

Project Swallowtail

PLANT AND BUTTERFLY GUIDE

June 2020 Edition



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Project Swallowtail: Plant and Butterfly Guide © Pollinator Partnership Canada 2020



Project Swallowtail is a collaborative effort that involves residents, neighbourhoods and community groups as well as a variety of individuals and organizations including Pollinator Partnership Canada, WWF-Canada, the Horticultural Societies of Parkdale and Toronto, the David Suzuki Foundation, the High Park Stewards, the North American Native Plant Society and Ecoman. We have also received expert advice from Lorraine Johnson, Colleen Cirillo and Brian Millward.

Cover photo: zebra swallowtail on milkweed (Shutterstock)

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Neighbours United for Nature

PROJECT SWALLOWTAIL

*“Nature is not a place to
visit. It is home.”*

—Gary Snyder

In human-dominated landscapes across Canada and the world, many wildlife species are in decline or at risk of extinction because of habitat loss. The best way to reverse this is through ecological restoration – the process of re-introducing not only species to a landscape, but also, through their interactions, the ecological phenomena that sustain ecosystems: photosynthesis, plant and animal reproduction, water filtration, and soil creation, to list just a few. These processes are the building blocks of life.

By participating in Project Swallowtail, you are practicing a basic principle of ecological restoration: the re-introduction of native plant species. You are also doing so in a novel and innovative way: by restoring nature in the city (the urban ecosystem). Planting native plants is also a nature-based solution to mitigate climate change: it draws carbon out of the atmosphere (as all plants do) but also makes our landscape more resilient to extreme weather, drought, and flooding while simultaneously building habitat for wildlife, including pollinators.

Ecological restoration is usually applied to natural landscapes like tallgrass prairies, or to places that have been degraded because of resource development, like tar sands, mines and former agricultural lands. But the time is long past when we think of humans and nature as separate, or of national parks as the only reserves of biodiversity. The dual environmental crises of the 21st century – climate change and biodiversity loss – require re-imagining our place in nature, and nature's place in the city.

Connecting neighbours

Project Swallowtail is an invitation to action and to connection: connection with nature and connection with each other. We are citizens, community groups, non-profits and government agencies working together to restore nature in the city, from private garden to community garden, from balcony to sidewalk median, and from street to street. We are showing how communities can fight the dual crises of biodiversity loss and climate change through collaboration.

Connecting habitat

West Toronto was chosen as the project area because ecological connectivity is at the core of our strategy: High Park, the Lakeshore trails, the West Toronto Railpath and the many city parks are already significant habitat. By planting native plants in our gardens, we are helping connect these important habitat hot spots to each other.



Map Data © Google 2020

The birds and the bees and the swallowtails

“Why swallowtail butterflies?” you might ask. Aside from the fact that they are a diverse, beautiful and fascinating group of butterflies, swallowtails rely on a large variety of host plants for their caterpillars as well as nectar-producing plants to feed on as adult butterflies. Host plants and nectar plants also provide food and shelter to countless other species of bees, butterflies, moths, flies, and birds. For example, swallowtails are attracted to the nectar of milkweed plants, which are the host plants of another iconic butterfly, the monarch. The shrubs in the willow family (*Salix* spp.), which are a host plant to the Canadian tiger swallowtail, are one of the most important early-spring sources of pollen for bees. And in the fall, the spicebush that earlier hosted the caterpillar of its namesake butterfly produces berries on which migrating birds feast. In other words, to plant for swallowtails is to plant for an entire ecosystem.

How to use this guide

This guide is meant as an introduction to the swallowtail butterfly species present in Toronto, and as a reference for the plants that are available to order through the project (www.inthegarden.ca/projects/whittowillow/). To learn about the plant species available in June 2020, turn to pages 16-18. The next opportunity to order plants will be in fall 2020, at which point this guide will be updated to reflect new species made available.

