



# Chanticleer Garden Biodiversity Survey



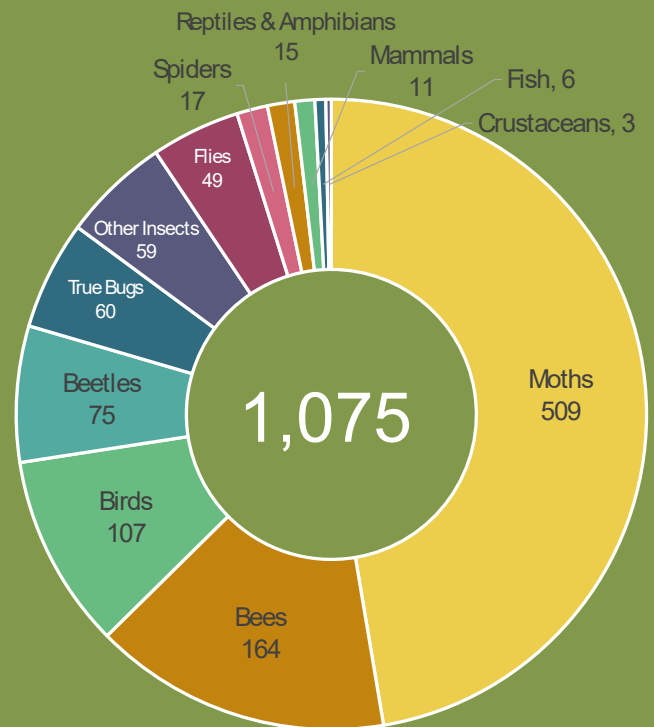
# Project Summary

Wildlife and insect surveys at Chanticleer have revealed that the garden supports a wealth of biodiversity. Over 1,000 species of insects, birds, reptiles, amphibians and fish find habitat here. Beginning in 2020, Sarver Ecological has conducted surveys of garden biodiversity, with a special focus on two major groups of insects: native bees and moths, both important pollinators and critical elements in food webs for other wildlife. These surveys resulted in the curation of over 15,000 collected specimens of these and other insect groups.

The Chanticleer Garden Biodiversity iNaturalist project provides a repository for over 3,000 photographic records from the Sarver Ecological biodiversity surveys and facilitates collection and review of records contributed by horticultural staff and garden visitors. Over 200 different observers have contributed more than 1,700 additional observations of non-plant species to the project.

The garden continues to work actively to improve habitat quality and management practices to support ecological processes and to convey lessons learned about these practices to the gardening public as well as local communities and homeowners.

## Species Diversity



### Highlights

The Chanticleer biodiversity surveys resulted in detection of a species of bee previously unreported in Pennsylvania, the Fedor Masked Bee (*Hylaeus fedorica*), as well as a previously undocumented population of an as yet unnamed species of crayfish (*Cambarus c.f. acuminatus* sp. C). Several new state records and numerous county records were recorded for moth species during the surveys.

Chanticleer serves as a model to visitors by showcasing, in both naturalistic and formal gardens, a diverse mix of native and non-native plants that support a complex food web. Home gardeners can make similar species choices and adopt ecologically sound practices to benefit biodiversity. See more in the “What Makes a Diverse Garden” section.





# Bee Diversity

Chanticleer hosts at least 164 species of bees, including 149 native species (35% of the total known bee species diversity in Pennsylvania).

164 species

To document this diversity, Sarver Ecological collected over 6,000 bee specimens using ground-based pan traps, canopy traps, and hand netting of bees on flowers, and collected photographic voucher records from garden visitors.

The survey documented a rich bee fauna, with abundant generalists including seven species of bumble bees (*Bombus*), and a sweat bee assemblage (*Lasioglossum*) of more than 35 species. Groups with many species that specialize on particular host plants were also well-represented, with over 40 species of mining bees (*Andrena*) documented, including specialists of spring ephemeral wildflowers (toothworts, spring beauty, and trout lily), specialists of woody shrubs (shrub dogwoods, native azaleas), and specialists of meadow wildflowers (evening primrose, sunflower, ironweed, golden alexanders, goldenrods, and asters). 21 pollen specialist species were documented during the survey.

