Zionsville

A Roadmap for Conservation:
The Homegrown National
Park.

Contents

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Introduction

Zionsville is in an excellent position to become a leader in conservation.

The positive leadership of the Town Government, and a Parks Board and Management who are both supportive and knowledgeable are significant advantages. The Town is making commendable progress in addressing climate resiliency, and addressing wider, and linked, conservation issues would be an important further step.

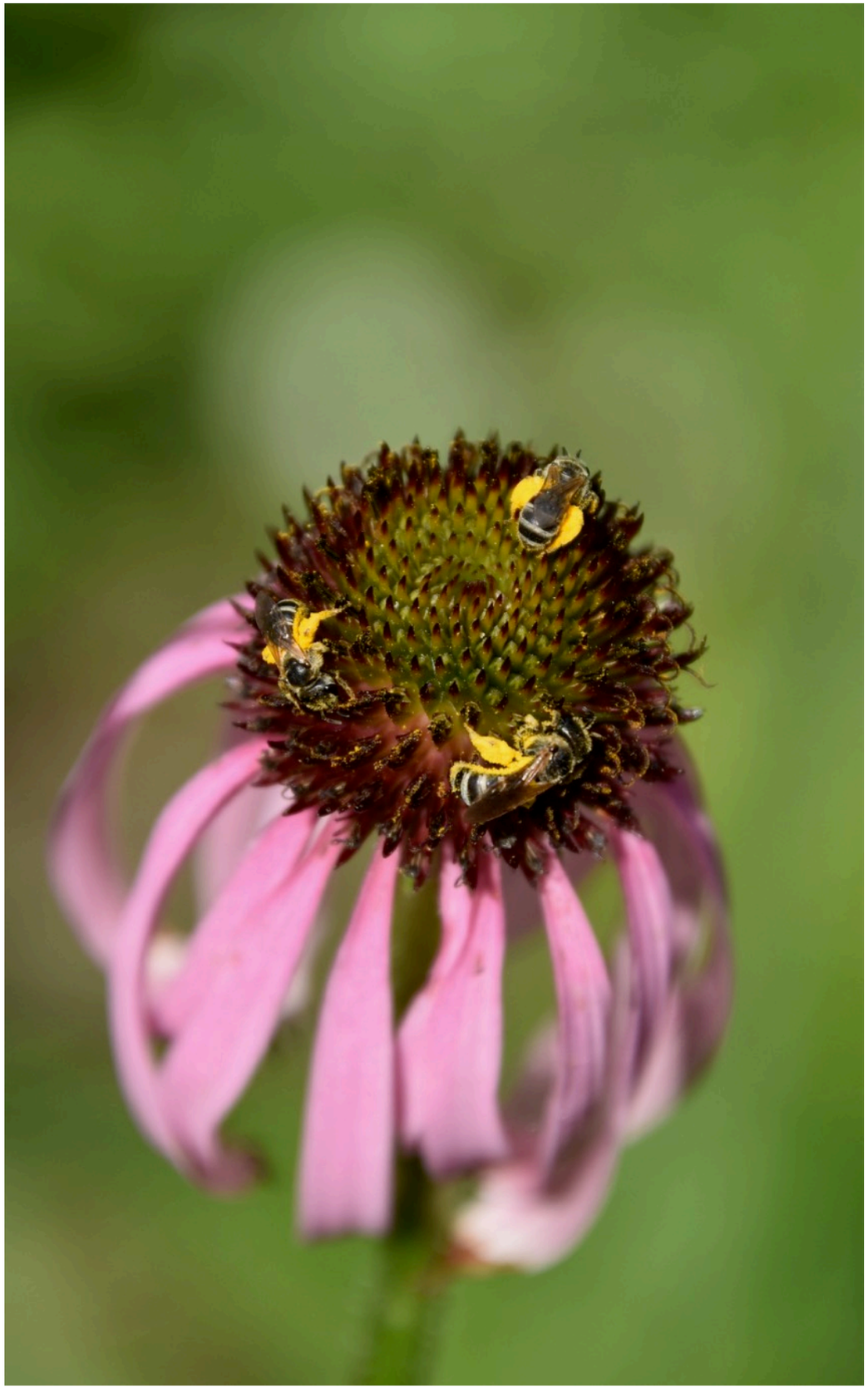
This document considers both potential policy and behavioral changes in Zionsville that would enhance conservation of Indiana's native species as they face increasing pressure from climate change and rapid urban development. Recommendations are based on the Homegrown National Park concept as discussed in Dr Doug Tallamy's recent book 'Nature's Best Hope', tailored specifically for Zionsville.