This resource is also meant to be a starting point for project participants in what we hope will be an ongoing exploration of the natural world right here in our gardens. On page 22 you will find a list of other resources to consult as you plan your garden and become more familiar with the wildlife that visit it.

Useful terms

- **Adult**

The butterfly is the adult form and the last of four life stages in a butterfly's life cycle.

- **Carolinian Zone**

An ecozone in Eastern North America characterized by deciduous forest, spanning from the Carolinas north to southern Ontario. It has the highest biodiversity and the largest number of Species At Risk found anywhere in Canada. Toronto is the northeastern most point of the Carolinian Zone.

- **Chrysalis**

The chrysalis is the third life stage in a butterfly's life where it undergoes metamorphosis from caterpillar (second stage) to butterfly (fourth stage). The chrysalis stage is also known as the pupa and colloquially referred to as a cocoon.

- **Citizen science**

Research conducted, in whole or in part, by amateur scientists. Often involves collecting observation data through the use of apps like iNaturalist and eButterfly.

- **Egg**

The first life stage in the butterfly life cycle. Butterflies begin life as an egg, deposited on a host plant by an adult female butterfly.

- **Habitat**

The natural home or environment for an animal, plant or other organism that provides all the elements required to live and grow, including food and shelter.

- **Host plant**

A species or group of plants upon which the caterpillars of specific butterfly species rely for food. These are usually close and stable evolutionary relationships. For example, pipevine swallowtail caterpillars can safely consume the leaves of Dutchman's pipe vine, which are toxic to other species, and this renders the pipevine swallowtail butterfly toxic to potential predators.

- **Larvae**

Also known as the caterpillar, this is the second life stage in the butterfly life cycle, between egg and pupa.

- **Life cycle**

The series of changes in the life of an organism, including reproduction. There are four stages in the butterfly life cycle.

- **Mimicry**

A resemblance between two or more non-closely related organisms. This relationship confers an advantage. For example, the spicebush swallowtail mimics the pipevine swallowtail, which is toxic, to ward off predators, even though the spicebush swallowtail itself is not toxic.

- **Native plant**

Plants that occur naturally in an area in which they evolved. In Canada, the term usually refers to plants that were present before European colonization; or plants that have evolved here since the last glacial period (~12,000 years ago). They are therefore adapted to local environments and have co-evolved with other native species.

- **Nectar**

A sugar-rich liquid produced by many flowering plants to attract pollinators, which is a part of a mutualist relationship (mutually beneficial).

- **Overwinter**

Live through the winter. All the swallowtails present in Ontario overwinter in the chrysalis stage (as pupa).

- **Pupa**

The third stage in the butterfly life cycle, also known as the chrysalis, in between the caterpillar and butterfly stages (between larvae and adult stages).

THE SWALLOWTAILS

There are eight species of swallowtail butterflies present in Ontario. The most common ones are the eastern tiger, the Canadian tiger, and the black swallowtail. One of the reasons why you are more likely to see them here in west Toronto is that their host plants – the plants their caterpillars rely on – are relatively common. The pipevine, spicebush, giant and zebra swallowtails, on the other hand, all rely on host plants that are less common and in some cases, even rare. These host plants are mainly associated with the Carolinian Zone, an ecozone that stretches from the Carolinas into southern Ontario, with Toronto at its northeastern most tip. The old world swallowtail, the eighth species, is only found in northern Ontario, in clearings in the boreal forest.

photo: eastern tiger swallowtail on thistle - Vicki DeLoach





Eastern tiger and Canadian tiger swallowtails

Papilio glaucous and *Papilio canadensis*

Host Plants:

