), and [sulfenatrons](#). The UK/EU version of the product appears to only contain acetic acid (vinegar), a least-toxic substance that presents moderate hazards

to pollinators from exposure. However, the results raise the likelihood that it is primarily the so-called “inert” materials not disclosed on the Roundup label that are harming pollinators. [Straw, Edward et.al. Roundup causes high levels of mortality following contact exposure in bumble bees. *Journal of Applied Ecology*. 58:1167–1176, 2021.]



Ecological Mystery Unravels, With Toxic Pesticide Use at the Center

MAY 12, 2021 | In 2021, a team of scientists published in *Science* a piece that appears to solve an ecological mystery that had persisted for decades. Throughout the southeastern U.S., bald eagles and other top-level avian predators were experiencing mass deaths from a disease known as vacuolar myelinopathy (VM), a neurological ailment that causes lesions in affected animals' brains. Scientists identified the source of the exposure as a cyanobacteria growing on an invasive weed, but up until now, did not know how the bacterium caused disease. Now, scientists have determined that the chemical bromine, likely introduced by brominated herbicides in an attempt to manage invasive species, is the trigger for the production of the cyanobacteria's neurotoxin. While there are several sources of bromine (flame retardants and other industrial compounds, including fracking pollution) one of the most likely sources is the pesticide *diquat dibromide*. Pesticide products containing diquat dibromide are often applied in chemical-intensive control of hydrilla. [Breinlinger, Steffen et al. Hunting the eagle killer: A cyanobacterial neurotoxin causes vacuolar myelinopathy. *Science*. 371(6536), 2020.]



General Release of Honey Bees Threatens Wild Native Bee Populations and Ecosystems

MAY 12, 2021 | In a prime example of cart-before-the-horse, greenwashing, or perhaps "beewashing," a British company has badly missed the mark in its latest attempt to market a product while "doing good" and generating goodwill with customers. As *The Guardian* reports, Marks & Spencer, the giant United Kingdom (UK) retailer, is releasing 30 million managed honey bees into rural British landscapes in what the company is promoting as an effort to support biodiversity and the beekeeping sector. However, according to experts and environmental advocates, unleashing that many honey bees may well actually harm both wild native bees and honey bees themselves. [Critics of the move say](#) this means that wild bees will likely face fiercer competition for already inadequate food sources. [The Guardian, 2021.]

Threat to Ocean Health: Pesticide Resistant Fish Lice Plague the North Atlantic Ocean

JUNE 3, 2021 | (A report published in *Royal Society Open Science* finds pesticide-resistant parasitic lice (*Lepeophtheirus salmonis*) are endangering wild and farmed fish populations in the North Atlantic. Extensive use of pesticides to rid the parasite has led to widespread resistance to multiple pesticides,



prompting increasing infection rates among North Atlantic salmon populations. Some fisheries market aquaculture practices, like fish/seafood farming, as a solution to overfishing. However, the aquaculture industry repeatedly faces sustainability issues and fails to adhere to environmental standards that threaten marine health. Over the past two decades, organophosphate and pyrethroid insecticides have been the two main chemical classes used to control parasitic salmon lice. However, laboratory studies find increasing resistance among salmon lice to these chemicals, in addition to multi-resistance after *in vitro* crossbreeding. Since laboratory studies identify that multi-resistance to both chemical classes can occur via crossbreeding, researchers suggest this same resistance transpires in the field. From 2000 to 2017, researchers sampled 1,988 lice from Northeastern wild Atlantic salmonid (salmon, sea trout, and farmed salmon) populations. Researchers analyzed parasites for genetic markers for both pyrethroid and organophosphate resistance. The study results find genetic resistance among salmon lice has a spatiotemporal (location and time) evolutionary pattern. This pattern means that lice demonstrate simultaneous resistance to organophosphate and pyrethroid insecticides across the entire North Atlantic, except Canada. The crammed, over-treated nature of farmed fish creates an environment for these parasites to persist through regular winter die-offs. Resistant lice appear

in farm pens a few years post-treatment and leak via currents through the barrier, due to their small size. All oceans connect to one another, cycling nutrients, chemicals, and organisms throughout the world. [Borretzen, Helene et al. Losing the 'arms race': multiresistant salmon lice are dispersed throughout the North Atlantic Ocean. *Royal Society Open Science*. May 2021.]

Forestry Use of Glyphosate Reduces Fertility of Perennial Flowers and May Reduce Pollination

JUNE 22, 2021 | With its use in forested areas, glyphosate persists in the environment for years and can prompt morphological changes in perennial



Study Highlights Important Role Field Margins Play in Insect Conservation and Pest Management

JUNE 16, 2021 | Uncultivated field margins contain almost twice as many beneficial insects as cropped areas around farm fields, according to research published in the *Journal of Insect Science*. The study finds that these predators and parasitoids overwinter in diverse vegetation and can provide farmers with an important jump start on spring pest problems. "A benefit of understanding overwintering is that those arthropods that emerge in the spring may be more inclined to feed on pests when pest populations are low," said Scott Clem, PhD, coauthor of the study. "And so, they may be more likely to nip pest populations in the bud before the pest problem becomes a big deal." In total, researchers collected 4,226 insects they considered beneficial, accounting for 95 species of parasitoids and pest predators. Arthropods collected along field borders contain two times the diversity and abundance compared to the middle of crop fields. Dr. Clem continued, "[T]hese field edges are important for maintaining natural enemies of pest species. [Clem, C Scott and Harmon-Threatt, Alexandra. Field Borders Provide Winter Refuge for Beneficial Predators and Parasitoids: A Case Study on Organic Farms. *Journal of Insect Science*. 21. May 2021.]

flowers that reduce their fertility and may make them less attractive to pollinators. These findings were published in *Frontiers in Plant Science* by researchers at the University of British Columbia. Glyphosate herbicides like Roundup and Visionmax (a Canada-registered glyphosate product produced by Bayer/Monsanto) are often applied aerially via helicopter on wide swaths of forest land known as cutblocks. Cutblocks, designated areas where coniferous trees are grown for harvest and processing, are doused with glyphosate in order to manage understory trees and shrubs that would compete with the conifers. Researchers set out to understand the nontarget impacts of this practice on the surrounding forest ecosystem. Wild prickly rose (*Rosa acicularis*) plants were collected from three different cutblocks, each sprayed with Visionmax according to label directions. A set of untreated plants were gathered outside of the cutblock to function as a control. While some morphological changes are expected given exposure to a highly toxic herbicide, what concerns scientists the most is how long the chemical's effects persist in the environment. In contrast to claims by agrichemical corporations that glyphosate breaks down quickly in the environment, wild prickly roses contained traces of the herbicide two years after initial exposure. "The changes to plants have been documented in the past, in agricultural plants, so it is not surprising to find them in forests," said Dr. Wood. "What is important is the timeline. To continue to find these effects one to two years after herbicide

applications, in new parts of growing plants, is noteworthy.” [Golt, Alexandra and Wood, Lisa. Glyphosate-Based Herbicides Alter the Reproductive Morphology of *Rosa acicularis* (Prickly Rose). *Frontiers in Plant Science*. June 2021.]