There are already some excellent mature native plantings in Town parks. Zionsville was the second ever National Wildlife Federation (NWF) Community Wildlife Habitat and 2020 is the 20 year anniversary of that accomplishment. There is a strong community of environmentally aware citizens, very keen and accomplished gardeners and wildlife enthusiasts.

Coordination between the town, civic groups and residents, Zionsville schools and local businesses could lead to meaningful, sustainable change and could build on Zionsville's solid foundation to make it an environmental leading light, and a pioneer in the 'Homegrown National Park' program.

In addition to the ecological importance of conservation, the potentially significant economic benefits associated with adopting best conservation practices are considered, as well as the links between conservation and climate resilience.

It could be beneficial for Zionsville to coordinate with the Indiana Wildlife Federation (IWF) and Indiana Native Plant Society (INPS). Both of these groups have done a great deal of work on these issues over the years and have active members in Zionsville. They are currently working together on a joint initiative to produce freely available educational material for homeowners, HOA groups and municipalities.



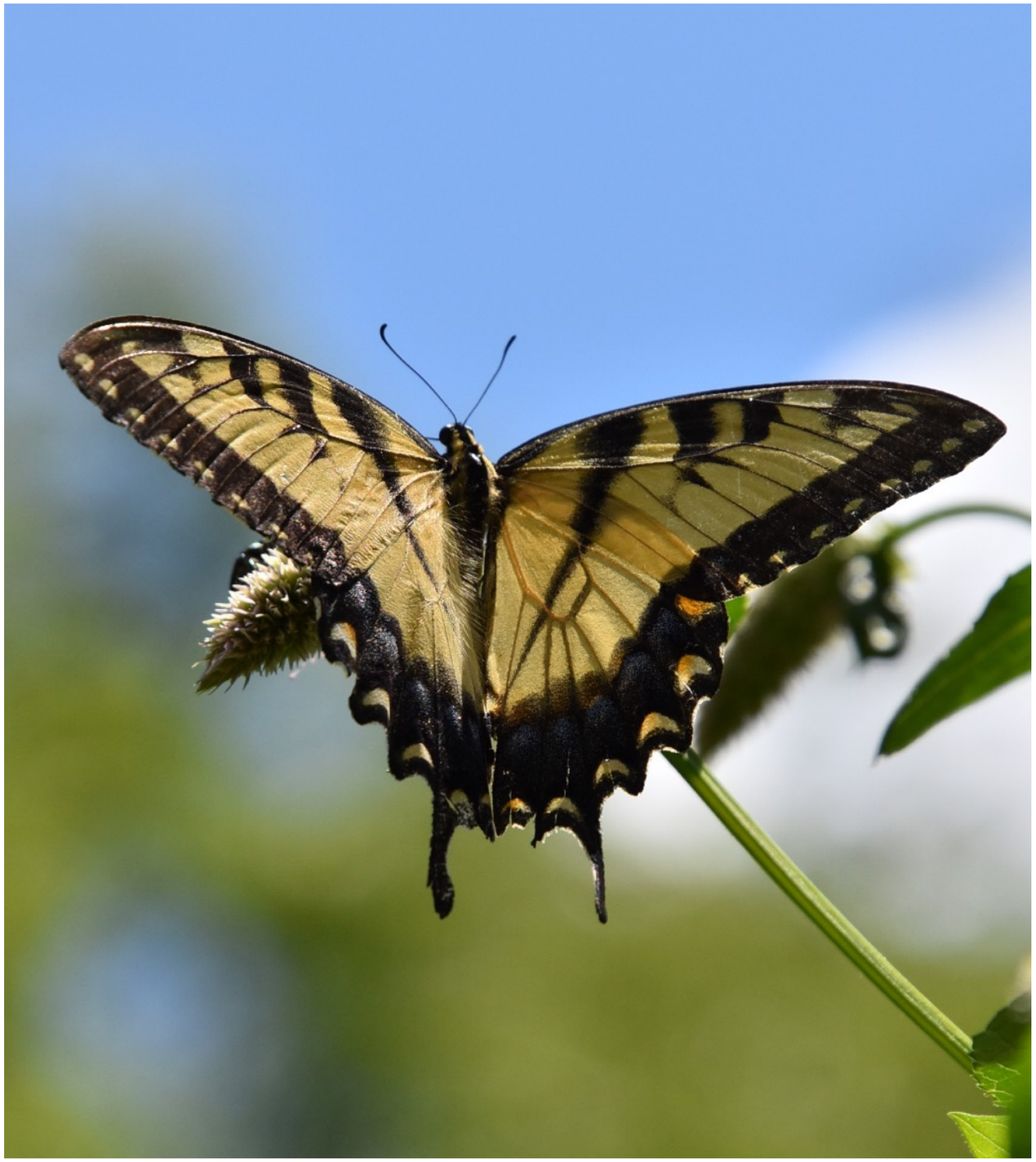
Linking Conservation, Biodiversity and Climate Resilience

