LONG ISLAND / ENVIRONMENT

ONLY IN NEWSDAY

Spring leaf buds popped early on Long Island. What that means for birds, plants and insects.

A speck of green breaks out Thursday at Belmont Lake State Park in West Babylon. Credit: Newsday/J. Conrad Williams Jr.

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Updated April 6, 2025 3:55 pm

Tiny leaf buds are forming on the apple and dogwood trees in Chris Kuhlow's Port Jefferson Station backyard, and leaves are appearing on his black raspberry bushes and lilacs.

For 15 years, Kuhlow, a 51-year-old former Stony Brook University microbiology researcher, has been logging observations of leaf and bud appearances — in his own garden, or farther afield on a hike — into a database called Nature's Notebook, created by the USA National Phenology Network.

This year, the young leaves of lilacs and honeysuckles are emerging between two and eight days early on Long Island, compared with the historical average from 1991 to 2020, which is March 21 to April 2, according to a mathematical model based on data collected by the Network.

It's a small shift for two of the earliest budders that many people may not have noticed. But experts in phenology — the study of plant and animal life cycles and how they are influenced by climate — say this year's earlier leaf-out is part of a long-term trend, driven by a warming planet.

WHAT NEWSDAY FOUND

- **Leaves are emerging** on Long Island a few days earlier than the average over the past 30-plus years, according to data collected by the National Phenology Network
- **This year's accelerated schedule** is part of a trend, driven by climate change.
- **Scientists are finding evidence** that the trend is leading to timing mismatches between plants, insects and bids, which could spell trouble for their survival.

And ecologists are noting that this advancing spring timetable is beginning to disrupt relationships among plants, insects and migrating birds that have evolved over thousands of years.

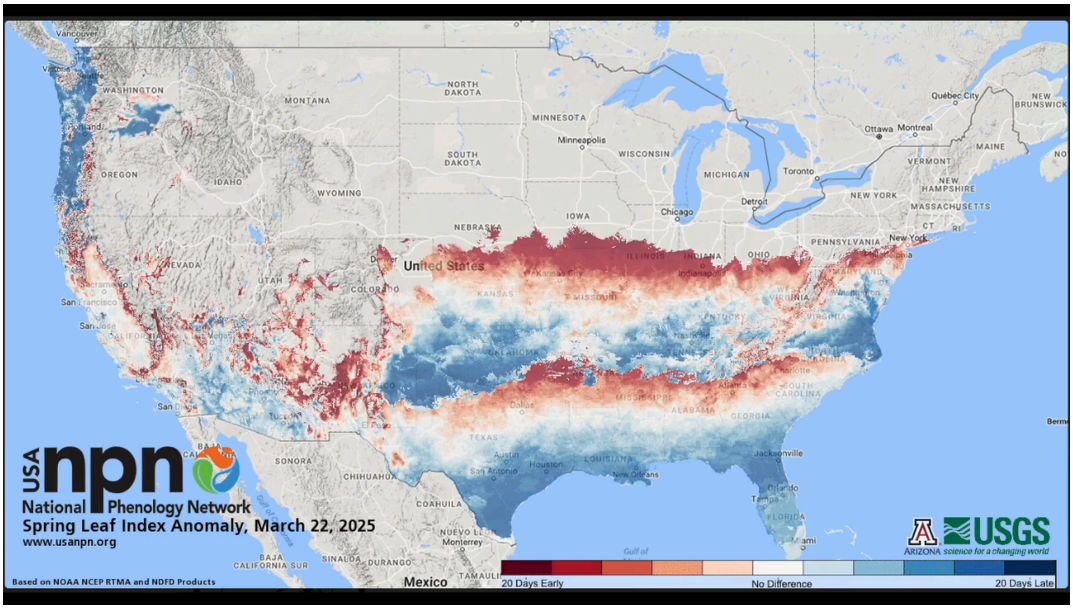
Colder winter, but warmer March

Spring leaves are cued mainly by warmer days as spring approaches. While this winter's temperatures on Long Island were slightly below average, last month was the fifth warmest March on record in the area, according to Jay Engle, a meteorologist with the National Weather Service in Upton. Those warm days most likely sent the message in the past few weeks that it was time to awaken from dormancy.

