

Beyond the Light Show: The Effects of Fireworks on Animals and People

Firework displays can harm animals and create bursts of pollution with lingering effects, but there are ways to mitigate them.



By Christina Kelso

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The rockets, explosions and cascading colors of fireworks are a staple of celebrations throughout the world, whether at the Fourth of July, Diwali or New Year's Eve. But while the clamor of light and sound brings out cheers from revelers, fireworks can cause panic in animals. They also leave behind trails of pollution that take a lingering toll on the environment and people.

Here is what to know about the harm fireworks cause and recommendations from experts on how people can celebrate while reducing the impact.

A Stress for Animals

The intense, erratic sounds and lights from fireworks frighten animals, both wild and domesticated. Fear and stress responses have been documented in pets, zoo animals and wildlife. Wild animals may flee when fireworks start: Weather radars have recorded masses of birds taking flight, and studies have shown fleeing by sea lions and seals.

This rush to escape costs the animals energy and can lead to longer-term damage, said Bill Bateman, a professor of ecology at Curtin University in Australia and the author on a review of global research on the impact of fireworks on the environment. The animals may abandon habitats completely, or return with less energy for regular survival.

These effects are worse when fireworks occur during migration and breeding seasons. Independence Day in the United States, for example, falls in the breeding season for many coastal birds. Shorebirds are particularly at risk because of their proximity to fireworks and beach crowds, said Nicole Michel, director of quantitative science at the National Audubon Society.

Birds frightened by fireworks may abandon their nests, leaving chicks or eggs behind and exposed to threats like predators.

And adult birds are already running at the end of their energy reserves by this time, Dr. Michel said. They may be eating less while sitting on nests or burning more energy as they feed both themselves and their chicks.

“These poor birds are just run ragged,” she said. “It’s additional stress for a bird that’s already very stressed.”



A pond reflecting fireworks during celebrations in Moscow last year. Shamil Zhumatov/Reuters

Occasionally, fireworks kill large numbers of birds. In Beebe, Ark., in 2011 and 2012, thousands of blackbirds died after New Year's after being startled by fireworks. In 2022, fireworks in Taylor, Texas, caused nesting egrets to scatter, leading several to strike power transformers.

“Many of these birds, they’re not nocturnal and they’re flying low. They are surrounded by buildings and trees,” Dr. Bateman said. “It’s probably not a surprise that they end up piling into these things.”

Pollution and Litter Left Behind

Fireworks cause short-term surges in air pollution and leave behind toxins in waterways and soil that harm people and wildlife over the long term.

“Bursting fireworks produce a thick particulate smoke that’s laden with lots of nasty chemicals,” Dr. Bateman said.

Studies have shown that air worsens in the hours after fireworks, containing particulate matter, metals and gases like sulfur dioxide. Levels are higher after celebrations where fireworks use is high over multiple days. Air pollution aggravates lung and heart disease and is linked to other health conditions. Chemicals linked to fireworks, including perchlorate, have also been detected in water bodies.

Fireworks are also commonly made with and wrapped in plastic and leave behind debris that can be ingested by animals and break down into microplastics. One study found New Year's fireworks in London caused an immediate spike in microplastics.

Ways to Reduce Harm While Celebrating

People around the world have taken different approaches to reducing the risks to people and wildlife while continuing sky celebrations, including:

- Keeping fireworks from being set off in sensitive areas or banning them outright
- Restricting personal fireworks,
- Pushing for fireworks with fewer chemicals
- Staging alternative spectacles like drone light shows.