This roadmap is intended to be supplemental to the work addressed in Zionsville's Climate Action Plan.

The impacts of climate change have worrying implications for many of Indiana's fragile native plant populations and the wildlife that depends on them. Shifts in wetland, grassland, forest and understory plant composition associated with climate change will strongly influence Indiana's wildlife populations, while phenological shifts are predicted to affect migratory species.

Conservation and protection of Indiana's diverse native species should be a central component of climate change preparation. Genetic variation enabling adaptation is key to species survival as conditions change. Restoration and protection of habitat, supporting biodiversity to maintain ecosystem stability and increasing population numbers will all be critical.

In addition to recognizing the impacts of climate change on Indiana's native species, the link between conservation and climate resilience should be stressed. The role of native plant communities and healthy wetlands, forests and grasslands in helping to mitigate impacts from climate change, and the economic and qualitative benefits of this, should be recognized. As our climate changes, the importance of maintaining urban green infrastructure to support economic, environmental and health benefits to cities in Indiana will likely increase.



The Importance of Biodiversity

Native plant communities support a great deal more biodiversity than introduced plants, and biodiversity is incredibly important for a stable ecosystem.

The greater biodiversity supported by native plant communities is primarily due to specialized relationships that have evolved between plants and insects, driven largely by the evolution of plant defenses to herbivory and insect adaptations to these. Around 90% of insect herbivores are diet or host-plant specialists, meaning that they can only eat or live on plants that they have developed a relationship with through evolutionary time.
This has consequences throughout the ecosystem. For example, a 2018 study found that there were 68% fewer caterpillar species, 91% fewer caterpillars, and 96% less caterpillar biomass in study areas with introduced plants compared to native hedgerows.

Caterpillars are one of the most important food sources for many wildlife species and the reduction in caterpillar numbers impacts food availability; another study found that suburban yards dominated by introduced plants were 60% less likely to have breeding chickadees compared to primarily native landscapes. The steep decline in bird numbers across the US has been well publicized, and the widespread use of non-native landscaping plants is a contributing factor.

While non-native plants can provide some ecosystem functions, there is almost always a loss in biodiversity when they are used in place of natives.