The collection of the fedora masked bee (*Hylaeus fedorica*) collected from a canopy trap near the pond garden represents a new state record for Pennsylvania. This tiny species, apparently associated with riparian forests, is poorly known and rarely collected. The evening primrose sweat bee (*Lasioglossum oenotherae*) which specializes on evening primroses and flies at dawn when the primrose flowers are still open, has been rarely documented in Pennsylvania, with only three prior county records.



# Butterfly Diversity

30 species

Chanticleer Garden supports at least 30 species of beautiful butterflies. This is about 25% of those known from Pennsylvania. Butterflies are documented by photographs via iNaturalist observations and by sightings from our formal surveys.



The Eastern Giant Swallowtail is one of the largest butterflies in North America, and their larvae feed on the leaves of plants in the Citrus family (Rutaceae). This species is moving their range northward with climate change and is taking advantage of novel resources in garden habitats such as Northern Prickly-ash (*Zanthoxylum americanum*) and Gas Plant (*Dictamnus albus*), Garden Rue (*Ruta graveolens*), Common Hoptree (*Ptelea trifoliata*).

The black and blue Pipevine Swallowtail feeds on vines in the dutchman's pipe family (Aristolochiaceae), which contain alkaloids that make the caterpillars and adults toxic to predators. Other species including Spicebush Swallowtail, Black Swallowtail, and Red-spotted Purple have color patterns that mimic the Pipevine Swallowtail to fool predators into thinking they are also distasteful. This species is common at Chanticleer where its host plant is more abundant than usual.



The large, charismatic Monarch butterfly is in steep population decline, and is proposed for federal listing as a threatened species. Chanticleer provides several species of larval host plant milkweeds (*Asclepias*) in multiple areas of the garden, and numerous nectaring flowers for migrating adults in late summer & early autumn.



# Moth Diversity

509 species

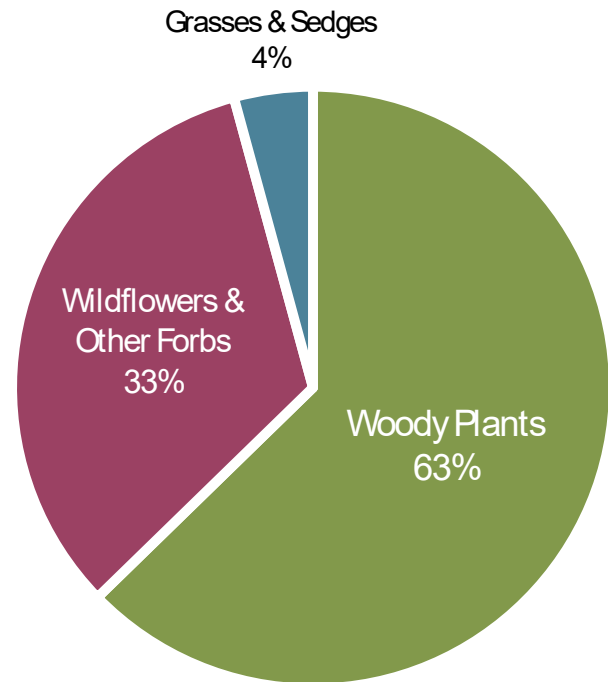
Chanticleer hosts at least 509 species of moths (about 20% of the total species estimated to occur in Pennsylvania). This excellent diversity reflects the diversity of native plants present in the garden, the darkness of the site at night (moths are sensitive to light pollution), and the presence of many large specimen trees.

234 of these moths specialize to some degree on only certain families or genera of plants. Most specialize on woody plant groups, with a smaller proportion of species specializing on wildflowers and other herbaceous species. Chanticleer's moth fauna is especially rich in forest understory specialists that are less common in the wild due to invasive plants and deer browse.