Canadian: ashes, willows, poplars, cherries

Eastern: tulip tree, hop tree, cherries, ashes

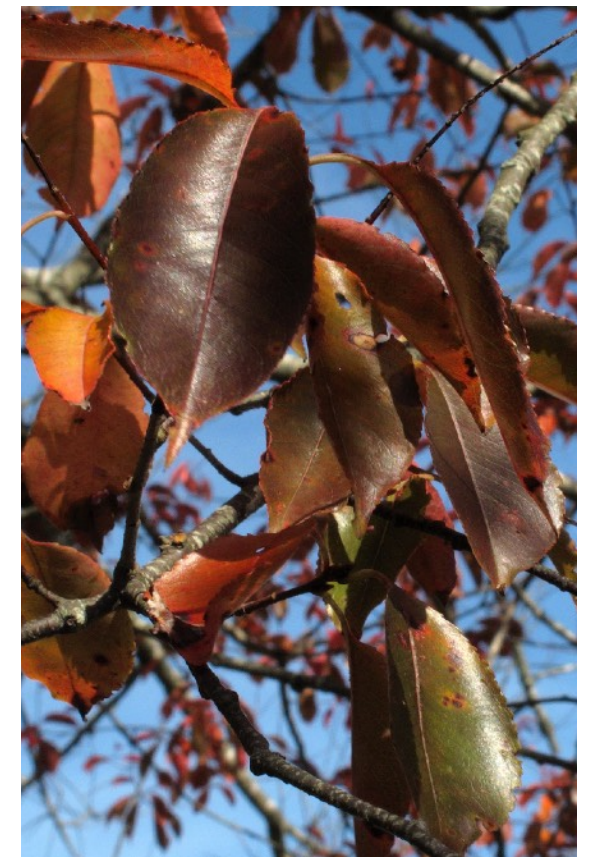


The eastern tiger and Canadian tiger swallowtail species appear very similar and can be difficult to tell apart – especially in flight! To add to the identification challenge, these two species can mate with each other and create hybrid descendants. One differentiating characteristic is that the eastern tiger swallowtail is larger than the Canadian tiger.

photos: top - eastern tiger swallowtail - Vicki DeLoach; bottom - Canadian tiger swallowtail- Kent McFarland

The eastern tiger swallowtail is mainly associated with the Carolinian Zone (southwestern Ontario, including Toronto at its northeastern most end), though it can be found anywhere south of the boreal shield. The Canadian tiger swallowtail is present across most of the province, including in the boreal shield, though it is not found in the Carolinian Zone (southwest from the Bruce Peninsula to Hamilton) and has been less frequently sighted in Toronto in the last few years than in the past.

While the Canadian tiger swallowtail has only one generation per year, the eastern Tiger has two overlapping generations. They both overwinter in the chrysalis stage.



photos: top - eastern tiger swallowtail caterpillar - Judy Gallagher; bottom left - tulip tree flower - JR P.; Bottom right - wild cherry tree (Prunus serotina) fall foliage - Sandra Richard.



Pipevine swallowtail

Battus philenor

Host Plant:

Dutchman's pipe vine



Pipevine swallowtails is a Carolinian species and has been increasingly spotted in Toronto. Though not all that common in the city, a resident population survives on Toronto Island where Dutchman's pipe, its host plant, persists. Though this plant is not quite native to Ontario, it can be considered a 'near-native' and was very popular in Toronto gardens in the early 20th century.

photos: pipevine swallowtail butterfly - John Flannery; pipevine swallowtail caterpillar - Dann Thombs

Dutchman's pipe vine contains the poisonous chemical aristolochic acid. Pipevine swallowtail caterpillars have the amazing capacity to use this poison to make their own bodies toxic to predators. Through evolution, spicebush swallowtails and the female forms of the black and eastern tiger swallowtails have taken advantage of this by mimicking the pipevine swallowtail's colouring. They are said to be part of a mimicry ring.



photos: Dutchman's pipe vine in Toronto alley - Kathleen Law, Pollinator Partnership Canada



Zebra swallowtail

Eurytides marcellus

Host Plant:

Pawpaw tree

This butterfly is a unique visitor to Ontario, and a rare one too. A Carolinian species associated with grasslands and savannah, two ecosystems that are now very rare in Ontario, its host plant is also an uncommon Carolinian species: the pawpaw tree. Historically, it was likely a resident breeder before its habitat was fragmented by development during the 20th century.

