

## **Urban Pollinator Conservation in the U.S. State Wildlife Action Plans**

**Jonathan R. Mawdsley**

*Association of Fish and Wildlife Agencies  
Washington, DC*

**Kristal Stoner**

*Nebraska Game and Parks Commission  
Lincoln, Nebraska*

### **Introduction**

The U.S. State Wildlife Action Plans (SWAPs) provide an important framework for conserving many ecologically and economically important groups of organisms. Forty of the 56 SWAPs incorporate information about animal pollinators, including species of bees, flies, butterflies, skippers, moths, bats, and birds. Pollinators are essential for reproduction of many species of flowering plants and thus have considerable value in natural as well as agricultural ecosystems. Concerns have been raised recently in the United States about population declines in many pollinator species, from bumblebees and honeybees to the monarch butterfly. In this paper, we provide information about pollinator species that have been included in the SWAPs and discuss strategies by which states could incorporate information about pollinators and pollinator conservation activities into future SWAP revisions. Although our paper focuses primarily on urban pollinators, many of the recommendations we present here are broadly applicable to pollinator taxa in other settings and contexts as well. We conclude with a case study of pollinator conservation activities associated with implementation of the Nebraska State Wildlife Action Plan.

### **Development and Taxonomic Coverage of State Wildlife Action Plans**

The State Wildlife Action Plans, also known as Comprehensive Wildlife Conservation Strategies, describe strategic conservation approaches for wildlife and wildlife habitats in each of the 50 U.S. states, the District of Columbia, and five U.S. territories. Each plan is the product of close collaboration between state, federal, tribal, and local conservation partners who have joined together to identify shared conservation priorities. Each plan has been designed to help guide wildlife conservation activities in a particular state or territory over a five to 10 year period for the express purpose of preventing species of wildlife from becoming endangered. Together, the plans form a comprehensive blueprint for wildlife conservation across the entire United States (Association of Fish and Wildlife Agencies (AFWA) 2012).

The process of preparing the SWAPs began in 2000, when the U.S. Congress established the Wildlife Conservation and Restoration Program and the State Wildlife Grants Program. As a condition of receiving funding under these programs, Congress required all 50 U.S. states, the District of Columbia and five U.S. territories to develop SWAPs by October 1, 2005. Each SWAP was required to identify wildlife species needing conservation efforts, identify key habitats for these species, identify threats to species and their habitats, outline strategies for ameliorating those threats and conserving species and their habitats, and describe methods for monitoring and evaluating the results of these actions. States were given the flexibility to customize the details of the plans in order to meet their own unique needs and ecological conditions. The SWAPs produced by each state and territory were then reviewed by the U.S. Fish and Wildlife Service (USFWS) and all of the plans were officially approved in 2006 (AFWA 2012). In accordance with guidance provided by USFWS, every SWAP was required to include the following set of basic elements:

1. Information on the distribution and abundance of wildlife, including low and declining populations, that describes the diversity and health of the state's wildlife;

2. Descriptions of locations and relative conditions of habitats essential to species in need of conservation;
3. Descriptions of problems that may adversely affect species or their habitats, and priority research and survey efforts;
4. Descriptions of conservation actions proposed to conserve the identified species and habitats;
5. Plans for monitoring species and habitats, and plans for monitoring the effectiveness of the conservation actions and for adapting these conservation actions to respond to new information;
6. Descriptions of procedures to review the plan at intervals not to exceed 10 years;
7. Coordination with federal, state, and local agencies and Native American tribes in developing and implementing the wildlife action plan; and
8. Broad public participation in developing and implementing the wildlife action plan (AFWA 2012).

Each SWAP includes a list of Species of Greatest Conservation Need (SGCN) for a particular state or territory. These lists were developed by state wildlife agency staff in collaboration with teams of outside experts and partners. The lists of SGCN in the first set of SWAPs tended to focus on vertebrate organisms, with birds, mammals, fish, reptiles, and amphibians well represented. Invertebrate groups such as insects, mollusks, crustaceans, and worms received less attention in the first round of SWAPs (Bried and Mazzacano 2010; The Heinz Center 2013). These differences in coverage of taxonomic groups exist for several reasons. Fish, mammals, and birds are popular with hunters, anglers, bird-watchers, wildlife-enthusiasts, and many members of the general public. Dedicated funding is available for the conservation of many of these species, supported by excise taxes on hunting and fishing equipment and also by private contributions from wildlife enthusiasts (Organ and Mahoney 2007). Many of the state fish and wildlife agencies were established for the explicit purpose of conserving fish and game species and thus may not have the legal authority to manage nonvertebrate groups. In some states, certain nonvertebrate groups such as insects fall under the authority of the state department of agriculture rather than the state fish and wildlife agency (The Heinz Center 2013).