Pesticide Contamination in Waterways Raises New Alarm for Aquatic Life, Citing Poor Regulation

JUNE 23, 2021 | Small streams are prone to excessively high levels of pesticide contamination that are even more hazardous than once thought, according to a pilot study by a team of German researchers and published in *Water Research*. The results indicate significant risks for the health of aquatic ecosystems and should be used as evidence for establishing greater protections from toxic pesticide use, researchers say. Scientists established monitoring sites at more than 100 streams throughout Germany over the course of two years. Most sites were established near farm fields, where chemical farmers will use highly toxic pesticides that often make their way into local waterways. The results are significantly worse than researchers anticipated. “We have detected a significantly higher pesticide load in small water bodies than we originally expected,” said Matthias Liess, PhD, ecotoxicologist and coordinator of the water monitoring project. The regulatory standards are exceeded in 81% of streams tested. For nearly

one in five streams, regulatory limits are exceeded for over 10 different pesticide compounds. For the most sensitive aquatic species, such as caddisflies and dragonflies, researchers say that these species require 1,000x lower threshold values than less sensitive animals like snails and worms. “For sensitive insect species, the pesticide concentration in the small lowland streams is the most relevant factor that determines their survival. In contrast, other environmental problems such as watercourse expansion, oxygen deficiency, and excessive nutrient content are less important. For the first time this study allows a ranking of environmental problems,” the researcher said. [Liess, Matthias et al. Pesticides are the dominant stressors for vulnerable insects in lowland streams, *Water Research*, 201:117262, 2021.]



Disease Carrying Mosquitoes Developing Resistance to Widely Used Mosquito Control Pesticides

JULY 1, 2021 | Yellow fever mosquitoes (*Aedes aegypti*) are evolving resistance to the pyrethroid insecticide permethrin, according to a study published by Colorado State University researchers in *PLOS Genetics*, highlighting the need to adopt [ecologically-based mosquito management](#). Widespread, intensive use of the pesticide in mosquito control has allowed genetic mutations to persist among these mosquito populations, causing subsequent resistance to permethrin. Pyrethroids are one of the few remaining classes of insecticides

available to control yellow fever mosquitoes, and resistance threatens the ability to prevent disease outbreaks with chemical-intensive methods. Two common pyrethroid resistance mechanisms occur among yellow fever mosquitoes: knockdown resistance involving “amino acid substitutions at the pyrethroid target site—the voltage-gated sodium channel (VGSC); [and] enhanced metabolism by detoxification enzymes.” Whether a mosquito displays a resistance or knockdown response to insecticide exposure depends on pyrethroid concentration and genetic background. [Saavedra-Rodriguez, Karla et al. Permethrin resistance in *Aedes aegypti*: Genomic variants that confer knockdown resistance, recovery, and death. *PLOS Genetics*. 17(6): e1009606, 2021

Second Highest Honey Bee Loss in 15 Years Documented

JULY 2, 2021 | The second highest bee loss in 15 years has been reported by the Bee Informed Partnership (BIP) in its [2020–2021 National Colony Loss and Management Survey](#), released on June 30. For the “winter” period of October 1, 2020 through April 1, 2021, approximately 32% of managed bee colonies in the U.S. were lost. This represents an increase of 9.6% over the prior year’s winter loss and is roughly 4% higher than the previous 14-year average rate of loss. For all of the past year (April 1, 2020 to April 1, 2021) the colony loss was 45.5%. Beyond Pesticides has covered the related issues of [Colony Collapse Disorder](#) (CCD), the ongoing



and devastating impacts of pesticides on bees and other pollinators, and the larger context of what has been called the “insect apocalypse.” These recent BIP data appear to indicate that “we,” writ large, are failing to remedy these problems. Three out of four food crops globally depend on pollinators, at least in part. Commercially kept bees account for a significant portion of pollination of some U.S. crops; almonds are the leading crop, followed by apples and melons. The [commercial bee business](#) is huge—a \$691 million dollar industry operating across nearly 12,000 managed crop pollination businesses. *Farm Progress* writes, “Crops that need pollination in the U.S. are valued at about \$81.5 billion. . . . Honey bee pollination contributes 23 percent of that value.” [Steinhauer, Nathalie et al. U.S. beekeepers continue to report high colony loss rates, no clear improvement. *Science News*. June 2021.]



Chemicals, including Pesticides, in Wastewater Discharge Contaminate Oysters in Pacific Northwest

JULY 8, 2021 | A Portland State University (PSU) study published in *Marine Pollution Bulletin* finds oysters of varying distances from wastewater discharge pipes along the Oregon and Washington state coast contain low levels of chemical contaminants. Although wastewater treatment facilities clean water draining from sinks and toilets,

the process does not adequately remove all contaminants. The process can leave behind pharmaceutical drugs and personal care products (e.g., shampoos, cosmetics, deodorant) residues in treated water. PSU has already found that pesticides from the forestry industry threaten clams, mussels, oysters (bivalves) along the Oregon coast. Marine ecosystem pollution is difficult to track and measure, and pesticide regulations can invoke variations in water quality requirements through discrepancies in buffer zones and application concentrations. The combined presence of pesticides, medicine, and personal care products in aquatic environments has direct implications for species and ecosystem health and indirect consequences for human well-being. Spring-time oyster samples, nearest wastewater sites, contain two pharmaceuticals: miconazole (a common antifungal medication) and virginiamycin (a common-use veterinary antibiotic medication). Additionally, researchers find four alkylphenols compounds (industrial chemicals used to make detergents, cleaner, and pesticide products) present in summertime oyster samples at both aquaculture and wastewater sites: 4-nonylphenol (NP), 4-tert-octylphenol (OP), and 4-nonylphenol mono- (NP1EO) and diethoxylates (NP2EO). [Ehrhart, Amy and Granek, Elise. Pharmaceuticals and alkylphenols in transplanted Pacific oysters (*Crassostrea gigas*): Spatial variation and growth effects. *Marine Pollution Bulletin*. 170:112584, 2021.]

