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Testimony on January 27, 2022 for the Vermont House Agriculture and Forestry Committee
H.626 - An act relating to the sale, use, or application of neonicotinoid pesticides

Thank you for inviting me to testify in regards to H.626. I am the director of the Vermont Atlas of Life at the Vermont Center for Ecostudies. I have been studying wildlife in Vermont and beyond for nearly 30 years. I have been a member of the State Advisory Group for Invertebrates to the Endangered Species Committee since 2002 and the chair for over a decade. And I was involved in both the 2005 and 2015 Vermont Wildlife Action Plans.

I was one of the principal investigators for the Vermont Bumble Bee Atlas project and co-authored recommendation reports submitted from the State Advisory Group for Invertebrates to the Vermont Endangered Species Committee for four bumble bee species, of which three are now listed as Threatened and Endangered in Vermont, with another pending. One is now listed Federally (Rusty-patched Bumble Bee), and the American Bumble Bee is under review, with the USFWS 90-day review finding that it may warrant listing.

In the 1990s and early 2000s, there were many reports from around the world concerning the decline of bumble bees. Here in Vermont, there was little data beyond anecdotal evidence to assess bumble bee populations.

With the help of the Vermont Fish & Wildlife Department and other partners, the Vermont Atlas of Life at the Vermont Center for Ecostudies conducted a statewide survey from 2010-2014. By comparing our surveys with historic collections, we found significant declines in bumble bee diversity and abundance in Vermont. Seventeen bumble bee species were documented as native to the state and we documented the probable extirpation of three species and significant declines among four others. Based on the conclusions of this study, the state of Vermont listed as threatened or endangered three bumble bee species, including Ashton cuckoo bumble bee, yellow-belted bumble bee, and the rusty-patched bumble bee. The latter was also listed as federally endangered by the US Fish and Wildlife Service in 2017, and is undergoing a 5-year review now.

Declines in bumble bee abundance, diversity, and range extent have been attributed to numerous factors, in particular (1) parasite and disease exposure, especially following contact with managed bees (both honey and bumble bees); (2) pesticides; (3) habitat loss; and (4) climate change. And of course, it is likely that multiple stressors occur

simultaneously. To quote Dr. David Wagner, University of CT entomologist, “Insects are suffering from death by a thousand cuts.”

For example, in the case of the Federally- and State-Endangered Rusty-patched bumble bee, the USFWS states that the cause of the species’ drastic decline is unknown, but evidence suggests a harmful interaction between a disease-causing pathogen and exposure to pesticides. Other threats to the insect include habitat loss and degradation, competition and disease introduction from managed and non-native bees, small population genetics, and climate change.

Bumble bees may be threatened by exposure to pesticides when residues occur in pollen and nectar of their food plants. Of principal concern are insecticides applied to control insect herbivores, including topically applied compounds such as carbamates and organophosphates, as well as compounds applied belowground that are systemic within plants, such as neonicotinoids. Certain fungicides and herbicides are also toxic to bees. And, there is evidence for synergistic negative impacts of pesticide combinations on bees. This is a concern because bees are commonly exposed to residues of many pesticides simultaneously.

There is a very large body of peer-reviewed research now concerning detrimental effects of neonicotinoids on bumble bees and other pollinators. Sublethal effects from feeding on pollen and nectar include: lower reproduction rates, reduced navigation abilities, poor foraging behavior, less successful pollination, and reduced immune function. All of these may lead to colony size reduction or failure.

In August 2021, the EPA released draft biological evaluations for three neonicotinoids to determine whether they may affect one or more species listed under the Endangered Species Act (ESA) or their designated critical habitats. The EPA must register all pesticides before they can be sold and used, and this registration triggers the requirement to engage in consultation under the ESA. These neonicotinoids were found “likely to adversely affect” many of the Endangered and Threatened terrestrial invertebrate species, including pollinators such as Rusty-patched Bumble Bee.

Neonicotinoids can be sprayed onto foliage or applied as soil drenches, but they are predominantly used as seed treatments. When used in this manner, neonicotinoids are taken up by all parts of the plant as it grows. This means these systemic insecticides are present in pollen and nectar that pollinators can come in contact with when foraging. In addition, they have been found on nearby flowers, in waterways, and they persist in the soil.

However, under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), seed coating gets a free pass with a regulatory loophole that allows seeds coated with chemicals to be considered “treated articles” rather than pesticides. And the use of pesticides in this manner is also not tracked. But some estimates find that in Vermont >99% of all neonicotinoid pesticide use is in the form of seed coating.

Pollination services provided by native insects, mostly bees, are estimated at \$3 billion per year in the United States. For some crops, native bumble bees pollinate more effectively than non-native honey bees, in part because they fly in cooler temperatures and lower light levels. But also, bumble bees are “buzz” pollinators. The bee grabs the flower stamen and vibrates her wing muscles causing pollen to fall. This is highly effective for the cross-pollination of tomatoes, peppers, cranberries, and blueberries.

For example, a 2019 UVM study found that of the nine berry farms studied across Vermont, wild bees could boost production up to 36%, or roughly \$136,000 per year, on one mid-sized berry farm alone. And, nearly all of the pollination service documented in this project was delivered by unmanaged, wild bees, in particular 3 species of bumble bees and two species of ground-nesting solitary bees (*Andrena*), along with about 90 other species of native bees.

A 2015 study, by UVM and others, estimated that wild bee abundance declined in 23% of the contiguous U.S. from 2008 and 2013. It also showed that 39% of U.S. croplands that depend on pollinators — from apple orchards to pumpkin patches — face a threatening mismatch between rising demand for pollination and a falling supply of wild bees.

How many wild bee species are there in Vermont? We are surveying the entire wild bee fauna in Vermont now in cooperation with the VT Fish & Wildlife Department, UVM, and others. We have documented 343 bee species in the state and we believe we may have as many as 375 species here. Remarkably, since beginning the project in 2019, we’ve documented 80 new species for Vermont so far. Population losses of some of these native bees could have far-ranging ecological impacts due to their keystone roles as pollinators.

In summary, wild bees and other native pollinators are important for Vermont agriculture and ecosystems. Some bumble bees have had a marked decline in the last 30-40 years, likely due to multiple stressors. Neonicotinoids are known to cause both lethal and sublethal harm to wild bees. Addressing the use of this stressor on wild bee populations and other pollinators is an important step for pollinator conservation.