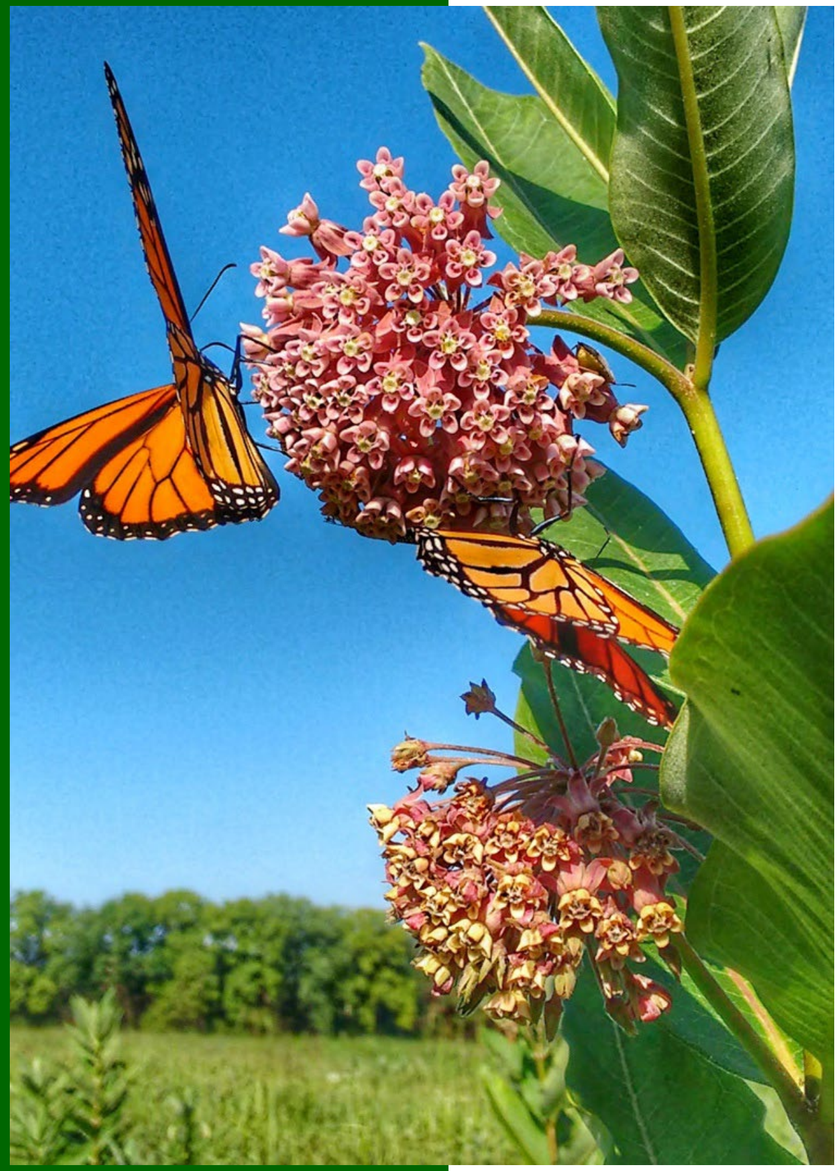
CULTIVATING WILD THINGS:

Gardening to increase **biodiversity**

Christine Elliott, MSc

Cultivating
Wild Things



Overview

- Do we need to conserve insect biodiversity?
- Do we want to conserve insect biodiversity?
- How do we conserve insect biodiversity?

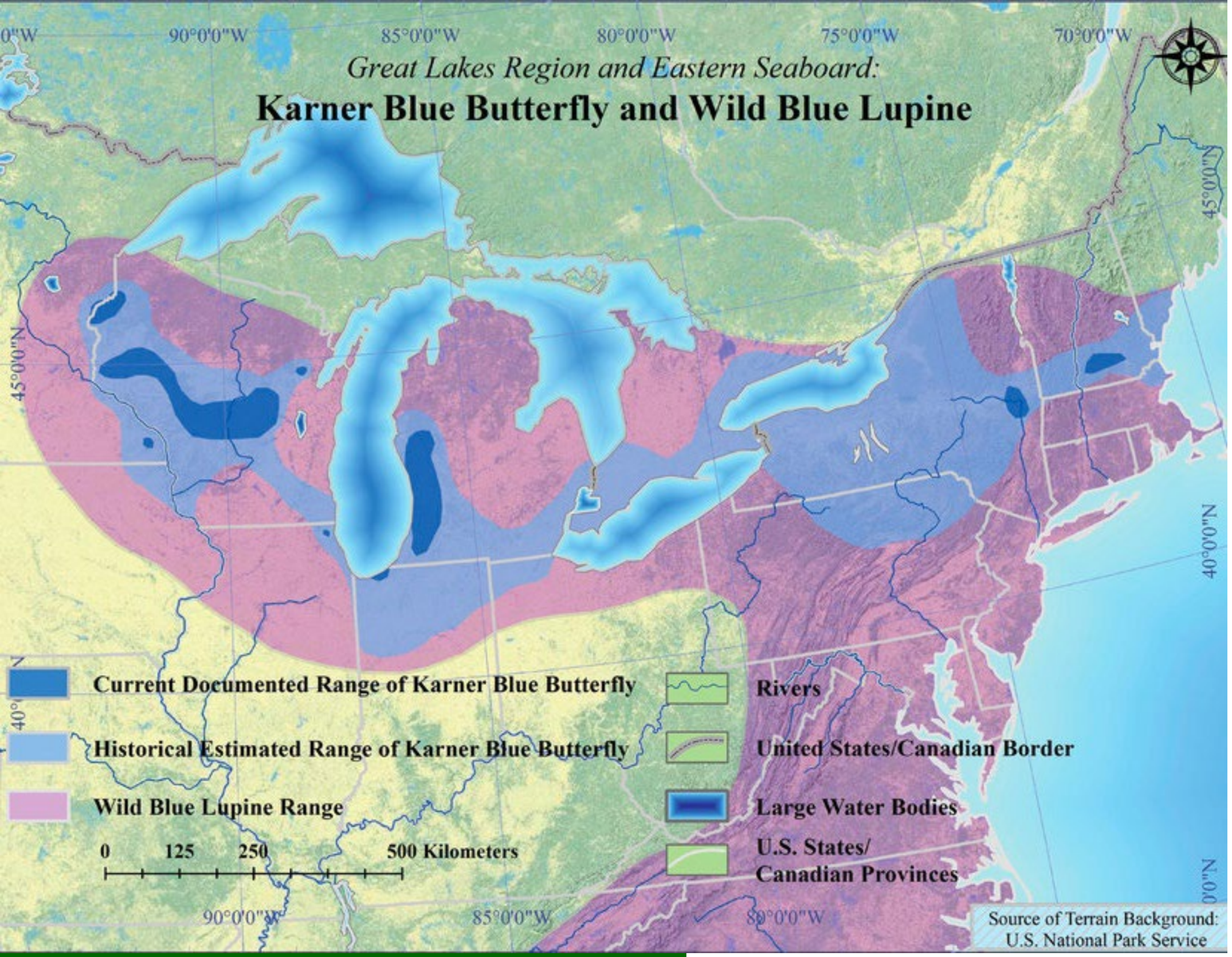
Do we need to conserve insect biodiversity?

...

Karner blue butterfly: Endangered specialist

Factors which contribute to insect declines and increase risk of endangerment and extinction:

- Dietary specialization
- Habitat specialization
- Mobility
- Size of habitat



Karner blue butterfly and blue lupine range map

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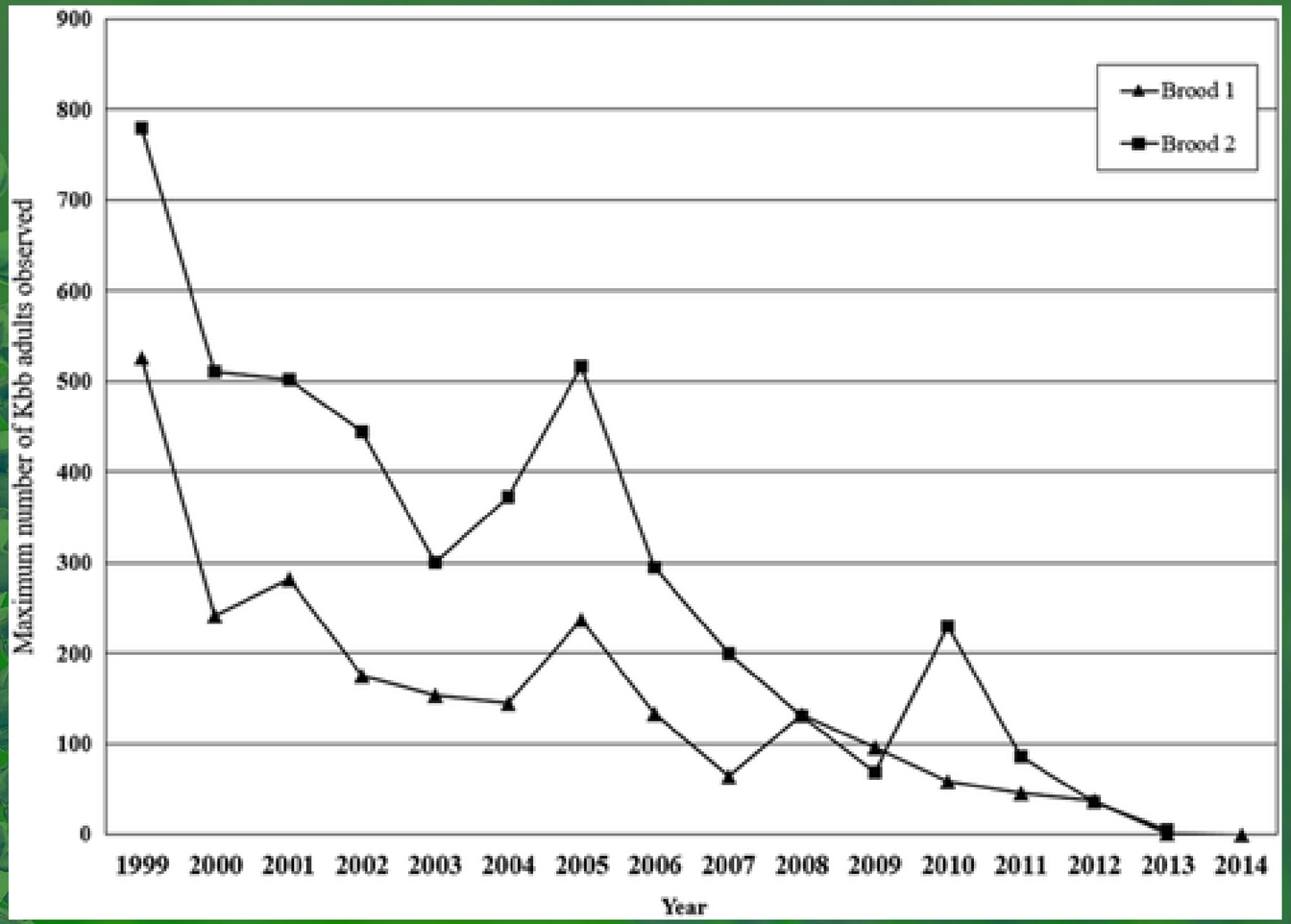
Populations of Karner blue butterfly (Kbb) in Indiana Dunes National Lakeshore

- Long term monitoring
- Long term declines

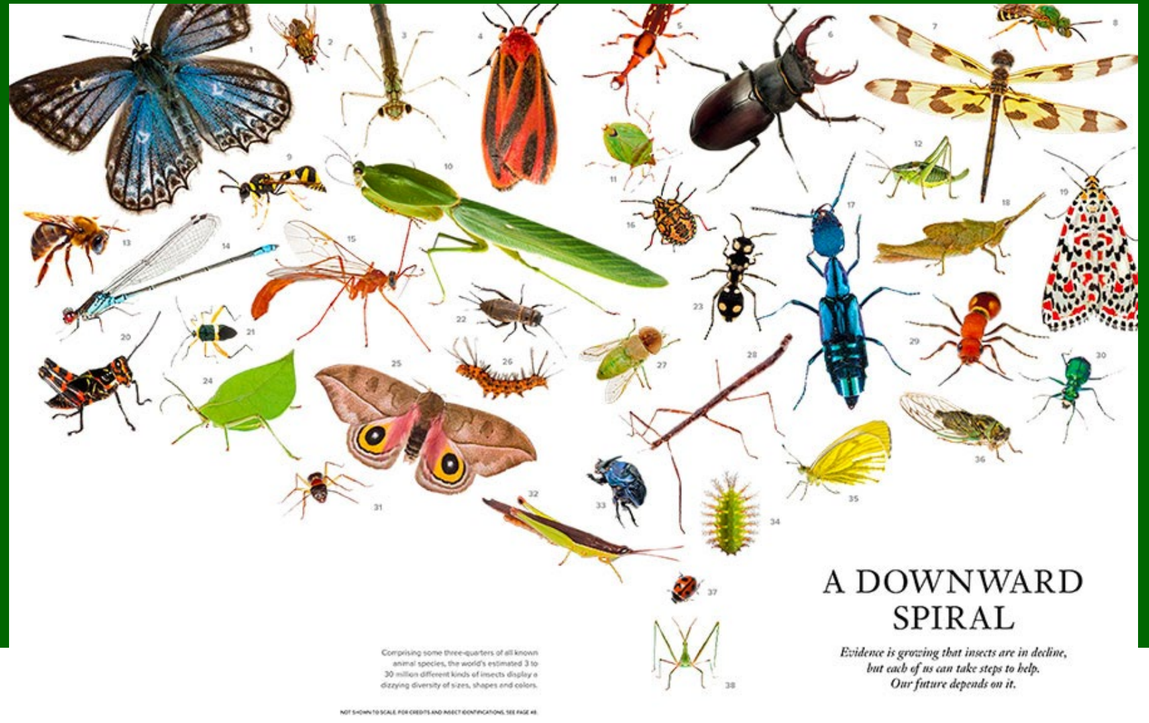


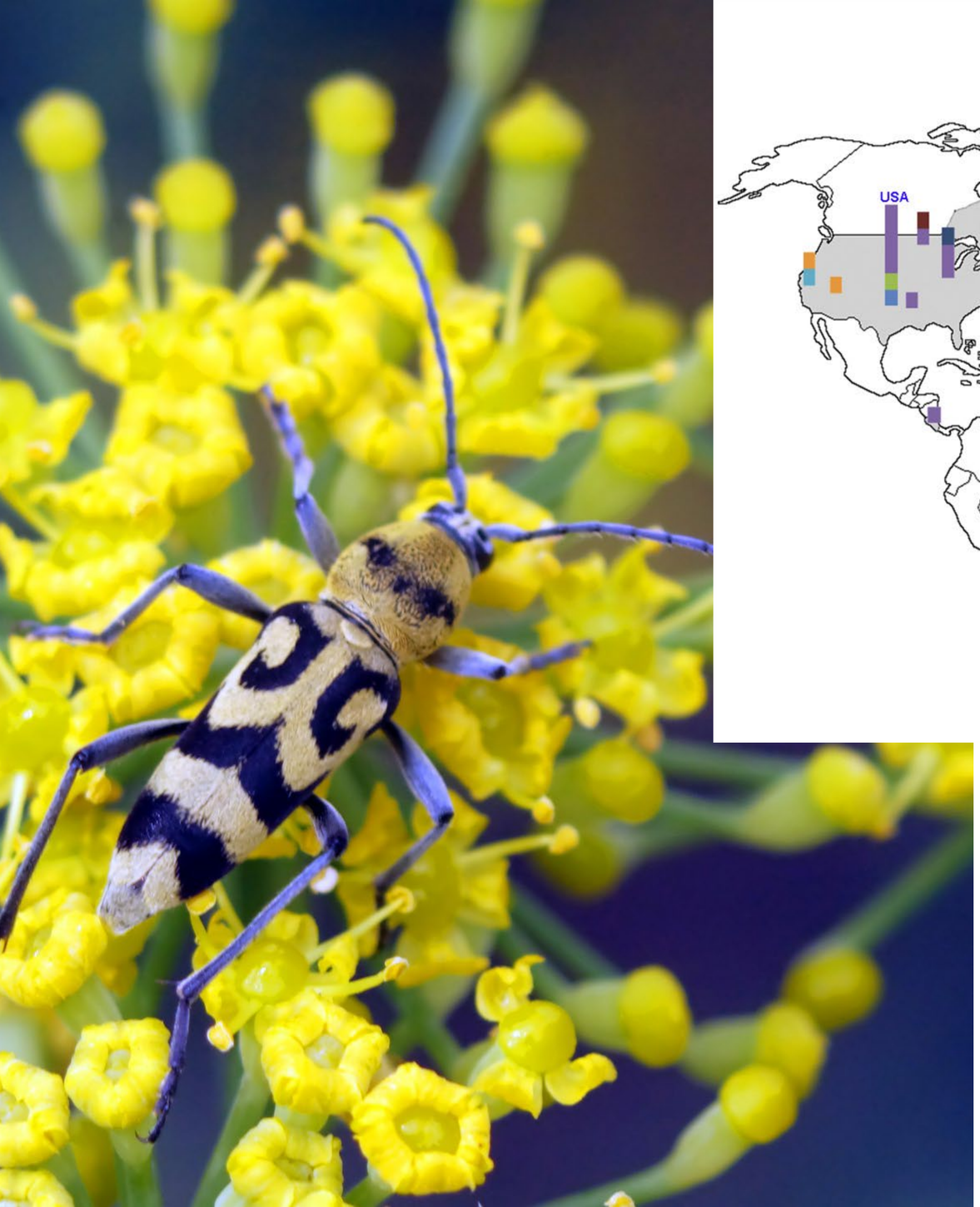
Maximum counts of Kbb during first (triangle) and second (square) brood adult generation surveys across six survey routes at INDU from 1998 to 2014. INDU, Indiana Dunes National Lakeshore; Kbb, Karner blue butterfly