U.S. Fish and Wildlife Service Proposes to Drop 1.5 Tons of Rodenticide on National Wildlife Refuge

JULY 10, 2021 | The U.S. Fish and Wildlife Service (FWS) is reviving its proposal to aerially apply (by helicopter) the toxic rodenticide brodifacoum to kill house mice on the Farallon Islands National Wildlife Refuge off the Northern California coast. Globally significant wildlife



populations inhabit the Farallones, including hundreds of thousands of seabirds and thousands of seals and sea lions. According to FWS, these include: thirteen species of seabird species that nest on the islands including Leach’s Storm-petrel, Ashy Storm-petrel, Fork-tailed Storm-petrel, Double-crested Cormorant, Brandt’s Cormorant, Pelagic Cormorant, Black Oystercatcher, Western Gull, Common Murre, Pigeon Guillemot, Cassin’s Auklet, Rhinoceros Auklet, and Tufted Puffin; pinnipeds including Northern fur seals, Steller sea lions, California sea lions, harbor seals, and northern elephant seals that breed or haul-out onto Farallon Refuge; and endemic species including white sharks, hoary bats, and arboreal salamanders. Aerial application of brodifacoum places at risk the mammalian and avian wildlife on the Farallon Islands, [as well as marine life](#) that may be exposed when the poison washes or settles into the ocean. There is no way to limit the impact to the targeted house mouse. A [2015 study](#) conducted after aerial drop of rodenticides on Palmyra Island off the coast of Hawaii reported: “We documented brodifacoum [rodenticide] residues in soil, water, and biota, and documented mortality of nontarget organisms. Some bait (14–19% of the target application rate) entered the marine environment to distances 7m from the shore. After the application commenced, carcasses of 84 animals representing 15 species of birds, fish, reptiles and invertebrates were collected opportunistically as potential nontarget mortalities. In addition, fish, reptiles,

and invertebrates were systematically collected for residue analysis. Brodifacoum residues were detected in most (84.3%) of the animal samples analyzed. Although detection of residues in samples was anticipated, the extent and concentrations in many parts of the food web were greater than expected." Advocates urge FWS to investigate under its environmental impact assessment requirements, the possibility of managing the mice through controlled intensified predation by providing nesting boxes for barn owls and/or kestrels.



Conservation Genomics Pinpoint Pesticides and Pathogens in Decline of Bumblebees

JULY 13, 2021 | Bumblebees exposed to pesticides and pathogens display changes in gene expression that can be pinpointed and analyzed by cutting edge research tools, according to scientists at York University, who utilized the new technique in a study published in *Molecular Ecology*. This form of next-generation gene sequencing is part of a growing field of science known as conservation genomics, in which entire animal genomes are sequenced to determine conservation problems. "Next-generation sequencing is a totally new way to think about why bees are declining, which could revolutionize conservation biology," says study coauthor Amro Zayed, PhD, associate professor in biology at York. "We're looking directly at bee tissues to try and get clues to the

stressors that are affecting this bee. I think this is a gamechanger for sure. With a single study, we are able to implicate a couple of really obvious things we've talked about for years—pathogens and pesticides—in the case of *Bombus terricola*." The gene analysis was conducted, and able to qualify nearly 9,500 gene expressions in bumblebee guts. Researchers discovered 61 differentially expressed genes, including those involved in detoxification, as well as those associated with neurodegenerative disorders and immune response. Bumblebees display gene expressions that are associated with exposure to neonicotinoid insecticides, fipronil, and a range of pathogens, including deformed wing virus and sacbrood virus. [Tsvetkov, Nadejda et al. Conservation genomics reveals pesticide and pathogen exposure in the declining bumble bee *Bombus terricola*, *Molecular Ecology*. June 2021.]

Death of as Many as 107,000 Bumblebees from Neonicotinoid Insecticides Studied

JULY 16, 2021 | Research published in *Environmental Entomology* reviews the 2013 Wilsonville, Oregon mass bumblebee die-off from application of the neonicotinoid *dinotefuran* on 55 linden trees in a big-box-store parking lot. In that single event, the research paper estimates between 45,830 and 107,470 bumblebees from some 289–596 colonies were killed. The coauthors said: "Our study underscores the lethal impact of the neonicotinoid pesticide dinotefuran on pollinating insect populations," and, "It is likely that the vast majority of mass pesticide kills of beneficial insects across other environments go unnoticed and unreported." Dinotefuran, the neonicotinoid (neonic) that killed those Oregon bumblebees, is used against fleas, thrips, tree-boring caterpillars, emerald ash borers, hemlock woolly adelgids, and in the Oregon case, aphids. Emerging scientific consensus on central causes of bee loss

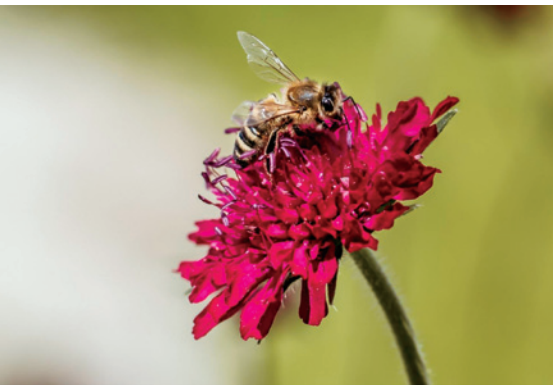


focuses on pesticide impacts and how they make bees more vulnerable to pathogens. As Beyond Pesticides wrote, *2019 Canadian research* "found that 'real life' exposures to neonicotinoid insecticides impair honey bees' ability to groom harmful mites from their bodies, thus allowing mite populations to thrive." In addition, Beyond Pesticides has discussed the correlation, during the early 2000s, of the emergence of CCD [Colony Collapse Disorder] and severe colony losses with the spike in use of neonicotinoid pesticides, particularly delivered as seed coatings. In 2014, a study from the Harvard T.H. Chan School of Public Health showed that two neonics—imidacloprid and clothianidin—significantly harm honey bee colonies during winters. [Hatfield, Richard et al. Neonicotinoid Pesticides Cause Mass Fatalities of Native Bumble Bees: A Case Study From Wilsonville, Oregon, United States, *Environmental Entomology*, 50(5)1095–1104, 2021.]