### **Pollinators and Pollinator Declines in the United States**

Pollination is a mutually beneficial relationship between plants and pollinators wherein the plant provides pollen and/or nectar to the pollinator and the pollinator provides reproductive services for the plant (National Research Council (NRC) 2007). Roughly 75 percent of the 240,000 species of flowering plants worldwide rely on pollinators for flower reproduction (NRC 2007). This includes many plant species that provide browse or forage for larger wildlife, as well as plant species that provide seeds and fruits to support birds and small mammals. Many of the most popular game species as well as many of the most popular “watchable wildlife” species are thus dependent on animal pollinators for part or all of their food requirements. Pollinators are also crucial to the U.S. agriculture industry, since 130 of the plant species grown as crops in the U.S. rely on animal pollinators to produce seeds and fruit (Klein et al. 2007; Calderone 2012).

Available evidence indicates that certain pollinator species have been declining in the U.S. (NRC 2007). Probably the most widely known example of a pollinator decline in the U.S. is the phenomenon known as “colony collapse disorder” in commercial honeybee colonies (vanEngelsdorp et al. 2009). Declines in pollinator populations can be traced to a multitude of causes, including intensive agricultural practices, use of certain pesticides, and habitat loss and degradation (Potts et al. 2010). Some species such as bumblebees and honeybees have experienced declines as a result of the spread of pathogens and diseases (Kremen et al. 2002; NRC 2007). Climate change is also expected to provide additional challenges to pollinator populations, ranging from disruption of migratory paths of pollinators such as hummingbirds and bats to decoupling of plant-pollinator interactions when plants and pollinators respond differently to climate cues (NRC 2007).

## New Discoveries Highlight Urban Pollinators

Recent field studies have revealed that urban and suburban landscapes across North America can actually support diverse assemblages of animal pollinators. More than 200 species of bees have been recorded from the New York City metropolitan area in recent surveys by John Ascher and colleagues at the American Museum of Natural History, including four species new to science (Olson 2011). In Maryland, Droege and Shapiro (2011) and Shapiro and Droege (2011) have found 49 native bee species in field surveys within the heavily urbanized Port of Baltimore and 82 native bee species at the Cove Point Liquefied Natural Gas facility in Calvert County. One interesting finding from these surveys is that some native bee species, such as the large carpenter bee (*Xylocopa virginica*), may nest preferentially in urban areas near human habitations (Droege and Shapiro 2011; Shapiro and Droege 2011). Bee taxa such as large carpenter bees that thrive in urban areas can provide important pollination services for the urban flora, including decorative plantings, green roofs, bioretention plantings, street trees, and urban vegetable and fruit gardens (Kearse 2010).

Even relatively rare species of pollinators may occur in urban areas. Small patches of suitable nesting or foraging habitat for rare pollinator species may persist in urban parks and other areas where native vegetation is present. The lead author conducted surveys of native bees in urban Washington, DC, during the spring, summer, and fall of 2014, and identified at least three nesting sites for the declining American bumblebee (*Bombus pensylvanicus*): one in a meadow at the U.S. National Arboretum and two in vacant lots in the Shaw neighborhood. The Karner Blue butterfly, discussed in more detail below, is another example of a rare insect species that persists within the Albany, New York, metropolitan area. The monarch butterfly can be found in many urban and suburban areas throughout the United States where its larval milkweed hosts and/or nectar plants for the adult butterflies are present.