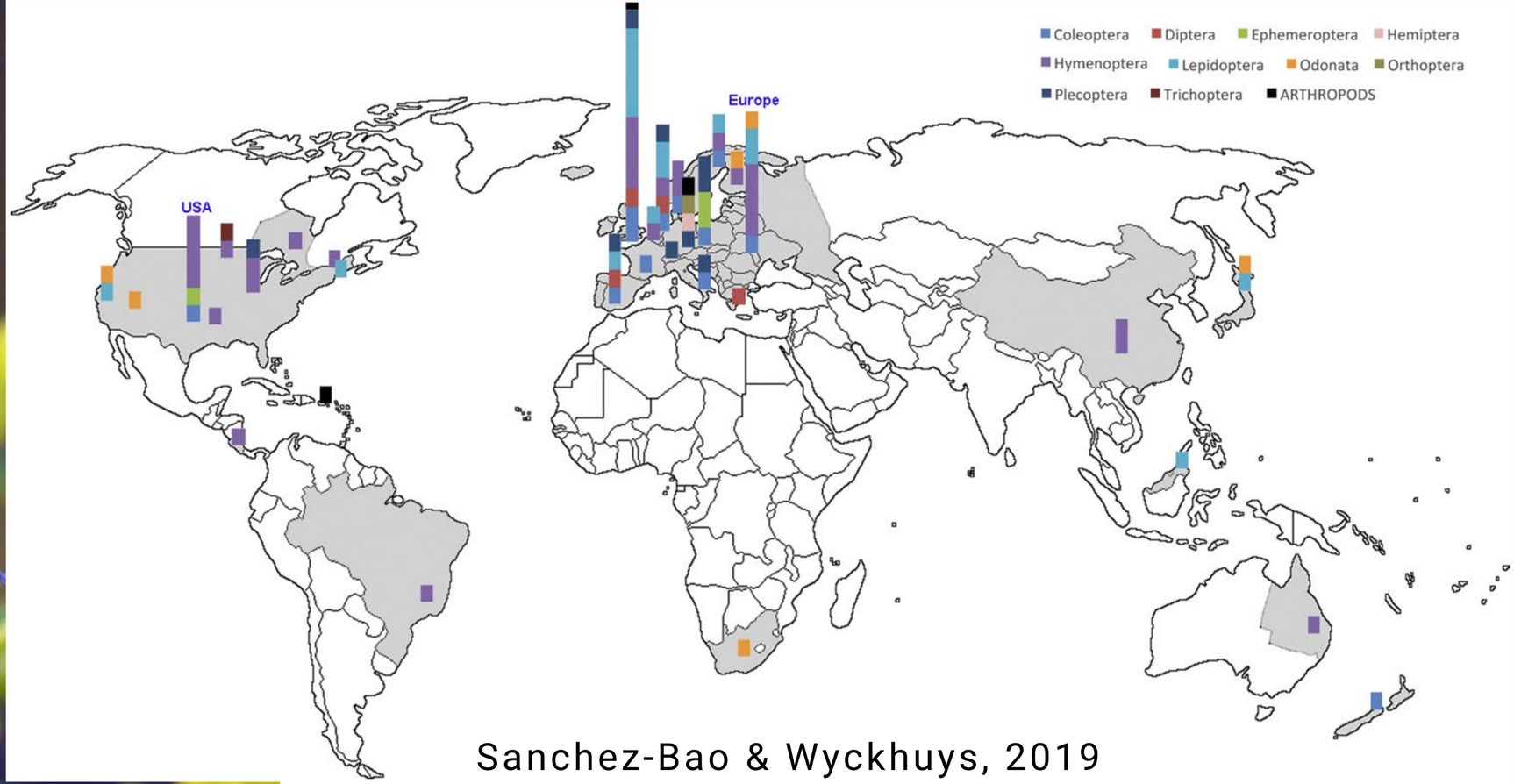

05.2020
NATIONAL GEOGRAPHIC
Insects are disappearing at alarming rates. That could be disastrous for the planet.
YOU'LL MISS THEM WHEN THEY'RE GONE


December 2, 2018
The New Yorker Magazine
THE INSECT APOCALYPSE IS HERE
What will the decline of bugs mean for the rest of life on Earth? By Brooke Jarvis


COVID-19's devastating march through the body p. 356
Watching skyrmions on the fly p. 386
Visualizing the radical transfer path in a protein complex p. 424
Science
$15
24 APRIL 2020
sciencemag.org
AAAS
INSECT DECLINE
Scattered gains, widespread losses pp. 368 & 417


A DOWNWARD SPIRAL
Evidence is growing that insects are in decline, but each of us can take steps to help. Our future depends on it.
Comprising some three-quarters of all known animal species, the world's estimated 3 to 30 million different kinds of insects display a dizzying diversity of sizes, shapes and colors.
NOT SHOWN TO SCALE. FOR CREDITS AND INSECT IDENTIFICATIONS, SEE PAGE 48.



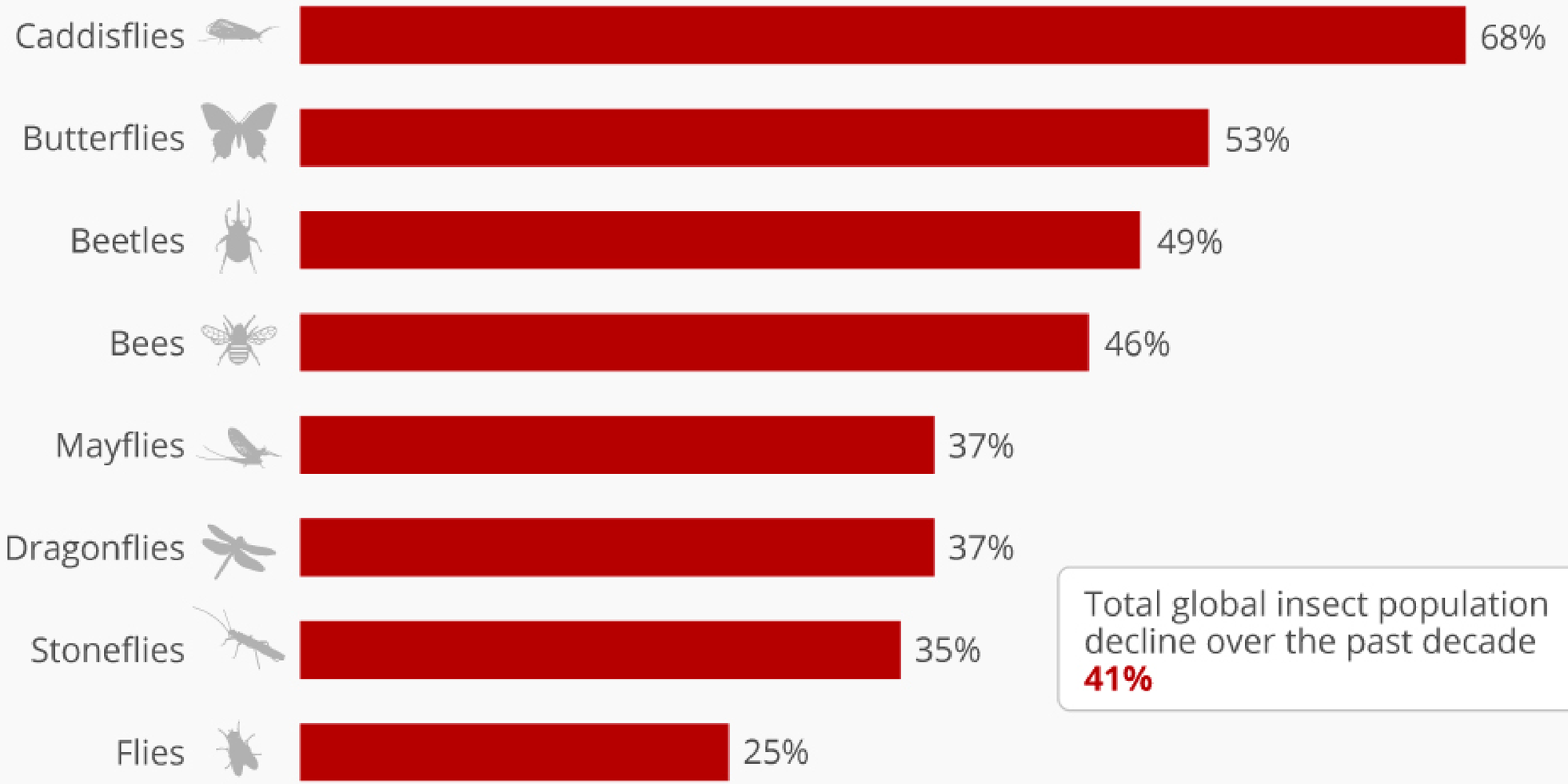


Sanchez-Bao & Wyckhuys, 2019

Fig. 1. Geographic location of the 73 reports studied on the world map. Columns show the relative proportion of surveys for each taxa as indicated by different colours in the legend. Data for China and Queensland (Australia) refer to managed honey bees only. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Massive Insect Decline Threatens Collapse Of Nature