Typical Neonicotinoid Insecticides at Any Level Likely to Kill Off Wild Pollinators

AUGUST 4, 2021 | Neonicotinoid insecticides applied to nursery plants sold at garden centers kill off wild, solitary pollinators regardless of the amount applied, according to research published in the *Proceedings of the Royal Society B*. The news is unlikely a surprise for those tracking the [science on pollinator declines](#), but nonetheless a

stark reminder of the lack of progress from federal regulators to stop practices that contribute to the ongoing crisis. With new science consistently showing unacceptable hazards to pollinator populations, advocates are urging Congress to take up and pass the [Saving America's Pollinators Act](#). Since 2006, scientists and beekeepers have singled out neonicotinoids, a class of systemic insecticides, for their role in pollinator die-off and decline. Once applied onto a seed or sprayed on a plant, neonicotinoids distribute themselves throughout the plant's structure. "Neonicotinoids are often used on food crops as a seed treatment," says study author Jacob Cecala. "But they're usually applied in higher amounts to ornamental plants for aesthetic reasons. The effects are



deadly no matter how much the plants are watered." [Cecala, Jacob and Wilson Rankin, Erin. Pollinators and plant nurseries: how irrigation and pesticide treatment of native ornamental plants impact solitary bees. *Proceedings of the Royal Society B*. July 2021.]

Debilitating Ear Blisters Plague Long Island Turtle Populations from Pesticide Use

AUGUST 5, 2021 | A report by [Turtle Rescue of the Hamptons](#) finds Long Island, New York turtles are experiencing higher rates of deadly aural abscesses or ear blisters from pesticide use. Previous research documents the role chemical exposure from environmental toxicants



Deer Ticks Developing Resistance to Popular Tick Control Chemical: Implications for Lyme Disease

JULY 22, 2021 | A study published in the *Journal of Medical Entomology* finds black-legged ticks (*Ixodes scapulari*) in New York are developing potential resistance to widely used tick-control [pyrethroid](#) insecticide, [permethrin](#) for the transmission of [Lyme disease](#). The study suggests continuous use of area-wide, 4-poster devices (devices that attract deer and then apply pesticide to their head, ears, and neck) to apply insecticide treatments on deer to control tick populations promotes resistance. Like mosquitoes, a subpopulation of ticks encountering chemical exposure naturally alter gene function, which results in resistance to the chemical rather than death. To assess resistance among tick populations, researchers evaluated the susceptibility of deer ticks to permethrin exposure. Deer ticks used in this study came from Shelter Island, NY, and the Cary Institute of Ecosystem Studies (CIES) in Millbrook, NY. Development of [resistance](#) is an entirely normal, adaptive phenomenon: organisms evolve, "exploiting" beneficial genetic mutations that give them a survival advantage. However, resistance is growing in all sectors of pest control. [Note: The best method to prevent tick bites and the diseases they carry is to wear appropriate clothing (light-colored that covers one's whole body), a hat, and consider tucking one's pants into socks. Most important is to conduct regular tick checks as it is critically important to detach a tick from one's skin as soon as possible after the bite to reduce the chance of disease transfer. If you have an outdoor pet, do not forget to check them as well. Safely kill tick larvae with nontoxic solutions: vacuum daily during flea season (changing bag often); groom pet daily with a flea comb (cleaning comb with soap-water between brushes); frequently bathe pets with soap and water; and frequently wash pet bedding, restricting pet to only one bed.] [Burtis, James et al. Susceptibility of *Ixodes scapularis* (Acari: Ixodidae) to Permethrin Under a Long-Term 4-Poster Deer Treatment Area on Shelter Island, NY. *Journal of Medical Entomology*. 58(4):1966-1969, 2021.]



play in inner ear abscess formation among turtles. However, synergism (collaboration) between viral infection and toxic chemical exposure increases aural abscess instances. Aural abscesses are painful ear blisters that can grow as big as a golf ball. Medical intervention is necessary to remove abscesses from turtles and treat them with an antibiotic regimen to prevent death. Turtle Rescue facility workers report a staggering 50 percent of turtles currently within their care to have aural abscesses. The percentage of turtles with this diagnosis is much higher than in past years. [Turtle Rescue of the Hamptons, July 2021.]

Of Multiple Stressors, Pesticides Are the Most Harmful to Bees by Acting Synergistically to Increase Mortality

AUGUST 11, 2021 | Multiple stressors, including pesticides, parasites, and poor nutrition, act synergistically to increase the risk of bee mortality, according to a meta-analysis published in *Nature*. The findings are yet another



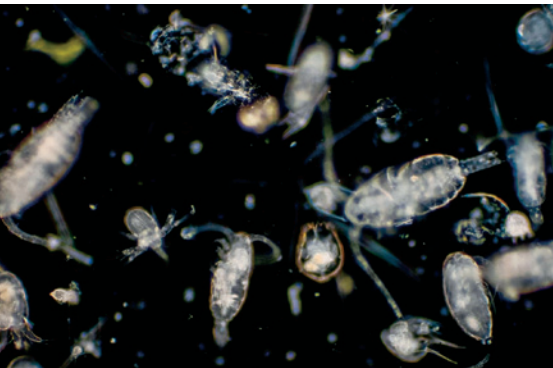
indictment of the U.S. pesticide regulatory system's ability to protect pollinators, as the authors note that their results, "... demonstrate that the regulatory process in its current form does not protect bees from the unwanted consequences of complex agrochemical exposure." Scientists evaluate how combinations of multiple pesticides, parasites, and lack of floral resulted in bee death or subchronic effects that impacted overall fitness (reproductive ability, colony health, etc.), behavior, parasite load, or immune response. The effects of multiple stressors can be characterized as antagonistic when stressors cancel themselves out, additive when the impacts seen are what would be predicted when summing the individual effects, and synergistic when the effects are multiple times more harmful than what would be predicted additively. To conduct the analysis, researchers began with nearly 15,000 papers on bee health, and narrowed down their review to 90 studies that observed over 350 interactions between multiple stressors. "Our results show that although many classes of anthropogenic stressors may have additive effects on bee mortality and fitness proxies, exposure to combined agrochemicals can have synergistic effects that are more detrimental than would be predicted by independent risk assessments," the study reads. [Siviter, Harry et al. Agrochemicals interact synergistically to increase bee mortality. *Nature* 596:389–392, 2021.]