Pawpaw trees need pollen from a genetically different tree to set fruit. Their carrion-like flowers attract beetle and fly pollinators, instead of bees.

Hint: team up with a neighbour (or even better, two neighbours) to each plant a pawpaw tree and enjoy Ontario's most tropical fruit!

photos: zebra swallowtail butterfly - Judy Gallagher; zebra swallowtail caterpillar - tillandsiausneoides; pawpaw fruit - Anna Hesser



Black swallowtail

Papilio polygenes

Host Plants:

Golden Alexanders, yellow pimpernel and non-native species in the carrot family such as parsley, dill, celery



Black swallowtails are a common species that can be found as far south as South America! In addition to the native flowering golden Alexanders (*Zizia aurea*) and yellow pimpernel (*Taenidia integerrima*), its caterpillars also feed on plants in the carrot family, which includes parsley, dill, celery, Queen Anne's lace, and carrots.

This species produces two generations per year.

photos: black swallowtail butterfly and caterpillar - Vicki DeLoach



Giant swallowtail

Papilio cresphontes

Host Plants:

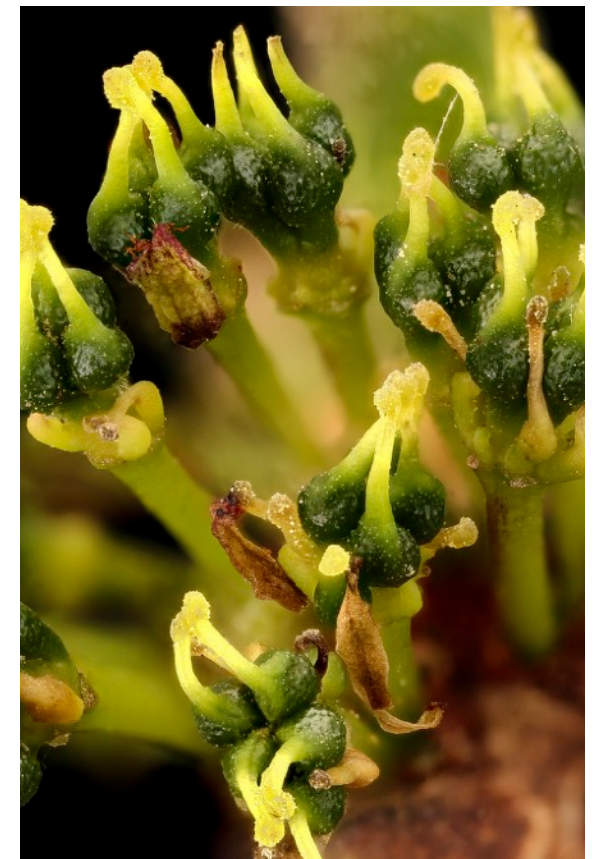
Hop tree and prickly ash

As its name suggests, the giant swallowtail is the largest butterfly in Ontario. Note how it's mostly black on top and mostly yellow underneath. At a distance and flying above you, it is easily mistaken for an eastern tiger swallowtail. This species has two or three generations per year.

In Ontario, the caterpillars rely on two Carolinian species as host plants: the common prickly ash (*Zanthoxylum americanum*) and the provincially rare hop tree (*Ptelea trifoliata*). In Florida and Mexico, where it is abundant, it feeds on citrus crops and is considered a pest.

photos: top - giant swallowtail butterfly - Lollie Dot Com; bottom - giant swallowtail - Rodney Campbell

Perhaps the most astounding aspect of this species is the caterpillar stage. At first, the caterpillar looks like bird droppings (a type of mimicry), but once it feels threatened, it reveals a part of its body called the osmeterium, which is meant to look like the forked tongue of a snake. That's two mimicries in one!



photos: top - giant swallowtail caterpillar - Elaine; bottom left - hop tree - Nicholas Turland; bottom right - prickly ash flowers - USGS Bee Inventory



Spicebush swallowtail

Papilio troilus

Host Plant:

spicebush, sassafras and tulip tree

The spicebush swallowtail, just like its host plants, is a Carolinian species. It is usually found in forest clearings and along forest edges where spicebush and sassafras shrubs are part of the understory.