The conservation of biodiversity is critical – ecosystems and trophic interactions are incredibly complex; we have limited understanding of even the most well studied species interactions, and there are countless others that we have little to no knowledge at all of; we just don't know where the 'breaking point' for ecosystems are. Not only do we risk losing individual species when we destroy habitat but we also risk cascading effects, the loss of multiple interdependent species and the breakdown and loss of entire ecosystems. Biodiversity also encompasses the genetic diversity found within populations that is so vital for their adaptability and ongoing evolution. This is becoming even more critical as fragile populations face increased pressures from climate change and loss of natural habitats through rapid development.

For many people, the conservation of other species is in itself a strong enough argument for action, but even for those who perhaps aren't concerned with conservation, we can also look at it from a very anthropocentric view. Humans are completely dependent on the ecosystem services provided by plants and animals. (This is rather brilliantly and succinctly described in E. O. Wilson's 1987 paper, The Little Things that Run the World in which he states '..if invertebrates were to disappear, I doubt that the human species could last more than a few months'.)

Plants, and native plants in particular, are the foundation of ecosystems on which all of life depends.

A Responsibility – and Opportunity – For Us All: The Homegrown National Park

In his wonderful *Half Earth*, E.O. Wilson argues that time is running short and we need to act quickly to stabilize the biosphere. He puts forward the argument that by saving – setting aside as a natural reserve – half the Earth, we could stabilize 80% of its species. This is an amazing goal, and something that it is wonderful to strive towards. However in reality, achieving this, particularly without the political will, can sometimes seem unattainable.

The brilliance of Dr Tallamy's approach, and the Homegrown National Park idea, is that it takes the teachings and ethics of Aldo Leopold and E.O. Wilson and looks at how we can achieve their goals within the constraints of the world we find ourselves in.

Looking at the situation as it is today (where, for example, in the US more than 83% of land is under private ownership, and where globally only 17% of the Earth's land surface is preserved), Tallamy does not diminish the critical role of public preserves, but argues that, on their own, they will not be enough to sustain biodiversity. We need to find ways for nature to thrive in human-dominated landscapes. He expands the opportunity and the responsibility for this '*necessary task of restoring ecological function to the land*' to all of us and provides a framework for how we can realistically do this.

Dr Tallamy's approach is excellently summed up by this paragraph from Nature's Best Hope:

'*We need a new conservation toolbox, packed with more expansive tools. New knowledge will be our most important tool, followed by a cultural recognition that conservation is everyone's responsibility – not just those few who make it their profession. Every day we are learning more about how to redesign both public and private landscapes in ways that meet the aesthetic, cultural and practical needs of humans without devastating the resources needed by humans and other species. We are learning how to convert at least half of the area now in lawn to attractive landscapes packed from the ground to the canopy with plants that will sustain complex food webs, store carbon, manage our watersheds, rebuild our soils and support a diversity of pollinators and natural enemies. In other words, we are learning how to create landscapes that contribute to rather than degrade local ecosystem function.*'

What is so encouraging is that, as Tallamy states, it empowers each of us and also ‘shrinks the problem’ to something that may be manageable. With so many environmental concerns worldwide, and with so many of our plant and wildlife populations declining and facing increasing threats, using our wonderful, diverse native plants in landscaping is a way we can all do something and really make a difference. Together, our gardens and community areas can all be part of the Homegrown National Park.

So many of the problems we are facing seem out of our control, but we can individually and collectively actually do something that will matter. Also, while so many of the steps that we know we need to take to live more sustainably involve perhaps challenging behavior changes or reducing our resource consumption, this is one area that doesn’t involve restraint. We can increase our use of native plants, make spaces more beautiful and enjoyable, encourage more wildlife – it is a positive in every way.

Dr Tallamy aims to have a website with “dots on the map so the world can see the [Homegrown National] park grow”. It would be wonderful for Zionsville to be one of the first points on that map.