Endangered Species Likely to Be Hard Hit by Neonicotinoid Insecticides, EPA Finds

SEPTEMBER 8, 2021 | (September 8, 2021) The U.S. Environmental Protection Agency (EPA) in August 2021 released a long-overdue biological evaluation of the three most commonly used neonicotinoid (neonic) insecticides, finding that the chemicals are likely to adversely affect the lion's share of endangered species and their habitat. While

the public may be most familiar with the damage neonics cause to pollinator populations, EPA's evaluation highlights the widespread, indiscriminate harm [scientists throughout the world](#) have been sounding the alarm about for years. Advocates say the findings make it clear that neonicotinoids must be immediately banned from use. Under the *Endangered Species Act* (ESA), EPA is required to consult with federal wildlife agencies and conduct a biological evaluation of the impacts a pesticide may have on endangered species and their habitats, prior to the agency formally registering the pesticide. Under EPA's current draft, each neonic is found to adversely affect over 1,000 endangered species out of 1,821 listed under the law. Specifically, the neonics are found to adversely effect nontarget endangered species: imidacloprid – 1,445 (79%), clothianidin—1,225 (67%), and thiamethoxam—1,396 (77%). Harmful effects are not limited to a specific subgroup—dozens of species are affected within all groups, including mammals, birds, amphibians, reptiles, fish, plants, and aquatic and terrestrial invertebrates. These findings are stark in the context of actions by the previous administration to weaken the biological evaluation process. [EPA, August 2021.]





Studies Show How Pesticides Harm Organisms that Form the Foundation of Freshwater Ecosystems

SEPTEMBER 15, 2021 | Toxic pesticide use, and glyphosate in particular, degrades the health of freshwater ecosystems by harming species that form the basis of aquatic food chains, according to research published by scientists at McGill University. In a [series of studies](#), scientists investigated how freshwater bacteria and zooplankton are affected by varying levels of the weed killer glyphosate, the neonicotinoid insecticide imidacloprid, and nutrient levels. “Because plankton form the foundation of the food chain in freshwater ecosystems, it is very important to understand how plankton communities respond to widely used pesticides,” said Jesse Shapiro, PhD, an associate professor in McGill’s Department of Microbiology and Immunology. “Our research shows that the structure of these communities can be impaired under currently acceptable North American water quality guidelines.” Zooplankton were found to be much more sensitive to pesticide exposure than freshwater bacteria. However, glyphosate was found to be the most damaging exposure within both experiments. In the zooplankton study, low levels (.3 parts per million) of glyphosate resulted in persistent declines in rotifer populations, while both pesticides harm populations of copepod crustaceans (at 3 parts per billion with

imidacloprid and 5.5 parts per million with glyphosate). At higher, yet still environmental relevant rates, scientists observe synergy between the two pesticides that result in significant declines in overall zooplankton biomass. [Barbosa da Costa, *Naíla et al.* Resistance, resilience, and functional redundancy of freshwater bacterioplankton facing agricultural stress. *Molecular Ecology*. July 2021; Hébert, Marie-Pier et al. Widespread agrochemicals differentially affect zooplankton biomass and community structure. *Ecological Applications*. July 2021.]

Common Mosquito Pesticide Exacerbates Health Issues Associated with Zika Virus

SEPTEMBER 28, 2021 | A widely used mosquito pesticide may exacerbate the effect of the Zika virus on fetal brain development, according to research published by an international team of scientists in [Environmental Pollution](#). [Pyriproxyfen](#), an insect growth regulator often used as a mosquito larvicide, is registered for use in hundreds of commonly used pesticide products. Scientists have discovered that the pesticide’s mode of action has the potential to worsen the public health mosquito diseases the chemical aims to control. The research reinforces the extent of unknowns associated with synthetic pesticide exposure, underscoring the need for a focus on nontoxic and ecological mosquito management. Scientists base their research on reports that in Brazil, during the 2015 Zika epidemic, certain areas of the country [experienced higher rates](#) of microcephaly. Microcephaly is a rare condition that causes a pregnant woman’s fetus to develop severe cranial deformities, alongside a range of other symptoms that include vision problems, hearing loss, feeding issues, developmental delays and seizures. While the study does not provide support for the chemical increasing viral infection rates, scientists did find that exposure could exacerbate an existing infection, resulting



in more harmful health impacts when exposed to both pyriproxyfen and Zika together. [Vancamp, Pieter et al. The pyriproxyfen metabolite, 4’-OH-PPF, disrupts thyroid hormone signaling in neural stem cells, modifying neurodevelopmental genes affected by ZIKA virus infection. *Environmental Pollution*, 285: 117654, 2021.]

Conventional Agriculture Decreases Diversity of Gut Bacteria in Foraging Bats

SEPTEMBER 29, 2021 | Bats foraging in chemical-intensive banana plantations have much less gut diversity than bats foraging in organic banana fields and natural forestland, finds research published in [Frontiers in Ecology and Evolution](#). Although there is increasing recognition that a diet of conventional, chemically grown food leads to adverse [disruptions of the gut microbiome](#) (also known as dysbiosis), little research has been conducted on the effect of production practices on the gut of wild foraging species. Researchers focused their investigation on Pallas’s long-tongued bat (*Glossophaga soricina*), a nectar feeding bat native to Central and South America. The bat is highly adapted to human environments, sustaining populations in both conventional and organic banana plantations, as well as surrounding forest land. For the study, researchers trapped nearly 200 bats across the country of Costa Rica over a 22-month time span. After trapping,



