



The Dangers of Pesticides to Wildlife

A White Paper by Defenders of Wildlife

"It was a spring without voices. On the mornings that had once throbbed with the dawn chorus of robins, catbirds, doves, jays, wrens, and scores of other bird voices there was now no sound; only silence over the fields and woods and marsh."

- "A Fable for Tomorrow" from Rachel Carson's *Silent Spring*

Many of us are familiar with Rachel Carson's seminal work, *Silent Spring*. But far fewer are aware that more pesticides are used today than at the time her book was published in 1962 and that these pesticides continue to pose an enormous risk to wildlife. Despite the ban of the organochlorine DDT in the United States, which was a wise decision that led to the improved health of many species like the bald eagle, many of our most commonly and newer chemicals are *equally or more dangerous* to wildlife and some harmful compounds closely related to DDT are still in use.

Unlike DDT and other organochlorines, which persisted in the environment long after their application, accumulated in the food chain and caused eggshell thinning, the most widely used pesticides today are organophosphates and carbamates that do not bioaccumulate and degrade rapidly in sunlight. But, they are much more acutely toxic, many even at very low levels.

Organophosphates and carbamates impact wildlife mainly by affecting the nervous system by inhibiting an enzyme called acetylcholinesterase. These chemicals prevent this enzyme from breaking down the neurotransmitter acetylcholine, which then accumulates. "Acetylcholine accumulation increases nerve impulse transmission and leads to nerve exhaustion and, ultimately, failure of the nervous system. When the nervous system fails, muscles do not receive the electrical input they require to move. The respiratory muscles are the most critical muscle group affected, and respiratory paralysis is often the immediate cause of death."

Before death occurs, an organism exposed to organophosphates and carbamate may behave abnormally and alter the animal's ability to survive or reproduce. In birds, for example, exposure can impact the bird's ability to sing and therefore decrease its chances of successfully attracting a mate or establishing a territory. Or it could impact the bird's care for its young, causing the nestlings to starve to death.

Some pesticides are endocrine disrupters, which mean they interfere with an organism's hormone system. According to the U.S. Fish and Wildlife Service (FWS) "Endocrine disruption has the potential to compromise proper development in organisms, leading to reproductive, behavioral, immune system and neurological problems, as well as the development of cancer. Effects often do not show up until later in life."

For many years, it has been known that these endocrine disrupting pesticides can affect the sexual form and function of many wildlife species. Newer studies reveal that these effects can occur at low rather than high levels of exposure. This is of concern because researchers have "found that the toxic effects of low-level combinations of certain chemical pesticides can be greater than the sum of the effects of the individual components." For example, when atrazine and other organophosphates are mixed, their combined toxicity was greater than could be predicted from the toxicities of the individual chemicals because of the synergistic effects of the components. A wide spectrum of animals have been looked at, from minnows to falcons, and studies show a range of altered behaviors including mating and parenting, nest building, activity level, predator avoidance, and foraging.

In attempting to assess the impacts of pesticides, traditional EPA testing looks mainly at lethal effects from high doses. They do not require testing of the combined effects of pesticides but only tests individual chemicals. By doing so, the real world uses of these chemicals is never evaluated. The result is that EPA testing has largely failed to detect the significance of sublethal effects and has downplayed or dismissed studies looking at these types of impacts.

The risk a pesticide presents depends on the type of pesticide, how toxic it is, where and how it is used, how much is used, how often it is used, how long it remains in the environment, if it concentrates through the food chain and how it impacts the habitat and the environment in general. Wildlife will be exposed to pesticides through their food or water, by absorbing them through their skin or by breathing them in.

Recent studies of major rivers and streams documented that 96% of all fish, 100% of all surface water samples and 33% of major aquifers contained one or more pesticides at detectable levels. The most common pesticides found were those typically used for lawn treatments. Other studies have determined that common pesticides at low level concentrations are highly toxic to aquatic wildlife and decreased their populations by nearly 70 percent. .