## Pollinators, Urban and Otherwise, in the SWAPs

Pollinator conservation was not specifically identified as a priority topic for the original set of SWAPs (The Heinz Center 2013). Nonetheless, many individual pollinator species were included in the first set of SWAPs, including species of hummingbirds, bats, bees, butterflies, skippers, moths, and flies. According to an analysis prepared by The Heinz Center (2013):

- 230 different species of butterflies are mentioned in 40 of the 56 total SWAPs.
- 36 SWAPs mention one or more moth species, some of which are known pollinators.
- 49 different SWAPs mentioned a total of 64 different bat species, although only a few of these are confirmed pollinators.
- 18 distinct hummingbird species were included in 24 SWAPs.
- Only 11 SWAPs cited flies, mentioning 11 different species.
- Only 10 SWAPs mentioned bees, although these states included a total of 31 bee species.

In light of the recent conservation attention to the monarch butterfly, it is interesting to note that only three states or territories selected the monarch butterfly as a SGCN in their first SWAP documents: California, Kansas, and the District of Columbia. California's SWAP specifically mentioned the overwintering sites for the monarch butterfly on the Monterey Peninsula as a conservation priority. Kansas's inclusion of the monarch butterfly in its SWAP appears to have been driven by public interest generated in part by the "Monarch Watch" program at the University of Kansas. And the heavily urbanized District of Columbia has small populations of most of its butterfly species and thus was one of the few jurisdictions to include common and widespread butterflies as SGCN (M. Pfaffko, personal communication 2014).

Urban pollinators, particularly butterflies and moths, feature prominently in many of the SWAPs. One of the best-studied urban species is the federally endangered Karner Blue butterfly (*Lycaeides*

*melissa samuelis*; USFWS 2003). The type locality for this species was a large sand dune complex located entirely within the city limits of Albany, New York (Nabokov 1943, 1949). Destruction of this area by human activities contributed to conservation concern for this species that ultimately led to its formal listing as endangered under the U.S. Endangered Species Act (Andow et al. 1994). The Karner Blue butterfly has subsequently been found in several other states and was included as a SGCN in eight of the original SWAPs: Illinois, Indiana, Michigan, Minnesota, New Hampshire, New York, Ohio, and Wisconsin.

### **New Context for State Fish and Wildlife Agencies**

Since the completion of the original SWAPs, several key documents have appeared that provide important new context and guidance for state fish and wildlife agencies interested in managing pollinator populations. Probably the best known is President Obama's "Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honeybees and Other Pollinators." Issued on June 20, 2014, this memorandum calls for federal and state agency action to stem pollinator declines and specifically identifies SWAPs as a vehicle for the conservation of the monarch butterfly and other pollinator taxa (The White House 2014). In September 2014, the directors of the U.S. state fish and wildlife agencies unanimously passed a resolution in support of voluntary efforts to conserve the monarch butterfly at the annual business meeting of AFWA. In March 2015, a new memorandum of understanding was signed by AFWA President Larry Voyles and USFWS Director Dan Ashe that encourages the states and USFWS to collaborate on projects that benefit monarch butterflies and other pollinator taxa, including incorporating these species in SWAP revisions. Finally, the recent petition to list the monarch butterfly as a threatened species under the U.S. Endangered Species Act has generated considerable interest in voluntary and nonregulatory approaches to conserve this species and other declining pollinators.

### **Opportunities for Pollinator Conservations in State Wildlife Action Plan Revisions**

State fish and wildlife agencies are currently in the process of revising the original set of SWAPs, with revisions due to USFWS by October 2015 (AFWA 2012). Many states are taking advantage of this opportunity to incorporate new information about animal pollinators in their revised SWAPs. At the AFWA Wildlife Diversity Program Managers meeting in January 2015, the authors facilitated a conversation with representatives from state fish and wildlife agencies about their plans for incorporating pollinator taxa, pollinator habitats, and conservation actions to benefit pollinators into their SWAP revisions.

Many states are considering adding high-priority pollinator taxa to their lists of SGCN. In addition to the monarch butterfly, most states are evaluating other species in the order Lepidoptera as potential SGCN for their SWAP revisions. Besides butterflies, other pollinator groups of interest within Lepidoptera include skippers (family Hesperiiidae) and hawk or sphinx moths (family Sphingidae). Most states already include information about relevant vertebrate pollinators such as hummingbirds and nectar-feeding bats in their existing SWAPs (The Heinz Center 2013).