physiological characteristics, like size and body weight, were measured, and bat guano was analyzed for its microbial population. All sampled bats were released back into their habitat. Bats that forage in agricultural land—whether organic or conventional, were found to be overall larger in size and weight than bats that live primarily in the forest. This was likely a result of a diet heavily reliant on the nectar from banana plants. However, bats in organic plantations have significantly higher levels of gut biodiversity than those in conventional plantations (based on a range of analyses, including observed amplicon sequence variants, Shannon diversity index, and Faith’s Phylogenetic Diversity index). Gut diversity in organic bats is found to be similar to the diversity analyzed in forest bats. The study indicates that it is likely that organic practices are maintaining a “high diversity of commensal microbiota,” while on the other hand, “less diverse gut microbiota in bats foraging in conventional monocultures may suggest that these habitats potentially have negative physiological consequences for the animals (e.g., gut inflammation and metabolic disease), and may act as an ecological trap.” [Alpizar, Priscilla et al. *Agricultural Fast Food: Bats Feeding in Banana Monocultures Are Heavier but Have Less Diverse Gut Microbiota. *Frontiers in Ecology and Evolution.* September 2021.*]

Monoculture Agriculture Leads to Poor Soil Health

OCTOBER 5, 2021 | Soil and soil quality are declining rapidly in the U.S. and around the world, with recent data indicating that the [U.S. Corn Belt](#) has lost 35% of its topsoil. “Understanding the management practices that lead to healthier soils will allow farmers to grow the same crops while reducing costly chemical inputs (fertilizers, pesticides, herbicides) and protecting the environment,” said study coauthor Lori Phillips, PhD in a study published in [Agrosystems, Geosciences and Environment](#). Researchers analyzed a long-term cropping system that includes 18 years of continuously grown soy, corn, and perennial grasses. Each cropping system was evaluated for its bacterial and fungal population, as well as a test called CNPS, which measures the enzymes produced by microbes specifically related to the soil’s carbon, nitrogen, phosphorous, and sulfur cycles. Researchers indicate that these measurements create “a holistic measure of biological activity.” Within the perennial grasses, the community consisting of red fescue and birdsfoot trefoil (a legume) is found to contain healthier soil than a system with only tall fescue grass. Both soil organic matter and CNPS activity are higher for the grasses than for the monoculture crops by 2- or 3-fold. Microbial communities are also markedly different between monoculture crop and perennial grass soils. “Intensively managed agricultural soils, with more frequent tillage and high fertilizer



inputs, tend to be dominated by bacteria. In contrast, more sustainable management practices increase the overall amount of fungi in soil,” Dr. Phillips notes. [Pérez-Guzmán, Lumarie et al. An evaluation of biological soil health indicators in four long-term continuous agroecosystems in Canada. *Agrosystems, Geosciences and Environment.* June 2021]



Weeds Are Now Developing Resistance to Herbicides They’ve Never Been Exposed To

OCTOBER 13, 2021 | Pesticide use in conventional chemical-intensive farming is so pervasive that weeds are developing resistance to herbicides they have never encountered before. According to research published in [Plant and Cell Physiology](#) and [New Phytologist](#), the notoriously difficult-to-control weed waterhemp (*Amaranthus tuberculatus*) is outpacing commercial crops in its ability to detoxify after herbicide exposure. “This is probably the first known example where waterhemp has evolved a detox mechanism that a crop doesn’t have. It’s using a completely different mechanism, adding to the complexity of controlling this weed,” says Dean Riechers, PhD, study coauthor and professor at University of Illinois. Analyses conducted by the University of Illinois scientists determined that waterhemp developed a process completely novel and separate from how corn detoxifies the compounds. While it is usually the cytochromes P450 enzymes that break



Ag Secretary Vilsack Pushes Petroleum Farming Inputs, Fights EU's Climate-Friendly Organic "Farm to Fork" Initiative

OCTOBER 8, 2021 | U.S. Secretary of Agriculture Tom Vilsack used a September G20 summit in Italy to target the European Union's "Farm to Fork" (F2F) strategy, a part of its European Green Deal. Trump administration Agriculture Secretary Sonny Perdue said that F2F is "more . . . 'political science' than demonstrated agricultural science"; Secretary Vilsack called it "a path very different from the one the U.S. is pursuing." The F2F initiative aims to transition the EU to a sustainable food system such that it also achieves significant mitigation of climate change. But Mr. Vilsack chose to counter the F2F efforts by promoting an "alternative strategy"—under the moniker "Coalition for Productivity Growth"—through which "other nations pledge *not* to follow the European path on farm policy." He has described this alternative, U.S.-led strategy as "a market-oriented, incentive-based, voluntary system [that] is effective" at slashing agricultural carbon emissions. *Mother Jones* poses the central question in the headline of its September 30 article: "[Why is Secretary Vilsack So Afraid of a Plan to Cut Pesticides and Meat?](#)" The central F2F tenets that the secretary seems to find unnerving are those that would slash use of synthetic pesticides and fertilizers, and move one-quarter of European farmland to organic production by 2030.

Mother Jones writes, "The Farm to Fork program, part of the European Commission's response to the continent's own accelerating climate chaos and steady rise in illnesses related to highly processed food, aims to 'make food systems fair, healthy and environmentally friendly.' At its heart lies the goal of slashing farmers' reliance on water-polluting, energy-intensive agrochemicals: It requires a 20 percent drop in fertilizer use by 2030, and a 50 percent cut in pesticides. The plan . . . also mandates a 50 percent reduction [in] food waste; calls on farmers to halve their use of antibiotics for livestock, a key driver in the global crisis of antibiotic resistance in human medicine, and; aims to nudge Europeans to adopt a 'diet with less red and processed meat and with more fruits and vegetables.'" [Philpott, Tom. "Why Is Ag Secretary Vilsack So Afraid of a Plan to Cut Pesticides and Meat?" *Mother Jones*, September 10, 2021.]

down hazardous molecules, waterhemp uses different enzymes called glutathione S-transferases (GSTs). It is increasingly clear that herbicide use is the prevailing driver of the ever-evolving adaptability of waterhemp plants. [Strom, Seth et al. Metabolic Pathways for S-Metolachlor Detoxification Differ Between Tolerant Corn and Multiple-Resistant Waterhemp. *Plant and Cell Physiology and New Phytologist*. 62(11):1770–1785, 2021.]