Spicebush gets its name from the wonderful smell of its leaves, which can be used to make a fragrant tea. As if that weren't enough, it also blooms early in spring, produces bright red berries that attract birds and has beautiful fall foliage.

Hint: Spicebush shrubs are either male or female, so plant two or three (or team up with a neighbour) to ensure pollination!

And look at that caterpillar!

photos: spicebush swallowtail butterfly - Dianne Frost; spicebush swallowtail caterpillar - Pollination Guelph; spicebush shrub in bloom - Dan Keck



photo: CC courtesy Alvesgaspar (Wikipedia)

June 2020 Plant List

The two tables on the following pages list the plants made available through the Project Swallowtail June 2020 delivery. The species were chosen for their adaptability. The moisture and soil conditions listed in the table therefore indicate either ideal conditions for that species, or their ability to tolerate certain extremes (such as deep shade or dry soil).

- full sun
- ◐ part sun/part shade
- full shade
- ☪ tolerates draught
- 💧 prefers moist/wet soil



attracts bees



host plant for moth and/or butterfly



attracts hummingbirds

SUN-LOVING PLANTS

	NAME	LATIN NAME	LIGHT	MOISTURE	SOIL	HEIGHT (cm)	BLOOM PERIOD	BLOOM COLOUR	SWALLOW-TAIL HOST	OTHER WILDLIFE	SPECIAL NOTES
	Flowers										
	Golden Alexanders	<i>Zizia aurea</i>	○-◐		average	50-90	May-June	Yellow			
	Grey Goldenrod	<i>Solidago nemoralis</i>	○	♂	average	15-60	Aug-Oct	yellow			
	Hairy Beardtongue	<i>Penstemon hirsutus</i>	○	♂	poor	45	May-June	blue, white			
	New England Aster	<i>Symphyotrichum novae-angliae</i>	○-◐		average	100-200	Aug-Oct	blue/purple			
	Prairie Smoke	<i>Geum triflorum</i>	○-◐	♂	poor	15-45	May-July	pink/purple			seed pods are ornamental feature
	Sky-blue Aster	<i>Symphyotrichum oolentangiense</i>	○	♂	average	60-9	Sep-Oct	blue			
	Swamp Milkweed	<i>Asclepias incarnata</i>	○	💧	average	100-160	July-Aug	pink, red, white			monarch host, fragrant
	Upland White Aster	<i>Solidago ptarmicoides</i>	○	♂	average	30-60	Aug-Oct	white			
	Wild strawberry	<i>Fragaria virginiana</i>	○-◐	♂	poor	15	Apr-May	white			delicious fruit; ground cover
	Yellow Pimpernel	<i>Taenidia integerrima</i>	◐	♂	poor	90-150	May-July	Yellow			
	Grasses and sedges										
	Canada Wild Rye	<i>Elymus canadensis</i>	○-◐		average	100-200					winter form
	Little Bluestem	<i>Schizachyrium scoparium</i>	○	♂	average	100-150					nesting material
	Switchgrass	<i>Panicum virgatum</i>	○	♂	average	150-300					nesting material