States can also highlight ecological communities that support multiple pollinator species in the habitats chapter of their State Wildlife Action Plans. Ecological communities that support large and diverse pollinator communities throughout the United States include many of the early successional habitats such as barrens, prairies, grasslands, shrub-scrub communities, and wet meadows, including sites that have been restored through human activity (Droege et al. 2009). Certain key habitat features support many native bees, particularly open areas of bare, sandy soil. Remnant areas of natural vegetation within agricultural landscapes and urban landscapes are also especially important for supporting populations of pollinator species.

States will likely include many different actions to benefit pollinator species in their SWAP revisions. These actions may include conservation of existing pollinator habitat areas as well as restoration or creation of habitat areas for pollinators. Some states are discussing the application of

integrated pest management in parks and natural areas to reduce pesticide exposure to nontarget organisms, including pollinators. Many states are considering the implementation of surveys and inventories for particular pollinator taxa, including native bees, butterflies, moths, and skippers. Data from these surveys would then be included in the state Natural Heritage databases and the national NatureServe database. Several eastern states, including Maryland and Delaware, have collected enough information on native bee populations to begin the process of developing NatureServe S-ranks and G-ranks for these important pollinator species (M. J. Sarver, personal communication 2014).

### **First Steps for States Interested in Pollinator Conservation**

For states that have not yet begun to consider the incorporation of pollinators into their SWAPs, some basic first steps might include:

- Highlighting and recognizing pollinator SGCN in the SWAP revision through a call-out box in the document or even a separate stand-alone publication;
- Highlighting key pollinator habitats in the state, as part of the SWAP revision;
- Commissioning statewide surveys for one or more pollinator groups;
- Identifying specific conservation actions in the SWAP that also benefit pollinators;
- Working with the Natural Resources Conservation Service to explore opportunities for restoration of pollinator habitats within agricultural landscapes; and
- Working with partners to develop and implement outreach and education programs, especially in urban areas, that help build public understanding of pollinator declines and generate support activities that conserve pollinator populations (The Heinz Center 2013).

### **Case Study: Pollinators in Nebraska's State Wildlife Action Plan**

The Nebraska SWAP includes pollinator taxa such as butterflies, moths, and skippers as SGCN. Through SWAP implementation, conservation practitioners across the state are taking action to improve the status of these species. For example, surveys are underway to determine if the rare Tawny Crescent (*Phyciodes batesii*) is still extant in Nebraska and needing conservation action or if it has been extirpated due to climate change. Many prairies are being restored using high diversity seedings that include specific host plants for at-risk pollinators such as the Regal Fritillary (*Speyeria idalia*).

Many partners are providing pollinator habitat at large landscape scales that benefit multiple species. For example, Nebraska Pheasants Forever, Inc. is actively restoring and enhancing habitat that benefits quail, pheasants, and pollinators. It is widely understood that habitat enhancements that include increasing habitat complexity and available pollen and nectar sources will benefit pollinators and also provide quality habitat for many socially important vertebrate species. Nebraska Pheasants Forever, Inc. not only impacts thousands of acres annually, but also actively promotes pollinators and their importance and provides educational resources to stimulate pollinator conservation and pride among landowners.

Pollinators can also provide validation and insights of a successful restoration. A prairie restoration in a landscape dominated by row crop agriculture had documented use by the native bee species *Tetraloniella cressoniana*, a specialist on *Salvia*, despite little to no habitat in the immediate vicinity. Although this prairie was not restored specifically for pollinators, the presence of this species indicates it is providing habitat for a variety of species.

Pollinator conservation efforts are also effective at much smaller scales and provide substantial opportunities to engage small communities and local individuals. Nebraska's Watchable Wildlife Small Granting Program provides technical and financial assistance to individuals seeking to improve wildlife viewing opportunities, many of which have included pollinator gardens and pollinator awareness. Through these programs, the Nebraska Game and Parks Commission has educated local nurseries regarding using native plants which therefore encourages more local use of native plants.



Pollinator conservation efforts can be readily addressed through citizen science projects. Existing programs and applications such as iNaturalist will be used to empower master naturalists to collect information regarding the distribution and trends for many Lepidoptera species across Nebraska.

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