Aquatic Wildlife Populations Take a Nosedive after Neonicotinoid Exposure

NOVEMBER 10, 2021 | The diversity and abundance of freshwater aquatic insects plunges when commonly used neonicotinoid (neonic) insecticides leach into waterways, finds research published in the *Proceedings of the National Academy of Sciences*. While this is the latest study exploring the effects of neonicotinoids in the field at real-world exposure levels, [it is far from the first](#) to show unacceptable hazards to wildlife and ecological health. To determine how neonicotinoids affect critical aquatic species near the bottom of the food chain, researchers created a series of 36 experimental ditches, split into four groups of nine. Mimicking a pulse that may come from a nearby insecticide application, each group of ditches was dosed every two weeks for a period of three months. Scientists collected over 55,000 insects over the course of the experiment. However, overall abundance, biomass, and diversity of insects collected declined in dosed ditches over the three-month

period. By the end of the study, compared to the control group overall insect biomass declined by 11, 4, and 50 percent along a gradient of increasing amounts of neonic dosing. “We saw dramatic declines in all the species groups studied, such as dragonflies, beetles and sedges,” said study author Henrik Barmantlo, PhD, both in absolute numbers and in total biomass. “In the most extreme scenario, the diversity of the most species-rich group, the dance flies, even dropped to a single species.” Dr. Barmantlo notes that these effects have major trophic impacts for other wildlife, like birds that rely upon these insects. “So it is quite possible that these bird species suffer from a lack of insects, or in other words: food,” he said. Amphibians are likely to feel the full effect of neonicotinoid contamination, as they are not only exposed through water, but also rely upon a healthy insect population for sustenance. [Barmantlo, S. Henrik et al. Experimental evidence for neonicotinoid driven decline in aquatic emerging insects. *Proceedings of the National Academy of Sciences*. 118 (44):e2105692118. 2021.]



Secret Inert Ingredient in “Bee Safe” Pesticide Found to Kill Bumblebees

NOVEMBER 11, 2021 | Evidence is building that so-called “inert” ingredients in pesticide formulations are harming pollinators and undermining regulatory determinations that designate products as “bee safe.” According to

a study published in *Scientific Reports*, the fungicide Amistar causes lethal and sublethal effects that can be primarily attributed not to its active ingredient azoxystrobin, but to alcohol ethoxylates, a proprietary, nondisclosed co-formulant, or inert (or other) ingredient intentionally added to a pesticide formulation—calling into question EPA’s little bee icon warning on product labels and the effectiveness of its regulatory review. In the study, all positive control bees died, and all negative control bees lived. None died from benzisothiazol, and only one died from naphthalene-sulfonic acid exposure. Fully formulated Amistar resulted in 23 percent mortality, while alcohol ethoxylates, and the mixture of benzisothiazol, naphthalene-sulfonic acid, and alcohol ethoxylates resulted in death rates of 30 and 32 percent. Researchers find that bees that weigh more at the beginning of the study are more likely to survive. That is because alcohol ethoxylates are causing sublethal impacts that do not necessarily kill every exposed bumblebee outright. [Straw, Edward and Brown, Mark. Co-formulant in a commercial fungicide product causes lethal and sublethal effects in bumble bees. *Scientific Reports*. 11(21653), 2021.]

Fungal Resistance to Antimicrobial Pesticides Leads to Deadly Infection

NOVEMBER 23, 2021 | The U.S. Environmental Protection Agency (EPA) announced in mid-October 2021 a revision of its guidance on the evaluation of antimicrobial pesticides used against *Candida auris* (*C. auris*). This pathogen is a type of fungus (a yeast) that can cause serious infection and can spread readily among patients and staff in hospitals and other congregate health care settings (such as nursing homes). *C. auris* has developed resistance to what used to be the therapeutic impacts of major antifungal medications. (Resistance is a major and growing problem in health care and in agriculture, with



the latter exacerbating the former.) To be clear, it is not all isolates (strains) of *C. auris* that have developed drug resistance—yet. Beyond Pesticides wrote in 2019: “Echoing the development of resistance in bacteria, there have lately been resistant fungi showing up in hospitals and labs, adding to the already considerable worry in the medical community about how to treat people who contract infections caused by resistant pathogens. *Candida auris* can be deadly; indeed, more than one in three patients with a serious *C. auris* infection of the blood, heart, or brain die from it, and nearly half of those who contract the infection die within 90 days. Immunocompromised people and infants are at high risk of lethality from these infections. The agency has a decades-long poor track record on this front. Back in 1990, the U.S. Government Accountability Office (GAO) issued recommendations, based on its review of EPA’s regulation of disinfectants, a document titled *Disinfectants: EPA Lacks Assurance They Work*. Adoption of organic agricultural practices can diminish the resistance problem, potentially helping to preserve important antibiotic and antifungal medicines for treatment of human infection. But EPA abdicates its responsibility “to protect human health and the environment” when it fails to address the issue of efficacy of pesticide products, causing downstream health, economic, and environmental harms. [Richtel, Matt and Jacobs, Andrew. “A Mysterious Infection, Spanning the Globe in a Climate of Secrecy.” *The New York Times*. 2019.]



ACTIONS OF THE WEEK

Tell the U.S. Fish and Wildlife Service To List Monarch Butterflies on the List of Threatened and Endangered Species. Tell the Environmental Protection Agency To Eliminate Pollinator Poisons

FEBRUARY 1, 2021 | The yearly winter monarch count along the California coast, overseen each year by the conservation group Xerces Society, was the lowest ever. In 2020, citizen scientists counted only 2,000 butterflies. The findings indicate that many on the planet today are, within their lifetimes, likely to experience a world where western monarchs are extinct.

Help Get Congress To Support National Biodiversity Strategy Legislation

FEBRUARY 22, 2021 | Congressional Rep. Joe Neguse, Rep. Alan Lowenthal and Chair of the Natural Resources Subcommittee on Water, Oceans and Wildlife Rep. Jared Huffman have reintroduced their resolution (H.Res. 69: Expressing the need for the Federal Government to establish a national biodiversity strategy for protecting biodiversity for current and future) to create a national biodiversity strategy.

Tell Congress and EPA To Suspend Deadly Insecticide Use and Transition to Organic To Save Hummingbirds

MARCH 29, 2021 | New data on the hazards of neonicotinoid insecticides calls for urgent regulatory action. The same pesticides that are linked to the worldwide decline of insect pollinators also present significant risks to their avian counterparts, hummingbirds. Widely known for their nectar-fueled hovering flight powered by wings beating up to 80 times per second, hummingbirds display unique reactions to toxic pesticides.