The intent of pesticides is to kill specific organisms that cause damage to plants but few are target-specific and routinely kill many beneficial organisms. The EPA does not require the testing of insecticides for their effects on beneficial insects, many of which prey on the problem insects and are therefore extremely

important to the ecosystem and are important natural controls. Bees for example, are important pollinators of many food crops. Pollination is vital to food production -- approximately one third of all human food production is dependent on pollinators. A study of the economic impacts of pesticides found that estimated pollination losses to food production from pesticide effect on honey bees and wild bees are \$200 million per year. In 1995, the U.S. Department of Agriculture declared that the U.S. was facing the worst pollination crisis in American history.

Many pesticides are applied in granular form, which makes them particularly dangerous to birds, which pick them up while searching for seeds. Pesticide-killed insects become a readily available food source for birds and serve as another means of exposure. Once a bird is killed by a pesticide, it will likely be eaten by a bird of prey or a mammalian scavenger, which can then in turn be poisoned. Raptors such as red-tailed hawks and great horned owls often feed on pesticide-poisoned prey.

Many experts believe birds are amongst the most vulnerable species when it comes to pesticide exposure and serve as sentinels of the quality of the environment. One reason they are most susceptible is that they are very mobile and difficult to exclude from areas that have been treated with pesticides and there is little that can be done to prevent them from landing in areas that have recently been treated. Their susceptibility relates to their high rates of ventilation and inhalation of vapor and fine droplets, which makes them at risk from pesticides that are sprayed. They also ingest pesticides through their food and by preening and grooming and by absorbing them through their skin and their feet.

Pesticides can harm or kill birds by hurting their food resources. Some cause anorexia - or loss of appetite - in birds causing them to starve to death. Researchers have documented this effect in several large bird kills during migration. The birds failed to put on the necessary weight to survive energy-draining migratory flights.

The U.S. Fish and Wildlife Service estimates that an estimated 67 million birds die from pesticide poisoning each year and more than 600 million are exposed. Some scientists have likened bird deaths from pesticides to an iceberg: those that are actually found and analyzed and whose deaths can be attributed represent the tip of the iceberg. The base of the pyramid represents the majority of pesticide related bird deaths that go undetected.

When an animal dies in the wild, it is quickly eaten by other animals. Often there is no trace of the animal after a few hours. Scientific studies show that up to 92% of the bird carcasses will be scavenged and removed from the area within 24 hours. This phenomenon makes it difficult for people using these chemicals to realize they are poisoning wildlife and leads to the false assumption that these

compounds are safe. Even when a dead animal is found the only way to determine the cause of death is a post mortem exam in the laboratory, something that rarely occurs.

The FWS estimates “about 20 percent of the nation’s endangered species are imperiled at least in part because of the harmful effects of contaminants.” Unfortunately, the FWS recently enacted “counterpart” regulations to the Endangered Species Act that allows the EPA to determine the impacts of pesticides without consulting with the FWS. EPA has historically failed to adequately consider the impacts of pesticides on listed species, which undoubtedly led to harmful impacts to a number of listed species. The change in the process was the result of a series of successful lawsuits by environmental organizations challenging EPA decisions regarding pesticide impacts for several listed species. Defenders and several other conservation organizations are challenging the new regulation through a lawsuit.

According to the Rachel Carson Council, a study of the unintended economic consequences of pesticides found that:

- 1) The estimated pollination losses to food production from pesticides' effects on honey bees and wild bees is \$200 million per year;
- 2) Destruction by pesticides of the natural enemies of pests can cost an estimated \$520 million per year in the U.S.;
- 3) A conservative estimate of fish (6-14 million) killed per year by pesticides ranges from \$24 to \$56 million; and
- 4) The total number of wild birds killed by pesticides is estimated at 67 million and the value of this bird loss to pesticides is \$2.1 billion annually.

For information on Defenders of Wildlife work on protecting wildlife from the impacts of pesticides, visit <http://www.defenders.org/wildlife/birds/pesticides.html>.

ABOUT DEFENDERS OF WILDLIFE

Defenders of Wildlife is a leading conservation organization recognized as one of the nation’s most progressive advocates for wildlife and its habitat. Defenders uses education, litigation, research and promotion of conservation policies to protect wild animals and plants in their natural communities. Founded in 1947, Defenders of Wildlife is a 501(c)(3) membership organization with headquarters in Washington, D.C., and 480,000 members nationwide.

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