INPS & IWF Landscaping with Natives Initiative

The Indiana Native Plant Society (INPS) & Indiana Wildlife Federation (IWF) are working together to provide accessible, comprehensive information to guide homeowners, HOA groups and municipalities so that they can successfully incorporate native plants into a wide variety of urban, suburban and rural landscapes.

INPS & IWF are building on Dr Tallamy's 'Homegrown National Park' concept as a platform to encourage homeowners, HOAs and municipalities to use native plants in their landscaping. Specifically, we aim to bridge the disconnect between gardening, landscaping and ecology, enabling people with any level of experience to contribute to conservation efforts through the use of native plants in their landscaping. Currently, much of the information available on native plants is focussed on individual species and assumes a level of knowledge that excludes many home gardeners and municipal planners. Both the lack of easily accessible information and the lack of availability of the plants themselves mean that native plants are often only used by enthusiasts who specifically seek them out. Additionally, knowledge and availability often limit native plant use to prairie-type settings, despite the enormous diversity of Indiana's native plant species. The team is currently working on:

- The Science Explained—Detailed scientific, accessible information on native plants and why they are so important.
- A Digital Education Series—The centerpiece of the project, a series of short videos guiding through the steps of why and how to use native plants in landscaping.
- Species Information— With updated species pages for each Indiana native, hosted on the INPS website.
- Garden Designs— Sample garden plans for different conditions; plant combination ideas; photos and video virtual tours of mature native plant gardens.
- Material for HOA Boards—A video presentation that residents can present to their HOA boards, along with sample HOA letters and newsletter content.
- For Municipalities—Resources and a digital presentation for municipal leaders.
- Answers to Common Questions—FAQs on landscaping with natives plus advice on common problems and obstacles.
- Availability & Economics—How and where to buy native plants, including information on resources and grants available.

All of this material will be freely available online (https://indiananativeplants.org/); any questions or feedback will be gladly received at landscape@indiananativeplants.org.

For transparency, I am involved in leading this initiative and I would be so happy to answer any questions.

Zionsville - Celebrating a Legacy of Conservation

2020 is the 20th anniversary of Zionsville becoming a National Wildlife Federation (NWF) Community Wildlife Habitat; Zionsville was the second community ever to receive this distinction.

The National Wildlife Federation's Community Wildlife Habitat program partners with cities, towns, counties, neighborhoods, and communities to become healthier, greener, and more wildlife-friendly. Community Wildlife Habitats garden and landscape with wildlife in mind, promote the use of native trees and plants, work to reduce or eliminate the use of pesticides and chemicals, and integrate wildlife-friendly practices into sustainability plans and park master plans. Through this program, communities can enhance and restore islands and corridors of wildlife habitat in urban and suburban areas nationwide, while at the same time connecting to existing work around climate resiliency, community resiliency, urban forestry, water conservation, beautification, and more.

Elizabeth Mueller, Myrene Brown and Nancy Carpenter worked to secure Zionsville's certification 20 years ago; they are still very active in maintaining this certification status, raising environmental awareness and encouraging the use of native plants. This distinction, and their longstanding commitment, is something to build on and be proud of. Dr Tallamy is working closely with the NWF (IWF is the local affiliate of this National group) and Zionsville's record and Community Habitat status place us in an excellent position to be part of the Homegrown National Park.

NWF Native Plant Challenge

The National Wildlife Federation are calling on cities to adopt three policy changes in their Native Plant Challenge.

1. Pass native plant ordinances - ideally to mandate 100% use of native plants on all town properties and in new developments.

2. Update weed and vegetation control ordinances - to ensure that ordinances support wildlife-friendly landscaping while also ensuring public safety.

3. Designate no-mow zones - both to benefit wildlife and to save money through reduced maintenance costs; ideally combined with educational signage and media outreach to educate the public about the benefits to both wildlife and people.

Excellent examples and further details can be found on the NWF website. If Zionsville were to update ordinances to incorporate these changes it could make a very significant difference.