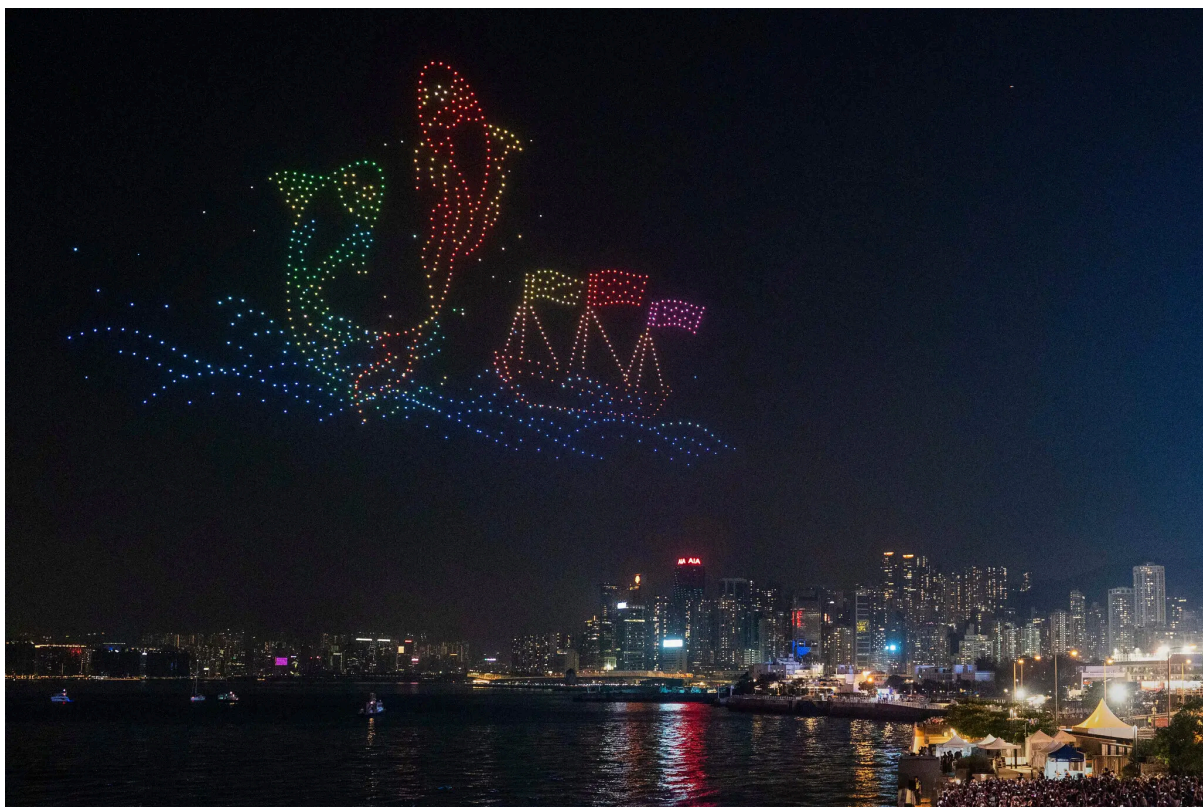
“Firework displays are spectacular and culturally important,” Dr. Bateman said, “and if there are options that are more environmentally friendly, then we really, really should embrace those.”

With traditional fireworks, damage can be reduced by shortening the length of shows and number of fireworks used, and moving them farther from people and animals. Community displays, staged high in the air, are better than firing fireworks individually, experts said.

“People just setting off fireworks all over the place are going to impact far more birds just because it is more spread out,” Dr. Michel said. “There’s also the risk of starting a fire, which would then destroy habitat.”

Drone light shows are increasing in popularity. They are quieter and don’t release the intense bursts of pollution associated with fireworks, though they still carry some smaller risks. Several cities and venues have swapped firework spectacles for drones in recent years, citing concerns over wildfires, pollution and wildlife.

This week, the town of Hingham, Mass., held its first Independence Day show using drones set to the music of a live band instead of fireworks. The town is home to a colony of nesting American oystercatchers that have settled on the islands in its harbor in recent years. In order to protect the birds, fireworks are not an option, said Marco Boer, chairman of the Hingham Harbor Development Committee, which organized the event.



A drone show above Victoria Harbor during the May Day holiday in Hong Kong this year. Bertha Wang/Associated Press

Mr. Boer said he had worried that people might miss the “big bang” of fireworks but that his community’s response to Wednesday’s drone show was “overwhelmingly positive.”

Alongside protecting the birds, he said, they noticed unexpected side benefits like less plastic debris floating in the water after the show and a more inclusive experience for people and pets sensitive to noise from fireworks.

When trying to reduce the damage from fireworks and other practices that harm the environment, “you’re not going to make any friends by saying, ‘What you enjoy is bad; stop doing it,’” Dr. Bateman said. “You have to look first for options that are more sustainable but still don’t take the pleasure out of having these things.”