SHADE-LOVING PLANTS

	NAME	LATIN NAME	LIGHT	MOISTURE	SOIL	HEIGHT (cm)	BLOOM PERIOD	BLOOM COLOUR	SWALLOW-TAIL HOST	OTHER WILDLIFE	SPECIAL NOTES
	Flowers										
	Arrow leaved Aster	<i>Symphyotrichum urophyllum</i>	☾		well-drained	100-130	Aug-Oct	White		 	pinch back in June
	Big-leaved Aster	<i>Eurybia macrophylla</i>	☾-●		well-drained	60-130	Aug-Oct	Violet/pale blue		 	
	Blue-stemmed Goldenrod	<i>Solidago caesia</i>	☾-☾	ψ	well-drained	50-100	Aug-Sep	Yellow		 	
	Common Blue Violet	<i>Viola sororia</i>	☾		average	7-20	April-May	Blue or white		 	
	Golden Alexanders	<i>Zizia aurea</i>	☾		average	50-90	May-June	Yellow			
	Great Blue Lobelia	<i>Lobelia siphilitica</i>	☾-☾	💧	humus-rich	50-90	July-Sep	Blue			water garden
	Heart-leaved Aster	<i>Symphyotrichum cordifolium</i>	☾-☾	ψ	average	60-170	Aug-Oct	Pale to rich blue		 	pinch back in June
	White Wood Aster	<i>Eurybia divaricata</i>	☾-●	ψ	well-drained	40-80	Aug-Sep	White		 	listed as a Species At Risk
	Wild Columbine	<i>Aquilegia canadensis</i>	☾	ψ	average	30-90	May-June	Yellow and red			
	Wild Geranium	<i>Geranium maculatum</i>	☾		humus-rich	30-70	May-June	Pink/purple		 	
	Yellow Pimpernel	<i>Taenidia integerrima</i>	☾	ψ	poor	90-150	May-July	Yellow		 	
	Zig-zag Goldenrod	<i>Solidago flexicaulis</i>	☾-●		average	30-90	July-Sep	Yellow			
	Grasses and sedges										
	Bottlebrush Grass	<i>Elymus hystrix</i>	☾	ψ	well-drained	100-150					
	Plantain-leaved Sedge	<i>Carex plantaginea</i>	☾		well-drained	30-50					

In the Zone Gardens

Grow Canada's biggest wildlife garden!

Project Swallowtail in west Toronto is found within the larger Carolinian Zone of southern Ontario. This area is unique, with more species of rare plants and animals than anywhere else in Canada; not only is it home to one-third of Canada's at-risk plants and animals, but also to a quarter of our human population. Since 2017, over 5,000 gardeners have been growing over 61,000 native plants on nearly 28,000 ha of land in the Carolinian Zone through a program called In the Zone: Gardens that help native species thrive – a joint program of WWF-Canada and Carolinian Canada. Through Project Swallowtail, In the Zone invites you to make your garden and other green spaces part of the solution to restoring lost habitat and creating a healthy, resilient landscape by using native plants.

The population in the Carolinian Zone is projected to grow significantly, and this will impact nature and the health of wildlife. And since over 95 per cent of the land in this region is privately owned, homeowners and other land managers can have a significant effect on habitat

restoration. But everyone can contribute to helping grow Canada's biggest wildlife garden. In Toronto, whether your garden is in the backyard, or on a rooftop, boulevard or balcony, every plant counts towards establishing healthy habitats and green corridors for wildlife.

Join us and discover tools, resources and special events designed to help you grow valuable habitat; see how the changes you make in your garden contribute to a wider, regional effort for healthy landscapes where both wildlife and people thrive. Count yourself in!



photo: In the Zone Gardens booth at a community event in Toronto

Citizen Science

Add your Project Swallowtail observations to the iNaturalist app

Citizen science is the practice of public participation in scientific research. Citizen science allows the public to collect data and contribute to databases that can be used by scientists and researchers to further knowledge.

You, too, can be a citizen scientist by joining Project Swallowtail on iNaturalist. Simply download the app on your smart phone, create an account and join 'Project Swallowtail'. Upload a photo to the app as an "observation" and a species identification will be automatically suggested, which is then vetted by dedicated volunteers.

But there's a lot more to citizen science than identifying species!

By recording your observations of the plants and animals (butterflies included) that you observe in your garden and on your Project Swallowtail plantings, you'll be helping monitor and measure the success of the project.