Recommendations: Zionsville and the Homegrown National Park.

These recommendations are based on those detailed in Chapter 11 of 'Nature's Best Hope' by Dr Doug Tallamy, tailored for Zionsville.

- Wherever possible, the following recommendations would ideally be brought into action on town property and required for new developments, and encouraged elsewhere in the town. New zoning regulations and ordinances that take these recommendations into account would make a significant impact. Adoption of these measures could be incentivized by highlighting participating municipal areas, businesses, schools and neighborhoods through media, signage and certification.

- Town media channels could be used to help inform residents about this exciting work - all of the information that we are developing for INPS/IWF will be freely available online and I would also be very happy to provide any content and share photo and video material for the Town's media use.

1. Shrink the Lawn

- The goal is to reduce the area of ecologically desolate turf-grass by 50%.
- This could be an easily achievable goal for the area around the Town Hall and a requirement for new developments, particularly in their common areas and around retention ponds.
- Town media channels could educate and encourage homeowners and businesses to do the same.
- As recommended in the NWF Native Plant Challenge, passing native plant ordinances (ideally 100% native species) and updating weed and vegetation control ordinances would make a significant impact.

2. Remove Invasive Species

- A key priority. A great deal of work has been done on this already and the town has made significant effort, but there is an urgent need for more. Significant areas (such as along trails and in some of the town parks) still have stands of Asian bush honeysuckle, while species that have not been covered under the Indiana Terrestrial Invasive Plant Rule but are still considered invasive (such as Callery pear, *Pyrus calleryana*) are still being used in landscaping.

- Tightening town ordinances so that in addition to the plants covered in the Terrestrial Plant Rule, all species designated as invasive by the Invasive Plant Advisory Committee are prohibited in municipal areas and new developments, and discouraged in all areas, would be an excellent step forward.

- There is already a strong network of people working on invasive species in Indiana. Close coordination with the Indiana Invasive Species Council, Southern Indiana Cooperative Invasives Management (SICIM), their Indiana Invasives Initiative and the (currently in development) Boone County CISMA (Cooperative Invasive Species Management Area) would help enormously.

- Both SICIM and IISC provide excellent resources. The availability of land surveys for property owners and the potential to train to become a surveyor, plus resources for financial assistance for invasive plant removal could be highlighted to Zionsville residents.

- INPS provide online information on native alternatives to commonly used invasive species and a directory of horticultural businesses committed to being invasive-free.

- Perhaps the town could consider hosting a ‘Weed Wrangle’ (through the CISMA) in one of the Zionsville Parks. Dawn Slack is the Chair of the Invasive Plant Advisory Committee, and Mary Welz is the Regional Specialist covering Boone County.

- Education through town channels about invasive plants and the Terrestrial Plant Rule would be excellent, as would having copies of the ‘Pocket Guide to Regulated Plants’ at the Nature Center and Library.

- The town could also highlight the link between plants used in home landscaping and invasive species in parks, agricultural and natural areas, and both the economic and environmental costs of invasive species through town media channels.

- For both plantings and invasive species control, participants in the Indiana Master Naturalist and Indiana Master Gardener programs (through DNR and Purdue Extension, respectively) need to complete volunteer hours for their qualifications and are often well placed to help, as are knowledgeable local volunteers from IWF and INPS. These volunteer groups not only bring expertise and man-hours, reaching out to them also brings them in as stakeholders and engages the wider community. Carmel Parks are developing a digital education series for volunteers to include invasive species control and a similar idea could perhaps be considered.

3. Plant Keystone Genera

- A few genera of native plants are critical for local ecosystems.
- In this part of Indiana, several genera within the Asteraceae family, such as *Solidago* (the goldenrods), *Helianthus* (sunflowers) and *Eupatorium* (Joe Pye Weeds, Boneset) are particularly important herbaceous plants. For trees and shrubs, those within the genus *Quercus* (oaks, in the Fagaceae family), genus *Prunus* (plums and cherries, Rosaceae family), and genus *Salix* (willows, Salicaceae family) are key.
- Prioritizing planting members of these genera on town properties and encouraging homeowners and developers to do the same could have a significant impact.