Moths rely on "keystone genera" or groups of native woody plants that support exceptionally high numbers of species, including oaks, willows, cherries, pines, poplars, birches, hickories, and maples.

Moth surveys documented numerous new county records and several new state records, as well as many species known to be rare in the state.

## Specialist Moth Feeding Guilds



Clockwise from top left: Moth survey blacklight station at Chanticleer under the moon. Luna Moth. Tiger moth. An American Dagger Moth caterpillar. Brown Scoopwing.

# Other Invertebrate Diversity



## Beetles

75 species

Preliminary work has identified 75 species of beetles at Chanticleer. With more targeted effort, many times that number should be located (some 1,800 species are known from Pennsylvania). Beetles are important decomposers, pollinators, predators and seed dispersers and include the greatest diversity of species in the animal kingdom.



## True Bugs

60 species

Incidental observations have so far documented 60 species of True bugs (insects in the order Hemiptera), 6% of the over 1,000 species known from Pennsylvania. True bugs can be important pollinators or plant pest predators.



## True Flies

49 species

Preliminary observations have identified 49 species of true flies (insects in the order Diptera), with surveys focused on important pollinators in the Flower Fly (Syrphidae) family. Flies are also important scavengers, food for other animals, and some are useful for plant pest control.

# Other Invertebrate Diversity

## Other Insects

59 species

Miscellaneous other insect groups including dragonflies and damselflies (Odonata), grasshoppers (Orthoptera), ants (Formicidae), have been recorded, but have not been the subject of targeted surveys.



## Spiders

17 species

Incidental observations were recorded for 17 species of spiders, primarily in the evident and relatively well-known groups jumping spiders, fishing spiders, and orbweavers. Further efforts will likely detect considerably more species.



## Crustaceans

3 species

Chanticleer hosts 3 documented species of crustaceans, including an undescribed species of native crayfish in the *Cambarus acuminatus* complex.





# Bird Diversity

107 species



Bird diversity at Chanticleer is primarily monitored through eBird, a global bird sighting community database hosted by the Cornell Lab of Ornithology. The Chanticleer Garden hotspot lists 107 bird species so far. Garden visitors and staff can report birds they see using the eBird mobile app.

Chanticleer Garden is used by at least 23 Species of Greatest Conservation Need (SGCN) in Pennsylvania.



Migrating thrushes, warblers, and other songbirds in spring and fall are some of the garden's most abundant and significant visitors, but many species also stay to breed in the riparian forest around Bell's Run, including Wood Thrush, Scarlet Tanager, Red-shouldered Hawk, Barred Owl and Eastern Screech-owl.



# Other Vertebrate Diversity

## Fishes

6 species

Preliminary eDNA results from water samples taken in Bell's Run and the ponds have revealed the presence of at least 6 species of native fish, along with a large number of non-native fish that have been stocked in the ponds over the years.



## Reptiles & Amphibians

15 species

Preliminary surveys indicate at least 15 species of reptiles and amphibians, all but one of which (the introduced Red-eared Slider turtle) are native. Species indicative of higher quality habitats include Dekay's Brownsnake and Red Salamander (the latter detected by eDNA water samples). Wood frogs utilize a small seasonal pond in the garden, where the lack of fish allows their tadpoles to survive during their period of early spring development.



## Mammals

11 species

Chanticleer hosts 11 documented native mammal species including expected squirrels, red fox, raccoon, and white-tailed deer. While we have confirmed one bat species, the big brown bat, we expect additional species are present. Chanticleer's dedication to cultivating insect biodiversity is undoubtedly supporting bat foraging habitat, particularly over Bell's Woodland. 90% of North American bat populations are declining so providing quality habitat in gardens supports their conservation.