"There is very often variability from one year to the next," said Theresa Crimmins, the director of the Network and an associate professor in the School of Natural Resources and the Environment at the University of Arizona. In any particular place, spring leaf-out may come early one year and late the next, depending on whether the late winter and early spring was mild or cold.

And it's not consistent across space either: Leaf-out in Boston was 13 days early this year, National Phenology Network data shows, while in the Pacific Northwest, leaves appeared one to two weeks late.

The organization's first spring leaf index map shows a wave flowing from south to north, each dot representing new leaves, colored in blue where leafing out is late to deep red where they have emerged early.



But these inconsistencies are "layered on top of this increasing trend," Crimmins said: Throughout the Northeast, "temperatures are warming, and that means that things are happening progressively earlier than they used to."

Researchers mining the data collected by NPN from thousands of volunteers like Kuhlow, and other records, have identified timing misalignments.

Pollinating insects are not keeping pace with the earlier flowering of the plants they pollinate, scholars at Peking University reported in a Nature Ecology & Evolution study published in January. If warming continues, the authors suggested, food webs could be disrupted and ecosystems destabilized.

Researchers have also found that in dioecious trees, where males produce pollen and females produce seeds — including hollies and willows, some maples and ash, and ginkgos — "the male trees are shifting earlier at a more rapid rate than the female trees are," Crimmins said. "If those two trend lines diverged sufficiently, then you could cease to have overlap." Males could be sending pollen out on the breeze before the females' blossoms are open to receive it.

Buds, bugs on different timeline than birds

These effects are somewhat speculative, based on early evidence. But the shifts are already challenging birds, ornithologists say. Insect life cycles, like leaves, are cued by warming air: Their eggs have evolved to hatch when leaves appear for the larvae to feed on.

But birds time their migrations according to daylight hours, not temperature. "When the days get longer and longer," explained Joy Cirigliano, the senior coordinator for bird-friendly communities at the Audubon Society's Theodore Roosevelt Sanctuary in Oyster Bay, their hormones tell them "it's time to migrate: I have to fly and I have to sing and I have to make my nest."

Hours of daylight and the angle of the sun are determined by the movement of the Earth, not the heating of its atmosphere. So birds are generally sticking to their time-honored migration schedules.

When hungry migrants arrive on Long Island after their long-haul flights from points south, "their entire mindset is looking for flowering oaks, hickories, elms," said Kevin Munroe, Long Island Preserve Manager at The Nature Conservancy, so they can snap up the insects that hover around those flowering trees.

Birds migrate with daylight, while trees bud based on temperature. Credit: Newsday/J. Conrad Williams Jr.

But now they're arriving to find the oak catkins are past their prime, the insects no longer swarming near them, Munroe said. "And so the birds are getting separated from their seasonal food webs too quickly to adapt," Munroe said.

The problem is compounded when migrating songbirds raise their young.

"If you are a mama bird, whether you are a hummingbird or a goldfinch or an oriole or a warbler, there is no better, more tasty protein-filled morsel for your babies than a little moth caterpillar," Munroe said.

By the time the hatchlings arrive, begging for those tasty morsels, they may have missed the time when chubby larvae are most abundant. Even if there are just 5% fewer caterpillars, Munroe said, "that's everything. When every day is a fight for survival, 5% can be life or death for one of your babies."

Birds that tend to lay a second clutch of eggs, such as northern cardinals found on Long Island, will struggle even more to feed their late-season brood, Cirigliano said.

Some birds are shifting the timing of their migrations, according to the ornithologist Scott Weidensaul, author of the book "A World on the Wing: The Global Odyssey of Migratory Birds," sometimes by shortening their layovers so they arrive at their breeding grounds a little early.

"We're still learning each year, the effect it's having," Munroe said in an interview. "But there's no question that it's having a negative effect."

Animated map source: Spring First Leaf Index, USA National Phenology Network, www.usanpn.org