PROTECTING POLLINATORS FROM PESTICIDES

Supporting Ecologically Sound Mosquito Management

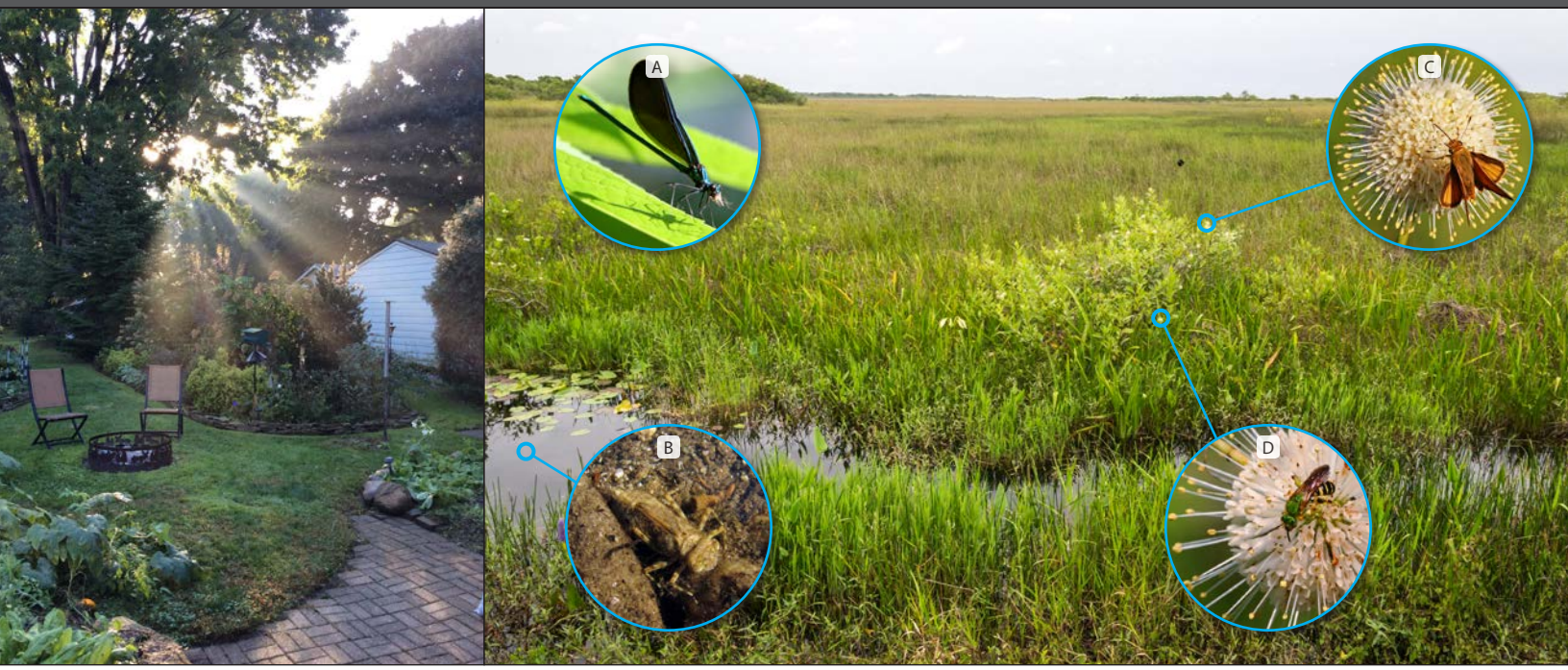

Figure 1: Left—Limiting mosquito production by draining stagnant water in places such as pet bowls and gutters effectively keeps mosquito numbers down. Spraying to kill adult mosquitoes is not the most effective way to manage mosquitoes and should not be part of a home-management strategy. Right—Supporting healthy wetlands with thriving fish and insect populations can help keep mosquitoes in check. Both adult (A) and juvenile (B) dragonflies and damselflies are voracious predators of mosquitoes. Widespread use of mosquito-control insecticides has been linked with declines of native pollinators (C & D).

Across the country, communities are actively working to bring back the pollinators. As a result, many municipalities are seeking ways to align important public health efforts, such as mosquito management, with pollinator protection goals. Fortunately, there are time-tested and effective ways to protect people from disease-carrying mosquitoes while also protecting pollinators. The Centers for Disease Control and Prevention (CDC) supports the use of integrated mosquito management:

- **Surveillance.** An accurate understanding of risk is important when fears are running high, and monitoring mosquito populations allows local governments to determine if there is risk of disease transmission from local mosquitoes. The vast majority of the approximately 175 species of mosquitoes in the United States do not transmit disease. Moreover, populations of disease-transmitting mosquito species in your area may not be infected with a disease.
- **Removal of artificial mosquito habitat** (i.e., source reduction). Since mosquitoes require stagnant water to develop, everyone (local governments and residents alike) can help keep mosquito populations down by identifying and removing standing water. Around town, mosquitoes can reproduce in garbage cans, corrugated pipes, buckets, pots, birdbaths, fountains, gutters, and old tires. Local vector-control districts can eliminate stagnant water in public areas, including in ditches and storm drains.
- **Early intervention.** Small freshwater crustaceans (cyclopoid copepods) can drastically reduce larval mosquito numbers, as they are voracious predators of mosquito larvae and occur naturally in many wetlands. Where disease-causing mosquitoes are present, targeted use of larvicides is often part of early intervention.
- **Personal protection.** Protecting yourself from mosquito bites can go a long way to stopping mosquito-borne diseases. Simple protections include wearing long sleeves when mosquitoes are active, using mosquito repellent, and keeping screens in good repair.

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- **Targeted use of adulticides by public health officials as a last resort.** Sometimes adulticides, insecticide treatments to kill adult mosquitoes, are part of a mosquito-management plan, but they are never appropriate as the first line of defense. Trying to kill flying adult mosquitoes is less effective than source reduction and early intervention. Furthermore, spraying insecticides over natural areas and places where people live puts communities and the environment at risk. Home treatments, such as mosquito misters, are not part of an ecologically sound management strategy. The World Health Organization recommends using adulticides only in case of a disease outbreak.

An effective mosquito-management plan takes an all-hands-on-deck approach. Community members and local agencies can work together to keep mosquito-borne diseases in check. With new diseases making headlines, we need to be prepared with thoughtful and effective mosquito-management programs. Our communities (human and invertebrate) deserve no less.

Figure 2: Mosquitoes reproduce in unexpected places—including flower pots (A), backyard ponds (B), and even in corrugated pipe grooves (C). Consider installing a pump in your pond to keep the pond water moving, drain water from flower pots, and be sure to install pipes so that water flows freely.

You can learn more about ecologically sound mosquito management on our website at **xerces.org/pesticides/effective-mosquito-management**. The CDC offers many resources, including a review of integrated mosquito management, at **www.cdc.gov/zika/vector/integrated_mosquito_management.html**.

CASE STUDIES IN EFFECTIVE AND ECOLOGICALLY SOUND MOSQUITO MANAGEMENT: Boulder, Colorado, and Cape May, New Jersey

Ensuring mosquito-management efforts protect pollinators and other natural resources can and should be community specific. Fortunately, there are excellent examples available to guide local efforts.

The city of Boulder, Colorado, has long been a leader in environmental efforts, and mosquito management is no exception. Boulder avoided the use of adulticides during the height of the West Nile virus epidemic while other jurisdictions routinely sprayed. The city's innovative program is based on ecological principles of protecting and enhancing biodiversity to naturally keep mosquito populations low. To that end, the city conducts biodiversity surveys at mosquito breeding sites. The surveys determine the presence of mosquito predators and evaluate a wetland's overall health and how it correlates to mosquito populations. The city program also includes a vector index to estimate the risk of West Nile virus. Boulder's staff map mosquito breeding sites, identify mosquitoes by species, and monitor for the virus's presence. Informed with that data, they can target larvicide treatments to manage disease-transmitting mosquitoes. When mosquitoes test positive for West Nile virus, the city also increases its already extensive public outreach to further involve whole communities in efforts to limit transmission.

The county of Cape May, New Jersey, which has experienced both West Nile virus and eastern equine encephalitis cases, also has a noteworthy mosquito-management program. Approximately 60% of the county is composed of marshlands and woodlands. Because the county has so much natural mosquito-producing habitat, an integral component of the program is open marsh water management—a technique that increases tidal exchange in marshlands that have been disturbed by human intervention. This technique restores natural areas, reduces the suitability of marshland for mosquito reproduction, and allows fish and other natural predators to consume mosquito larvae. Staff respond to every mosquito complaint, and they are generally able to identify and control the problem simply by removing nearby stagnant water.

Unlike Boulder, Cape May targets insecticide applications to control adult mosquitoes. Recognizing the damage these insecticides can cause, the county collaborates with residents to reduce risks. In 2018, one such collaboration happened when the county responded to a significant mosquito outbreak at an organic farm that serves as a stopover for migrating warblers. To protect the warblers and the crops from insecticides, the county used dry ice to draw the mosquitoes to a small area where they could target the insecticide spray. Since then, the farm has taken steps to limit mosquito reproduction and avoid insecticide use.

Boulder and Cape May have each developed methods to address the unique concerns of their regions. Yet, at their core, the two mosquito-management programs are very similar—both are informed by monitoring, focused on stopping mosquito reproduction through nonchemical means, and reliant on communities to succeed. These two localities can act as models for other communities working to ensure they have effective and sustainable mosquito-management programs in place.

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