# What Makes a Diverse Garden?



## Introduction

Increasing wildlife biodiversity can be as simple as planting new native plants into a home landscape. Chanticleer visitors can use the gardens as a living library of ideas to both beautify their homes and preserve biodiversity for future generations. Insects can generally find their host plants within a year if not in the same season they are planted.

## Grow a Diversity of Woody Plant Species

Woody plants are important to provide food for insects that in turn support birds and other species. In addition, they provide nesting habitat and other structural elements. Keystone trees include: oaks, willows, cherries, pines, poplars, birches, hickories, and maples. Trees provide excellent wildlife value especially for small properties as their height and size means that a single tree can provide a large volume of resources in a relatively small area. Important shrubs and small trees for our area include viburnums, alders, hawthorns, and blueberries.

## Grow Diversity of Herbaceous Plant Species

In the eastern U.S. the two primary evolutionary radiations of plant diversity are the spring ephemeral wildflowers (like spring-beauty, toothwort, and bluebells) and the autumn composites (such as asters, goldenrods, and sunflowers). Focusing on these groups will most efficiently support the largest diversity of insects.

## Provide Soft-pithed Plants for Stem Nesters

Native plants like joe-pye weed, elderberry, wild bergamot, mountain mint, swamp milkweed, and blackberries produce hollow or pithy stems suitable for stem-nesting pollinators. These insects will nest in stems that have been cut or broken. At the end of the growing season (December through March), cut the stems back to between 6-18" tall. These stems should be left standing for three years. While this may seem like a long time to leave cut stems in a garden, it is the only way to ensure that native pollinators can complete their life-cycles.





# What Makes a Diverse Garden?

## Provide Logs, Snags, and Sticks

While it is tempting to clean up dead wood around your property, downed woody debris like branches and logs are a natural part of forest ecology and provide critical refuges and feeding sites for many species of wildlife. In addition, deadwood-associated specialist species including fungi and numerous invertebrates require this habitat. Dead or partially dead standing trees, or snags, should also be left if they do not pose a safety hazard as they are important nesting sites for woodpeckers, bats, and other species. Chanticleer has begun to retain snags and large treefall logs, while also creating brush piles interspersed in the gardens as a way of keeping fallen limbs on site.



## Leave the Leaf Litter

Many insects require access to soil or leaf litter to complete their life cycles. Creating “soft landings” of diverse native plants directly underneath keystone tree species facilitates those developmental needs. These areas should also include leaf litter and woody debris to create important microhabitats. Consider raking leaves into designated soft landing areas instead of mulching or throwing them away, and avoid using landscape fabric which prevents insects from burrowing into the soil.



## Limit Pesticides

Mosquito and tick sprays are non-targeted pesticides (pyrethrins, pyrethroids) with significant risks to the health of people and pets through direct contact via respiration or indirect contact from contaminated water. These sprays also indiscriminately kill beneficial insects like bees, butterflies, moths, fireflies, and more.

Mosquitos are more effectively controlled at their larval stage by removing unnecessary standing water and treating remaining water sources with affordable and non-toxic mosquito dunks which prevent larvae from completing their life cycle to biting adults.

## Reduce Outdoor Lighting

Reduce or eliminate unnecessary outdoor lights. Excess artificial light at night (ALAN) is thought to be a factor in the decline of insect biodiversity. Lights should only be turned on as needed and should be shielded and oriented downward to minimize effects.



# Building Community

Consider joining the [Chanticleer iNaturalist Project](#) to submit sightings directly from your phone when visiting the garden, or to explore what species other visitors have seen.

You can also use [iNaturalist](#), [eBird](#), and [Merlin](#) to monitor biodiversity at home, as these community science apps have built-in resources for identification and automatically compile your sightings. Using these platforms allows the data to inform greater conservation efforts, but monitoring can also be a pen and paper listing activity enjoyed privately.

Connect with neighbors so they know why you're gardening, and make sure to include "[cues of care](#)" in your garden design, such as defined edges, mowed paths, and/or signage. If you are gardening to support wildlife, consider adding a bird feeder, bird bath, or bird house to make that intent clear without signage.