How It Works

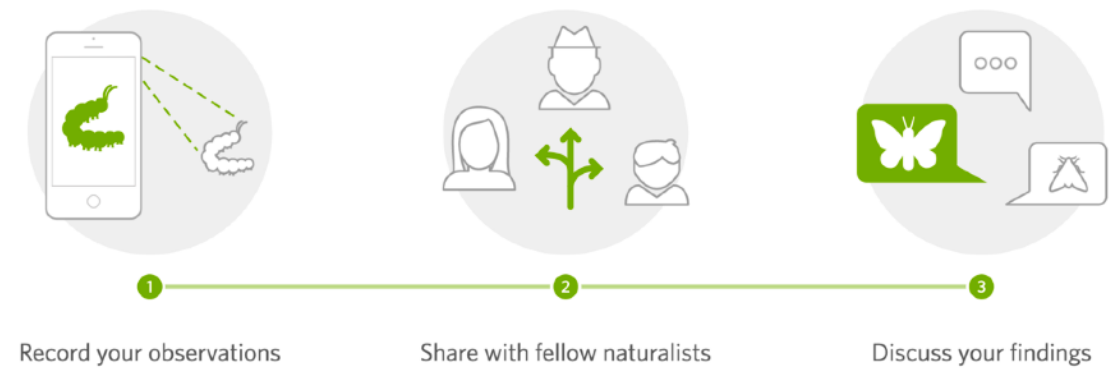
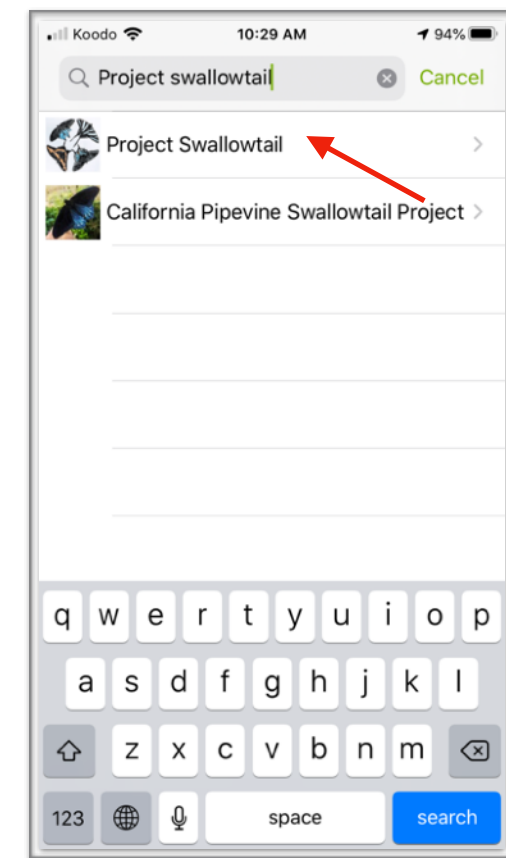
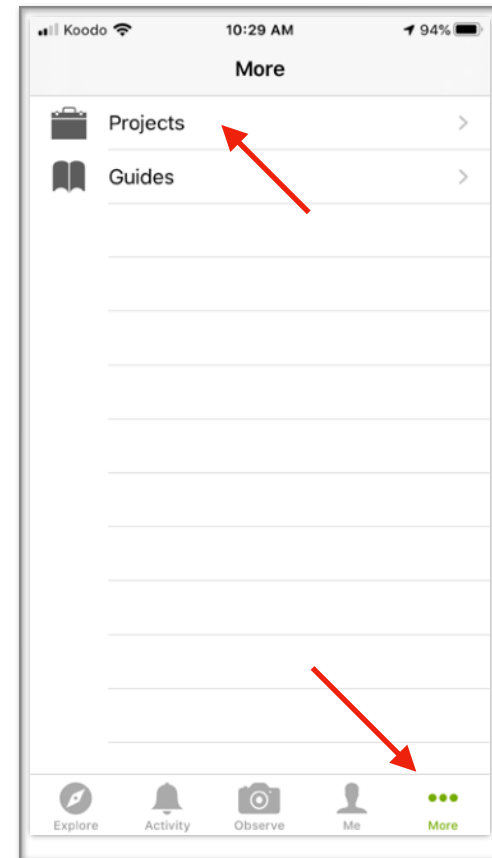


image top: iNaturalist; photo: west Toronto urban pollinator habitat - Kathleen Law.