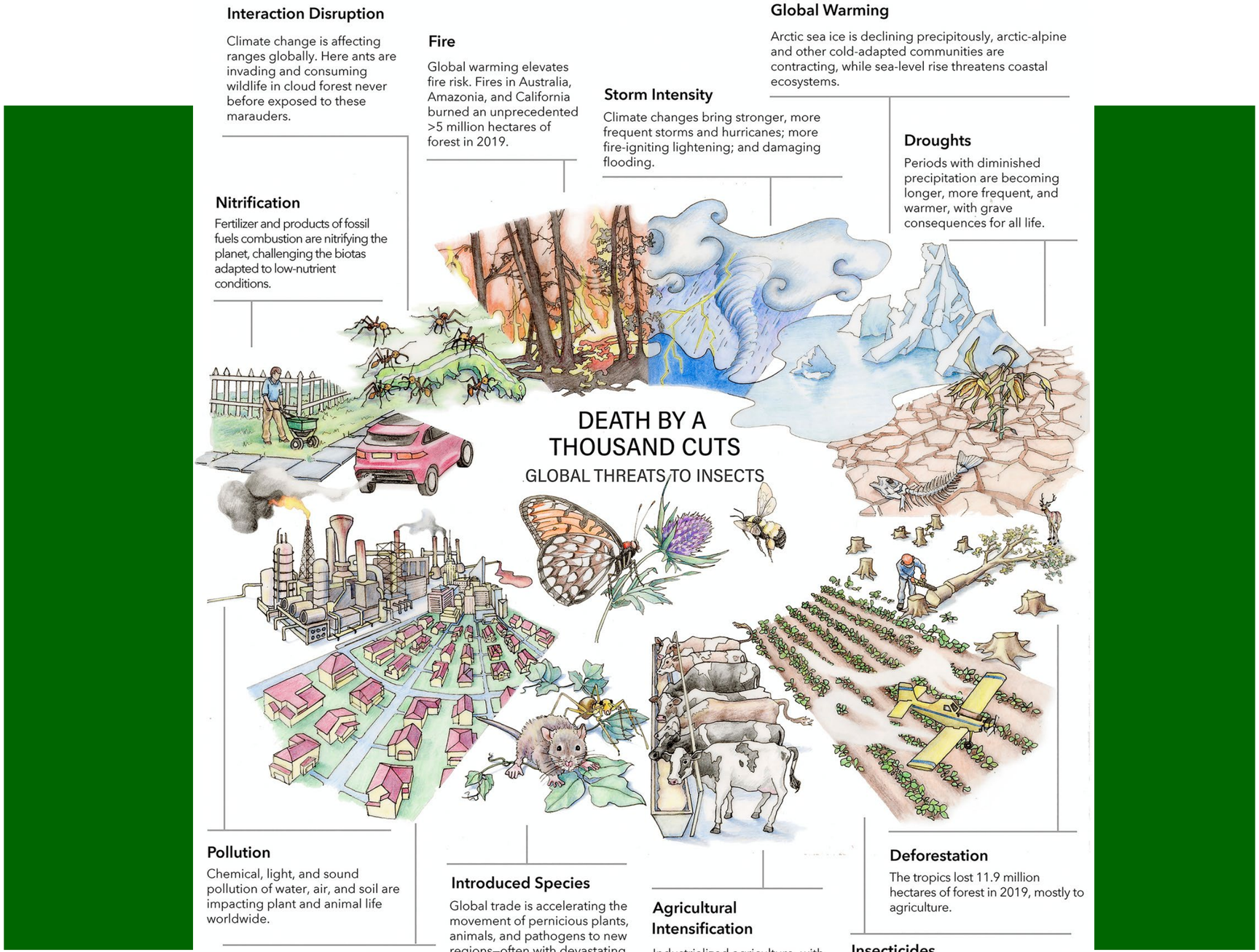
Percentage decline in selected global insect populations over the past decade



@StatistaCharts

Source: Sánchez-Bayo & Wyckhuys, Biological Conservation, 2019

statista



Wagner et al.

Proceedings of the National Academy of the Sciences, 2021

Do we need to conserve insect biodiversity?

...

Do we want to conserve insect biodiversity?

...

Insects provide ecosystem services

Eastern prarie fringed orchid

- One of six federally listed plants
- Habitat loss and fragmentation
- Cross pollination essential to viable seed production
- Need a long-distance pollinator


2008©J.McGavin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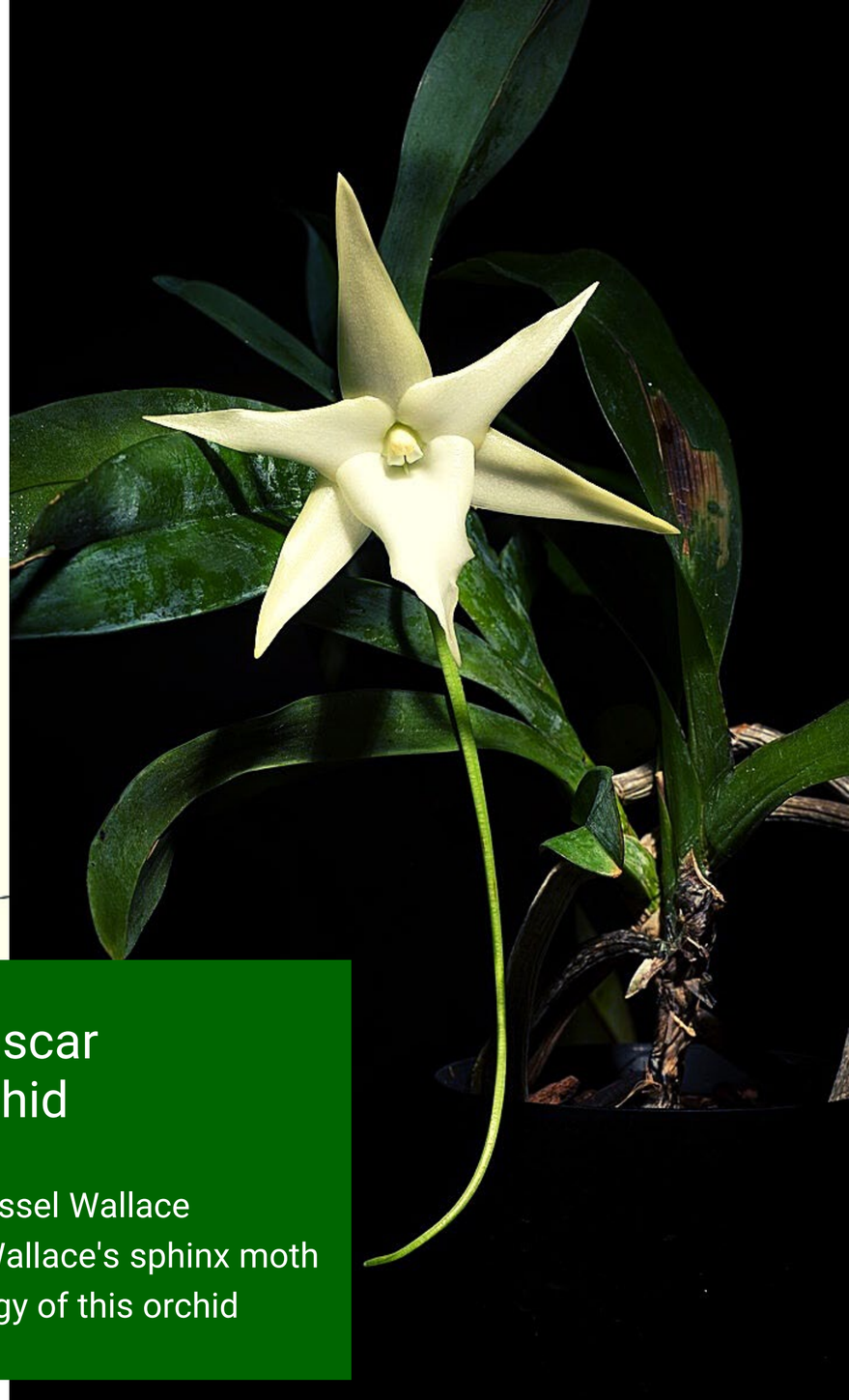
Eastern prarie fringed orchid

- Lengthy nectar spurs with large nectar reward
- Matching long proboscises in hawkmoths