## Resources

[Delaware Native Plants for Bees](#)

[Homegrown National Park](#)

[Mistake Identity? Invasive Plants & Their Native Look-Alike. An Identification Guide for the Mid-Atlantic](#)

[National Wildlife Federation](#)

[National Audubon Society](#)

[Pennsylvania Native Plant Society](#)

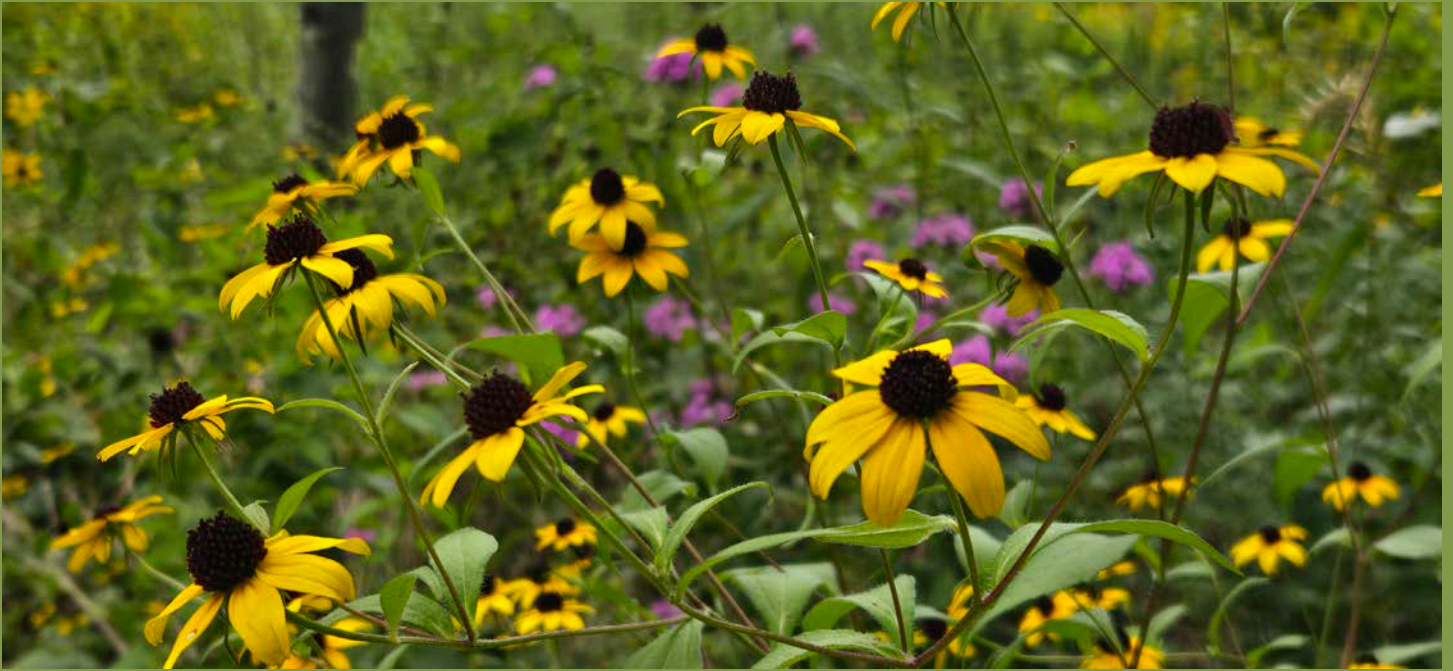
[Pennsylvania DCNR](#)

[USDA NRCS](#)

[Wild Ones Cues to Care](#)

[Xerces Society Pollinator Resource Center](#)





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# Recommended Citation

Sarver, Matthew J. & Bird, Katherine M. 2025. *Chanticleer Garden Biodiversity Survey Project Summary*. Sarver Ecological. Wilmington, Delaware. (January 2025)