Take the Ladybug Pledge; Bring Organic Landcare to Your City

APRIL 19, 2021 | In celebration of Earth Day and its fourth annual Ladybug Love campaign throughout the month of April, Natural Grocers is supporting Beyond Pesticides. The campaign celebrates insects that play a crucial role in food supply stability, and regenerative farming practices that use ladybugs and other beneficial insects instead of harmful synthetic pesticides to manage pests. Natural Grocers will donate \$1 to Beyond Pesti-

cides for each person who pledges (including renewals) “not use chemicals that harm ladybugs and other beneficial insects on their lawn or garden, and to support 100% organic produce.”

The Week of June 21 Is Pollinator Week—A Time To Take Personal and Community Action

JUNE 21, 2021 | Pollinator Week reminds us that change is critical to the survival of the planet and that we can take action, both in our households and communities and in the state and federal policy arena. Here’s how YOU can take action... Create an organic habitat on your own property or a space in the community—such as the library grounds, medians, and rights-of-way. Given that plant starts in many garden centers across the country are grown from seeds coated with bee-toxic neonicotinoid pesticides, or drenched with them, Beyond Pesticides has compiled a comprehensive directory of companies and organizations that sell organic seeds and plants to the general public. Included in this directory are seeds for vegetables, flowers, and herbs, as well as living plants and seedlings.

Saving America’s Pollinators Act Reintroduced, Advocates Urge Congressional Action To Stop Pollinator Decline

JUNE 24, 2021 | This Pollinator Week 2021, U.S. Representatives Earl Blumenauer (D-OR) and Jim McGovern (D-MA) are reintroducing the *Saving America’s Pollinators Act* (SAPA) in an effort to reverse ongoing declines in wild and managed pollinators.

Tell Your Congressional Reps To Cosponsor Pollinator Legislation; Thank Those Who Already Have

JULY 12, 2021 | New data released in June for 2020–21 documents the second highest honey bee losses in 15 years.

Retailers Fail To Protect Pollinators . . . Badly

SEPTEMBER 17, 2021 | Against the backdrop of what *The New York Times* in 2018 called the “insect apocalypse,” and the dire plight of pollinators in particular, Friends of the Earth (FOE) recently issued its retailer scorecard, which benchmarks “25 of the largest U.S. grocery stores on pesticides, organic offerings and pollinator health”—with the vast majority of retailers failing to protect pollinators.



ACTIONS OF THE WEEK

The path out of the chemical pesticide quagmire is organic: companies must do more to move suppliers to organic, regenerative production practices, and EPA should be pulling these toxic compounds from the market.

We Must End the Sixth Extinction

SEPTEMBER 20, 2021 | Scientists warn that humanity is causing the sixth mass extinction in the planet's history. A series of reports from the United Nations Environment Program (UNEP) highlights how human activities threaten the healthy functioning of ecosystems that produce food and water, as well as one million species now at risk of extinction. **Tell Congress to ratify the Convention on Biological Diversity (CBD). Tell EPA to incorporate CBD targets into its programs.** CBD has been ratified by 196 nations—all the members of the United Nations except the United States and the Vatican. The CBD includes 21 action targets to be achieved by 2030, including reducing pesticide use by two-thirds, eliminating plastic waste, and “fully integrating biodiversity values into policies, regulations, planning, development processes, poverty reduction strategies, accounts, and assessments of environmental impacts at all levels of government and across all sectors of the economy, ensuring that all activities and financial flows are aligned with biodiversity values.” **Take action by urging federal agencies to address mass extinction like the crisis it is by incorporating biodiversity goals into the decision-making process for pesticide approvals.**

American Bumblebee Considered for Endangered Status, But Will “Critical Habitat” Be Defined?

OCTOBER 5, 2021 | The U.S. Fish and Wildlife Service (USFWS) will consider listing the American bumblebee (*Bombus pensylvanicus*) under the *Endangered Species Act*, according to a notice published in the Federal Register late in September 2021. **Take action by urging federal agencies to address mass extinction.**

Protect Endangered Species: Comment by End of Today—Monday, October 25

OCTOBER 25, 2021 | The U.S. Environmental Protection Agency (EPA) is requesting public comments on its draft Biological Evaluations (BEs) for neonicotinoid insecticides imidacloprid, clothianidin, and thiamethoxam

by 11:59 pm (EDT) on Monday, October 25, 2021. The BEs will factor into EPA's registration review decisions on the three bee-toxic insecticides.

Stop Ag Secretary Vilsack from Undermining Climate Initiative to Transition Agriculture

OCTOBER 12, 2021 | Tell President Biden and Congress that there is no room for agriculture policies that are not in line with the Executive Memorandum and directive *Modernizing Regulatory Review*. USDA must remove all barriers to a national transition to organic agriculture. One of President Biden's first actions, on the day of his inauguration, was this Executive Memorandum and directive, requiring the heads of all executive departments and agencies to produce recommendations for improving and modernizing environmental stewardship.

California Releases Strategy for Land Management Practices that Confronts Climate Crisis

NOVEMBER 5, 2021 | In its draft Natural and Working Lands Climate Smart Strategy the California Natural Resources Agency asserts that the state's 105 million acres can “sequester and store carbon emissions, limit future carbon emissions into the atmosphere, protect people and nature from the impacts of the climate crisis. **Tell your state legislators and governor to adopt a Natural and Working Lands Climate Smart Strategy that supports organic agriculture and land management. (CALIFORNIA RESIDENTS: Please use this form.)**

Aerial Drop of Rodenticides on Farallon Islands in California Threatens Ecosystem, Comments Due

NOVEMBER 29, 2021 | The U.S. Fish and Wildlife Service (FWS) is reviving its proposal to aerially apply (by helicopter) the toxic rodenticide brodifacoum to kill house mice on the Farallon Islands National Wildlife Refuge off the Northern California coast. Globally significant wildlife populations inhabit the Farallones, including hundreds of thousands of seabirds and thousands of seals and sea lions. **Tell the California Coastal Commission to deny the proposed aerial dispersal of the highly toxic rodenticide brodifacoum on the Farallon Islands.**