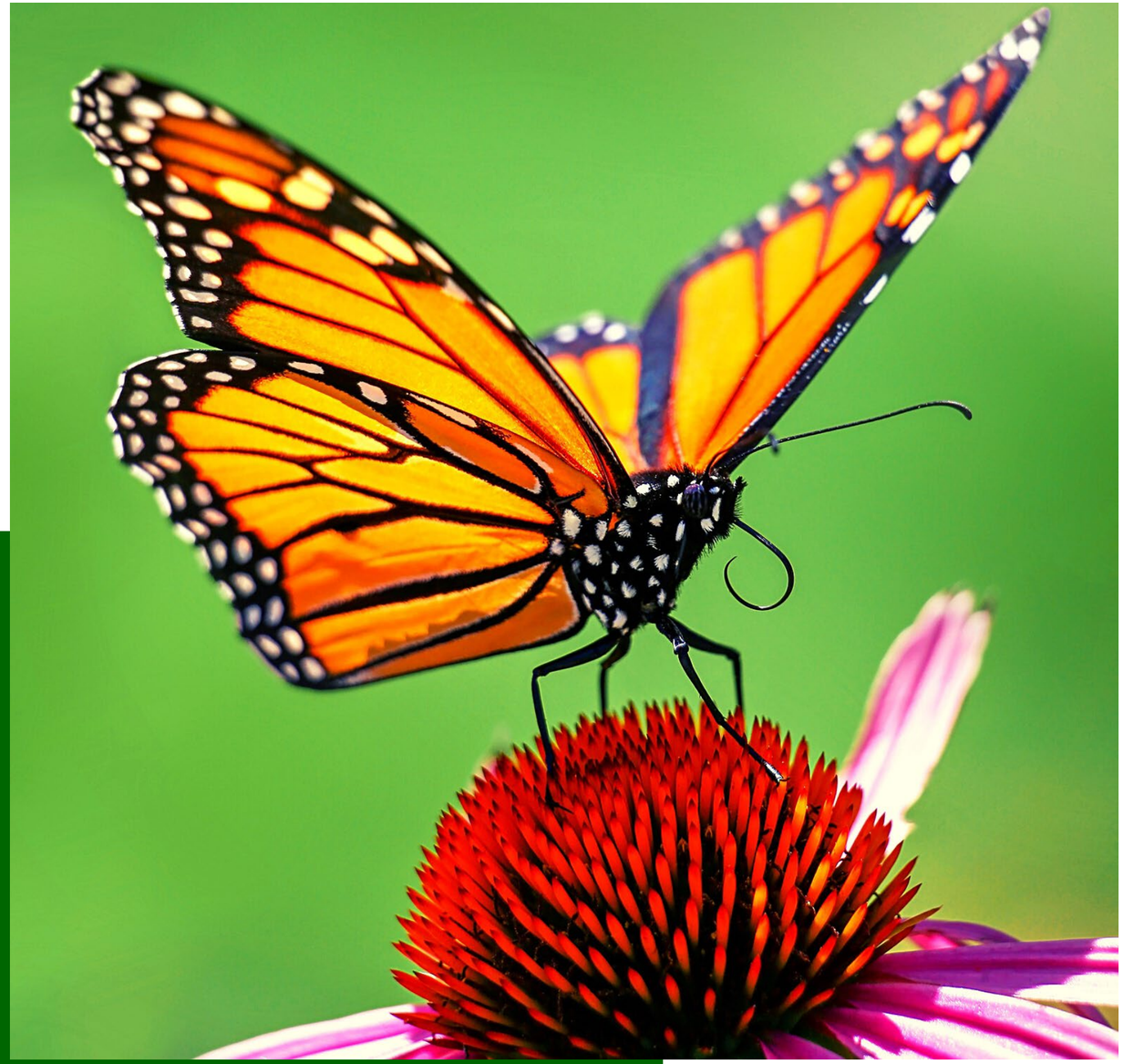
World's longest proboscis



Madagascar Star Orchid

Charles Darwin and Alfred Russel Wallace postulated the existence of Wallace's sphinx moth based on the floral morphology of this orchid

Insects are integral to food webs



Insects have intrinsic & aesthetic value

- Moral and ethical obligation
- Beautiful & beloved
- Create a sense of place
- Act as STEAM ambassadors

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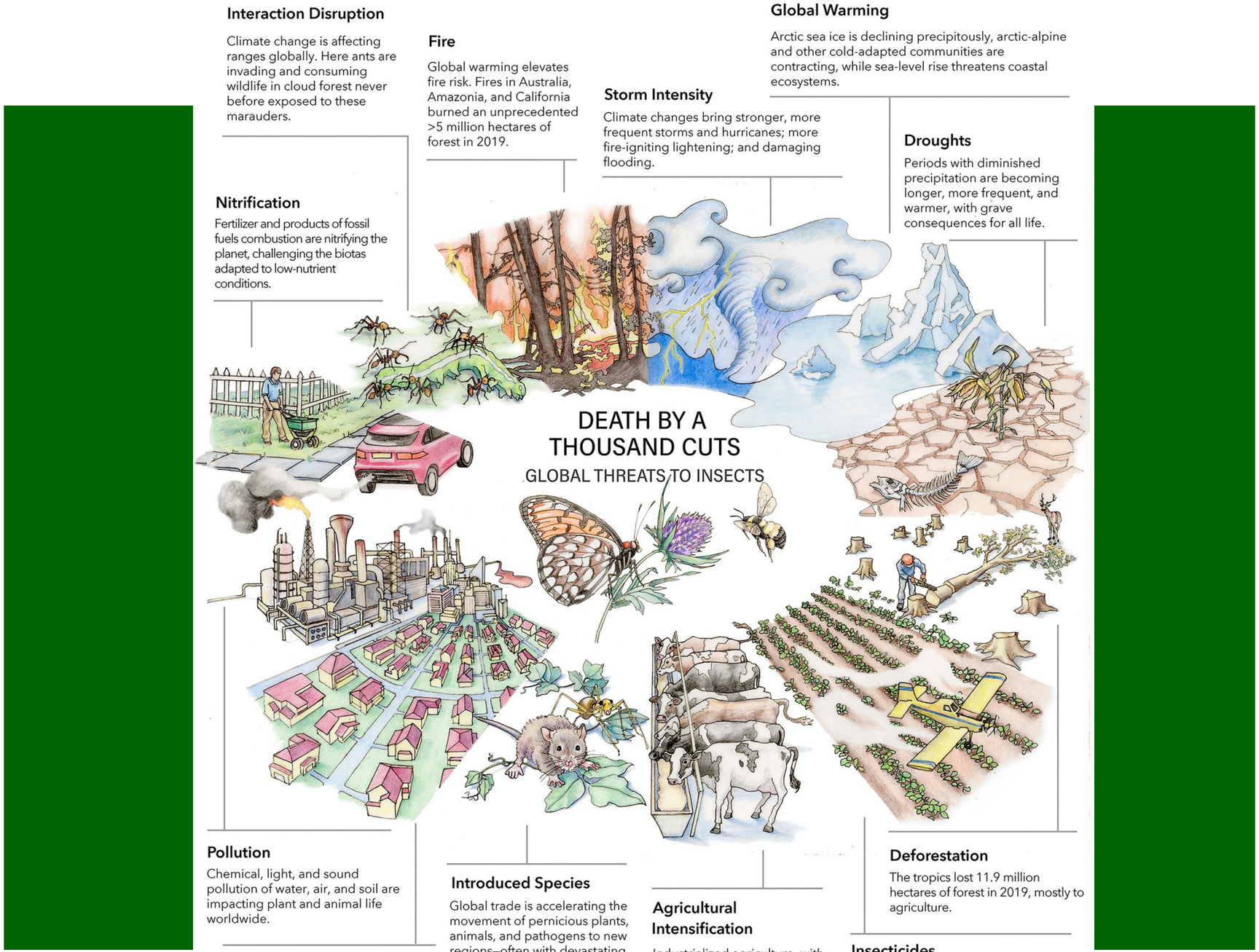
Do we want to conserve insect biodiversity?

...

How do we conserve insect biodiversity?

...

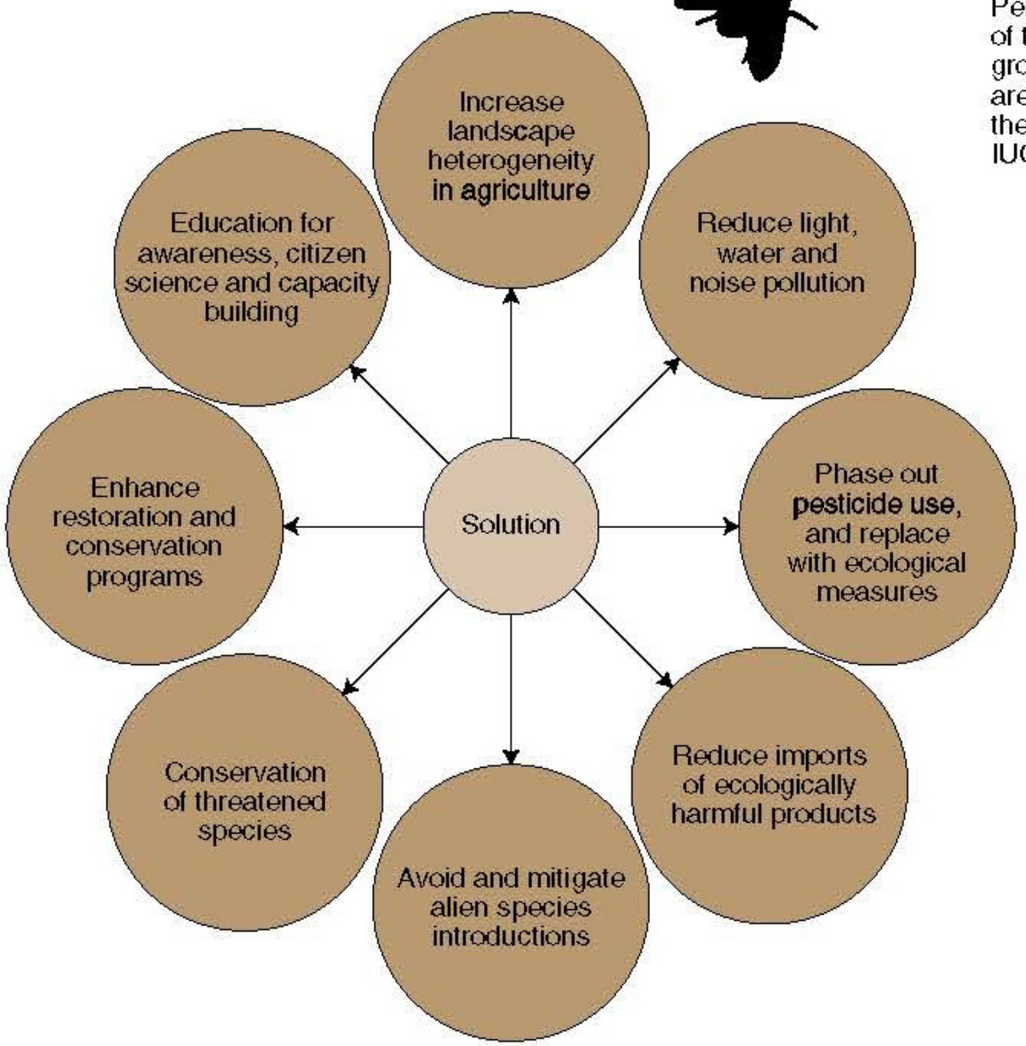


Wagner et al.