You will be helping answer questions such as how many host plants of a given species are needed before we see an increase in their population numbers? What distance between host plants is necessary to support a given butterfly species' population increase? And many more...

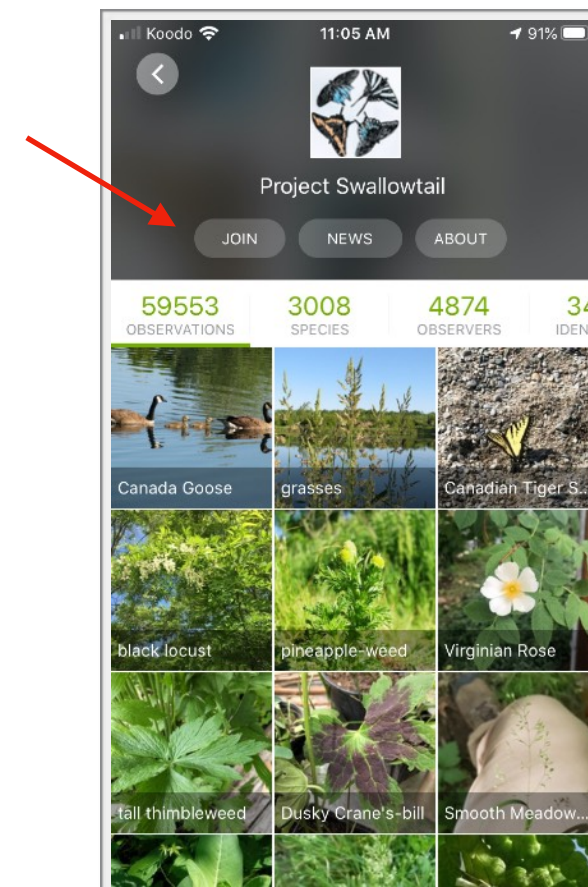
Instructions

1. After downloading the app and creating an account, tap on the bottom right 'More' icon, then select 'Projects'.
2. Type in 'Project Swallowtail' and choose the top one in the image to the right (the four swallowtails image)
3. Tap 'Join' and start recording your observations!



Explore

iNaturalist gives you a map of any species' sightings. For example, we searched "pipevine swallowtail" to see all the spots where it's been observed. A sidebar shows the most recent sightings. Zooming in on Ontario, it was seen in Kitchener in August of 2019. If you search giant swallowtail, you'll see many observations. As of June 19, 2020, there were six in west Toronto - with your help, there will be 60 or 600 in a year or two.



Additional Resources

Online

Project Swallowtail website and registration

www.inthegardens.ca/projects/swallowtail/

Pollinator Partnership Canada Ecoregional Guide

Lake Erie Lowlands

<https://pollinatorpartnership.ca/assets/generalFiles/LakeErieLowlands.2017.pdf>

In the Zone Gardens

<https://inthegardens.ca/>

Books

Hall, Peter W. et al. (2014), ***The ROM Field Guide to Butterflies of Ontario***, The Royal Ontario Museum, Toronto

Johnson, Lorraine (2017), ***100 Easy-to-Grow Native Plants for Canadian Gardens***, Douglas & McIntyre, Toronto

Johson, Lorraine and Sheila Colla (2020), ***A Flower Patch for the Rusty-Patched Bumblebee: Creating Habitat Gardens for Native Pollinators in the Greater Toronto Area***, Friends of the Earth Canada
(available for free download at foecanada.org/bee-garden-guide)