Proceedings of the National Academy of the Sciences, 2021

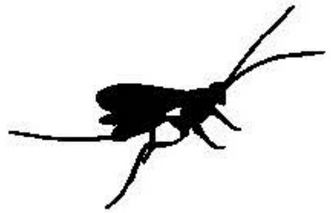
Immediate action

1. No-regret solutions



2. Prioritization

Perform large-scale assessments of the conservation status of insect groups to define priority species, areas and issues, for example increase the number of insects with informative IUCN Red List assessments.

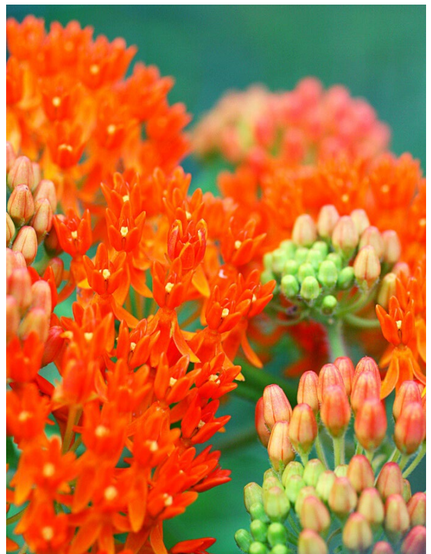


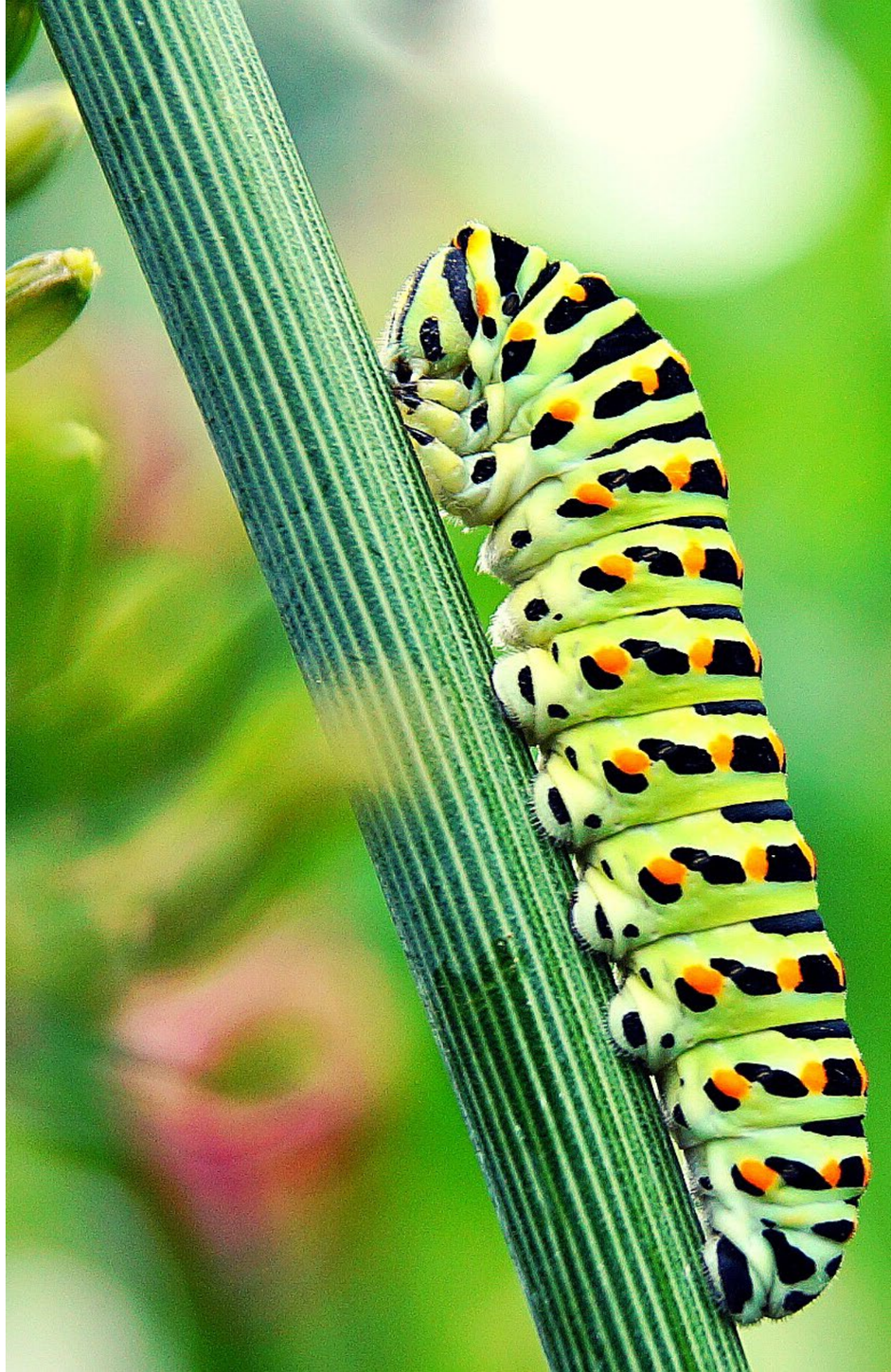
Harvey et al. 2020

Nature Ecology & Evolution

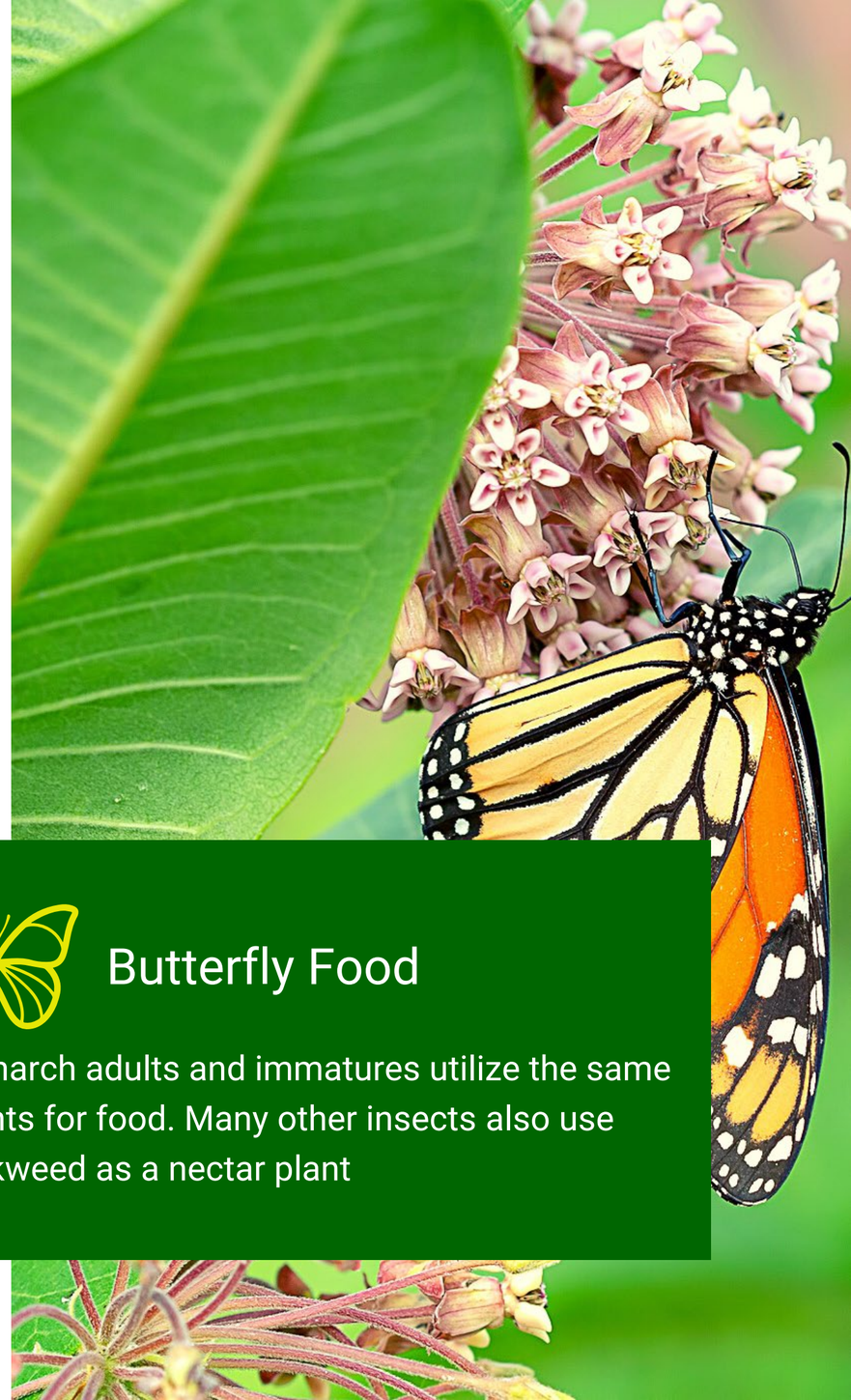
Insects need safe things to eat

Provide food across multiple seasons





Monarch butterflies have straightforward dietary needs



Butterfly Food

Monarch adults and immatures utilize the same plants for food. Many other insects also use milkweed as a nectar plant

- Many insects need different foods during various life stages.
- Your garden can reflect this

Wildflowers*

Common Name	Latin Name	Plant Information													Pollinator Connection							
		Sun			Soil Moisture					Height	Flower Color	Bloom Time	Hard to Find	Ephemeral	Bee	Beetle	Butterfly/ Moth	Fly	Hummingbird	Wasp	Special Notes	Pollinator Magnets
		Full Sun	Part Shade	Shade	Wet	Wet Mesic	Mesic	Dry Mesic	Dry													
sweet flag	*Acorus calamus*	X			X	X				2'-3'	green	spring				X						
nodding wild onion	*Allium cernuum*	X	X				X	X	X	1'-2'	pink	summer			X							
rue anemone	*Anemonella thalictroides*	X	X	X		X	X	X		<1'	white	spring			X							
[illegible]ine	*Aquilegia canadensis*	X																				
goat[illegible]	*Aruncus dioicus*	X																			dusky azure host	*
wild ging[illegible]	*Asarum canadense*	X																				
marsh milkwe[illegible]	*Asclepias incarnata*	X																			monarch host	*
Sullivant's milkwee[illegible]	*Asclepias sullivantii*	X																			monarch host	
common milkweed	*Asclepias syriaca*	X																			monarch host	
butterflyweed	*Asclepias tuberosa*																				monarch host	
whorled milkweed	*Asclepias verticillata*	X																			monarch host	
sky-blue aster	*Aster azureus*	X																			pearl crescent host	
heart-leaved blue wood aster	*Aster cordifolius*																				pearl crescent host	
heath aster	*Aster ericoides*																			X	pearl crescent host	*
shining aster	*Aster firmus*	X																			pearl crescent host	
smooth aster	*Aster laevis*																				pearl crescent host	
calico aster	*Aster lateriflorus*	X																		X	pearl crescent host	
New England aster	*Aster novae-angliae*	X																			pearl crescent host	
swamp aster	*Aster puniceus*	X																			pearl crescent host	
Short's aster	*Aster shortii*																				pearl crescent host	
flat-topped aster	*Aster umbellatus*	X																			pearl crescent host	
blue false indigo	*Baptisia australis*	X																			silver-spotted skipper host	
white false indigo	*Baptisia leucantha*	X																				
cream false indigo	*Baptisia leucophaea*	X																				
tickseed sunflower	*Bidens aristosa*	X																		X	dainty sulphur host	
false aster	*Boltonia latisquama*	X																		X		*
marsh marigold	*Caltha palustris*	X																				
spring cress	*Cardamine bulbosa*	X																			bee specialist	*
cut-leaved toothwort	*Cardamine concatenata*																				bee specialist; West Virginia white host	
wild senna	*Cassia hebecarpa*	X																			cloudless sulphur and sleepy orange host	
blue cohosh	*Caulophyllum thalictroides*																					
white turtlehead	*Chelone glabra*	X																			Baltimore checkerspot host	
pink turtlehead	*Chelone obliqua*	X																			Baltimore checkerspot host	
spring beauty	*Claytonia virginica*	X																			bee specialist	*
blue-eyed Mary	*Collinsia verna*																					*
lance-leaf coreopsis	*Coreopsis lanceolata*	X																				
plains coreopsis	*Coreopsis palmata*	X																		X		
tall coreopsis	*Coreopsis tripteris*	X				X	X	X		6'-8'	yellow	summer			X		X	X		X		
purple prairie clover	*Dalea purpurea*	X					X	X	X	1'-2'	purple	summer			X	X	X				dogface sulphur host	
dwarf larkspur	*Delphinium tricorne*		X	X		X	X	X		<1'	purple	spring	X	X	X		X	X				
pale purple coneflower	*Echinacea pallida*	X				X	X	X	X	2'-4'	lavendar	spring/summer			X		X					
purple coneflower	*Echinacea purpurea*	X				X	X	X	X	3'-4'	purple	summer			X		X					
harbinger of spring	*Erigenia bulbosa*		X	X		X	X	X	X	<1'	white	spring	X	X	X			X			very early resource	
rattlesnake master	*Eryngium yuccifolium*	X				X	X	X	X	3'-4'	white	summer/ fall			X	X	X	X		X	black swallowtail host	*
white trout lily	*Erythronium albidum*		X	X		X	X	X	X	<1'	white	spring	X		X			X				
yellow trout lily	*Erythronium americanum*		X	X		X	X	X	X	<1'	yellow	spring	X		X			X				
tall boneset	*Eupatorium altissima*	X	X			X	X	X	X	3'-4'	white	fall	X		X	X	X	X		X		*

Good butterfly host plants

Check for updates

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ARTICLE

ECOSPHERE
AN ESA OPEN ACCESS JOURNAL

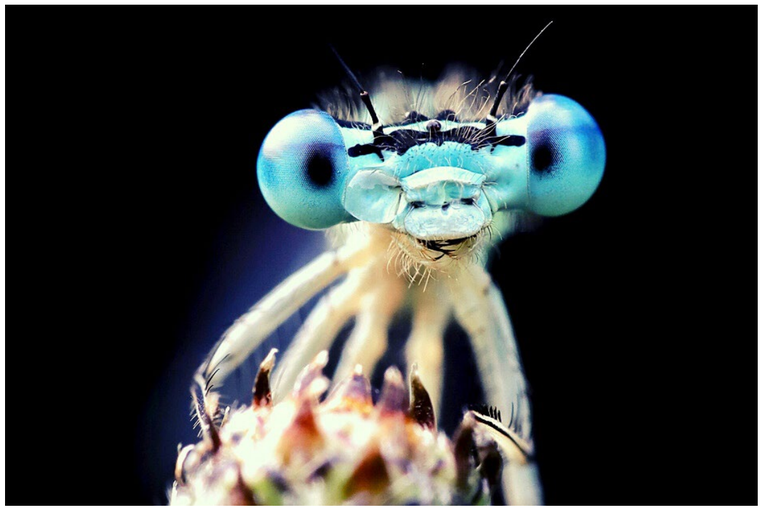
Effects of urbanization on specialist insect communities of milkweed are mediated by spatial and temporal variation

Lindsay S. Miles[1,2] | **David Murray-Stoker**[1,2,3] | **Vanessa J. Nhan**[1] | **Marc T. J. Johnson**[1,2,3]

[1]Department of Biology, University of

21508925, 2022, 9, Downloaded from https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecs2.42

Insects need a place to live



Hibernating insects

Some insects need a place to spend the winter. Plant stems, leaf piles, and bare ground can provide cozy winter domiciles.

NO MOW MAY

Cultivating
Wild Things

No Mow May

PeerJ

No Mow May lawns have higher pollinator richness and abundances: An engaged community provides floral resources for pollinators

Israel Del Toro[1] and Relena R. Ribbons[2]

[1] Biology, Lawrence University, Appleton, WI, United States of America
[2] Geosciences, Lawrence University, Appleton, WI, United States of America

ABSTRACT

No Mow May is a community science initiative popularized in recent years that encourages property owners to limit their lawn mowing practices during the month of May. The goal of No Mow May is to provide early season foraging resources for pollinators that emerge in the spring, especially in urban landscapes when few floral resources are available. We worked with the city council of Appleton, Wisconsin, USA. to allow No Mow May to take place in May 2020. Four hundred and thirty-five property owners registered for No Mow May in Appleton. We measured floral and bee richness and abundance in the yards of a subset of homes ($N = 20$) located near regularly mowed urban parks ($N = 15$) at the end of the month. We found that homes that participated in No Mow May had more diverse and abundant flora than regularly mowed green spaces throughout the city. No Mow May homes had three times higher bee richness and five times higher bee abundances than frequently mowed greenspaces. Using generalized linear models, we found that the best predictor of bee richness was the size of the designated unmowed area, and the best predictors of bee abundances were the size of the unmowed area as well as floral richness. While our findings cannot conclusively attribute increases in bee abundances and richness to the No Mow May efforts, our data does show that bee pollinators make use of no mow spaces as key floral resources during early spring in the upper midwestern United States. A post-No Mow May survey revealed that the participants were keen to increase native floral resources in their yards, increase native bee nesting habitat, reduce mowing intensities, and limit herbicide, pesticide, and fertilizer applications to their lawns. The No Mow May initiative educated an engaged community on best practices to improve the conservation of urban pollinators in future years.

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Additional Information and Declarations can be found on page 12

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OPEN ACCESS

Subjects Biodiversity, Conservation Biology, Ecology, Entomology, Coupled Natural and Human Systems
Keywords Urban biodiversity, Native bees, Lawn management, Bee biodiversity, Citizen science, Urban ecology

INTRODUCTION

As landscapes become increasingly urbanized, biodiversity is threatened by land use modifications, a changing climate, and poor management practices (*Elmqvist, Zipperer & Güneralp, 2016*). A notable component of the urban landscape in the United States is

How to cite this article Del Toro I, Ribbons RR. 2020. No Mow May lawns have higher pollinator richness and abundances: An engaged community provides floral resources for pollinators. *PeerJ* 8:e10021 http://doi.org/10.7717/peerj.10021

Community science

Empowers property owners to prioritize insect biodiversity by limiting spring lawn mowing

Early season resources

Wild flowers in yards provide increased nectar for emerging bees in spring

Public opinion

Participants indicated an increased interest in increasing native flowering plants and nesting sites for insects in their yards while reducing herbicide and insecticide use

Cultivating
Wild Things

No Mow May

PeerJ

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Retracted

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- Inconsistencies in data handling
- Inconsistencies in reporting
- Public opinion

Problems with No Mow May

Timing Problems

- Studies need to be long term to measure actual effects
- Bees species have different phenologies
- Spring varies from year to year and region to region
- Insects need conservation over more than a month to make a difference

Logistical Problems

- Grass can grow a foot and cover flowers
- Lawn mowers may not be able to mow grass that tall
- Such drastic cuts can kill grass
- Untended lawns don't revert to natural spaces

No Mow May – a Massive Mistake?!

Cultivate habitat heterogeneity

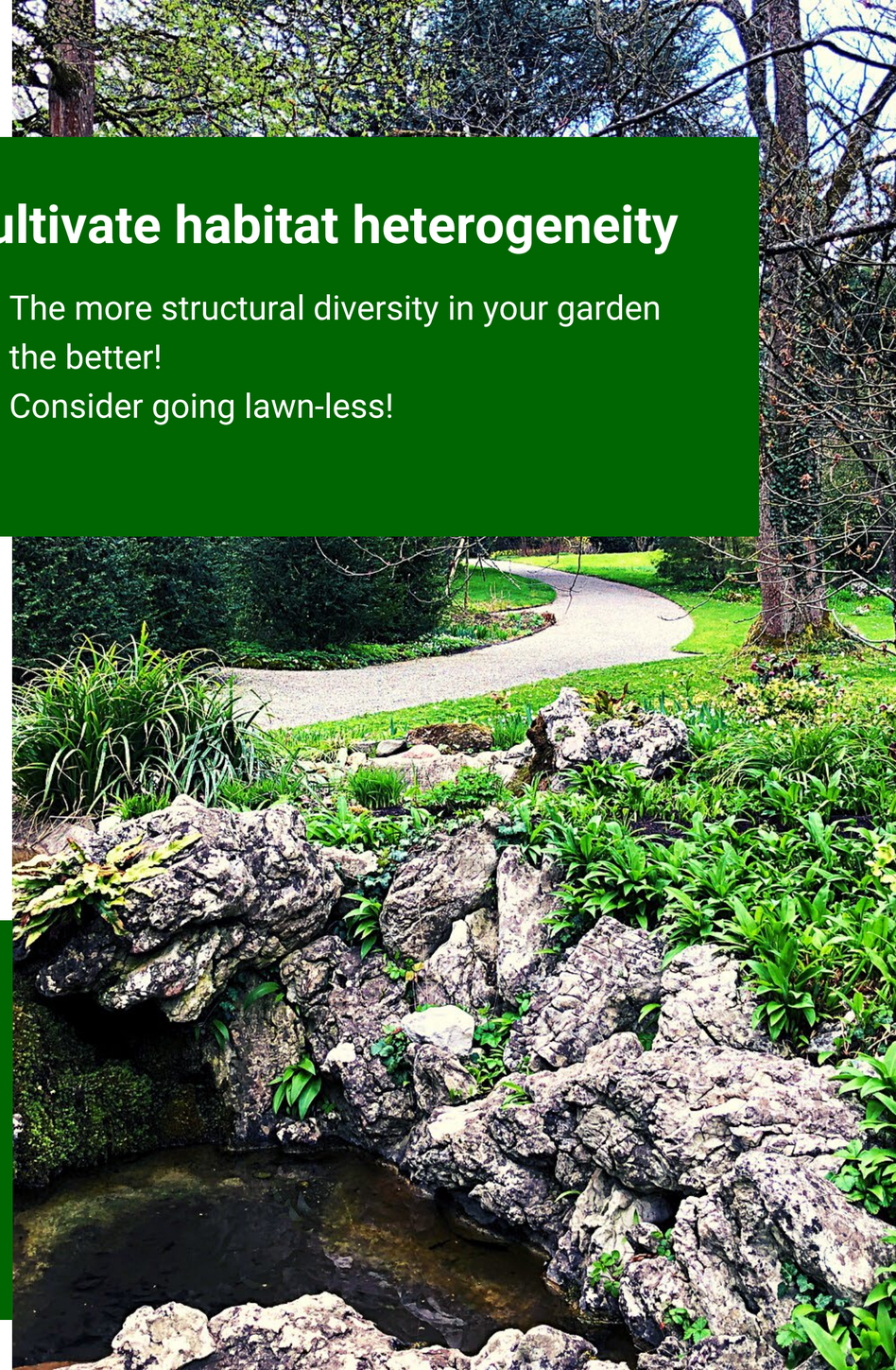
- The more structural diversity in your garden the better!
- Consider going lawn-less!

Increase native flowering plant diversity

More native flowering plants means healthier and more diverse food plants which support more diverse insects

Provide food throughout the growing season

Planting flowers which bloom in spring, summer, and fall will help feed insects regardless of their emergence timing.



BEE HOTELS

Cultivating
Wild Things

Benefits of Bee Hotels

- Personal Interest
- Outreach
- Nesting spaces for insects

Cultivating
Wild Things

Bee hotel liabilities

- Research indicates they don't really work

- Must be cleaned annually

  Dirty bee hotels increase the risk of disease, and parasitism, They should be cleaned once a year.by replacing all nesting materials

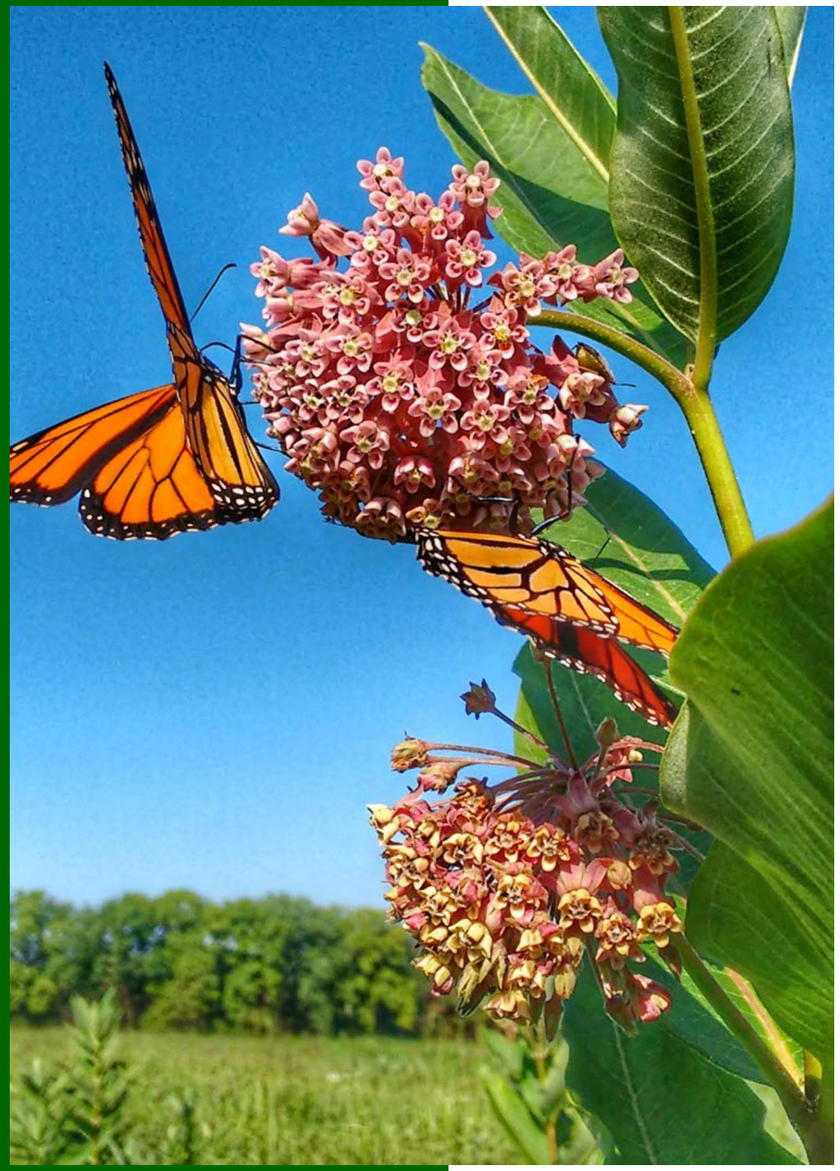
- Rarely host the intended species

  Studies show most bee hotels are dominated by wasps and a non-native bee species

How do we conserve insect biodiversity?

...

Cultivating
Wild Things



Overview

- [x] Do we need to conserve insect biodiversity?
- [x] Do we want to conserve insect biodiversity?
- [x] How do we conserve insect biodiversity?

Questions?

Let's connect:

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