4. Be Generous with Your Plantings

- Increasing the abundance and diversity of plantings is crucial.
- This is the fun part! Increasing the use of native plants not only provides valuable habitat, it can also increase the beauty and enjoyment of outside spaces.
- The Town Hall (discussed below) and the Nature Center would be excellent areas to showcase ideas and to achieve this. Additionally, areas around the village, road verges and trail edges and areas around municipal buildings could all be used to increase native plant diversity. Businesses, churches and schools could be encouraged to do the same, with incentives including being highlighted in Town media and signage.
- The native plantings already in some of Zionsville Parks are excellent, and increased signage and media focus could enhance their impact and educational value.
- Wherever possible, due to differences in their impacts on ecosystem services, biodiversity and gene flow, straight native species should be used and encouraged instead of (the often more widely available) nativars. Provenance of seed and plants used should also be carefully considered.
- Again, INPS has extensive resources and are currently updating species pages to provide additional information. The Buy Indiana Natives Directory is also a very useful resource.
- With significant plantings already in town parks, seed collection could reduce the costs of planting new areas considerably, and free seeds (for example through seed libraries) could benefit Zionsville residents.

5. Plant For Specialist Pollinators

Specialization is key to why native plants are so vital for maintaining biodiversity and ecosystem stability. Around 90% of insect herbivores are diet or host-plant specialists, meaning that they can only eat or live on plants that they have developed a relationship with through evolutionary time.

- Planting for specialist pollinators can greatly increase the biodiversity supported by the habitat, as both specialist and generalist species can be supported.

- There is still a great deal of research to be done in this area but several genera appear to support the most specialists (see Point 3 above). Many of our native bees specialize on a particular plant family or genus when gathering pollen (oligolecty); less commonly, some appear to specialize on a single species (such as the Passionflower Bee, *Anthemurgus passiflorae,* which is reliant on *Passiflora lutea*).

- Including plants from the genera that typically support the most specialists together with the greatest diversity of native plants is the best strategy for trying to conserve our native pollinators. The Xerces Society provide excellent information on endangered pollinators, and on planting for pollinators.

6. Network with Neighbors

- Many Zionsville residents are already engaged and providing habitat on their individual properties and there are some wonderful neighborhood and HOA native plantings (such as around the retention pond at Village Walk). These efforts, together with the extensive Zionsville Parks native plantings, mean that Zionsville is in an excellent position to make a really significant impact.

- Encouraging networking and information sharing would be excellent. Again, the INPS / IWF initiative is developing material aimed specifically at these groups, including material that can be used for presentations to HOA boards.

- Local native plant and seed swaps and giveaways could be supported - many of these happen at a small scale with garden clubs in Zionsville, and many keen local gardeners are excited to share their plants and seeds, expertise and advice. Zionsville has a great community of garden club enthusiasts and members, Master Gardeners and Master Naturalists. The town could consider sharing these events on town media channels, and even perhaps consider support through bulk purchase of plants from wholesale native plant nurseries and the Indiana State Nurseries. Free seed libraries could be set up to benefit Zionsville residents.

•Individual efforts around Zionsville can be documented and added to the community data for Zionsville's NWF Community Habitat, and used to be included on the (future) Homegrown National Park map). Additionally, these efforts could be celebrated on town social media and through certification schemes.

•Virtual tours of native plantings in the town could perhaps be hosted on the town website, and Zionsville residents asked to share video tours of their landscapes. Sullivan Munce Cultural Center has hosted a garden tour in Zionsville for a number of years; connections to this could be explored. Ideas such as photo competitions for native plants and the wildlife it supports in Zionsville could be considered.

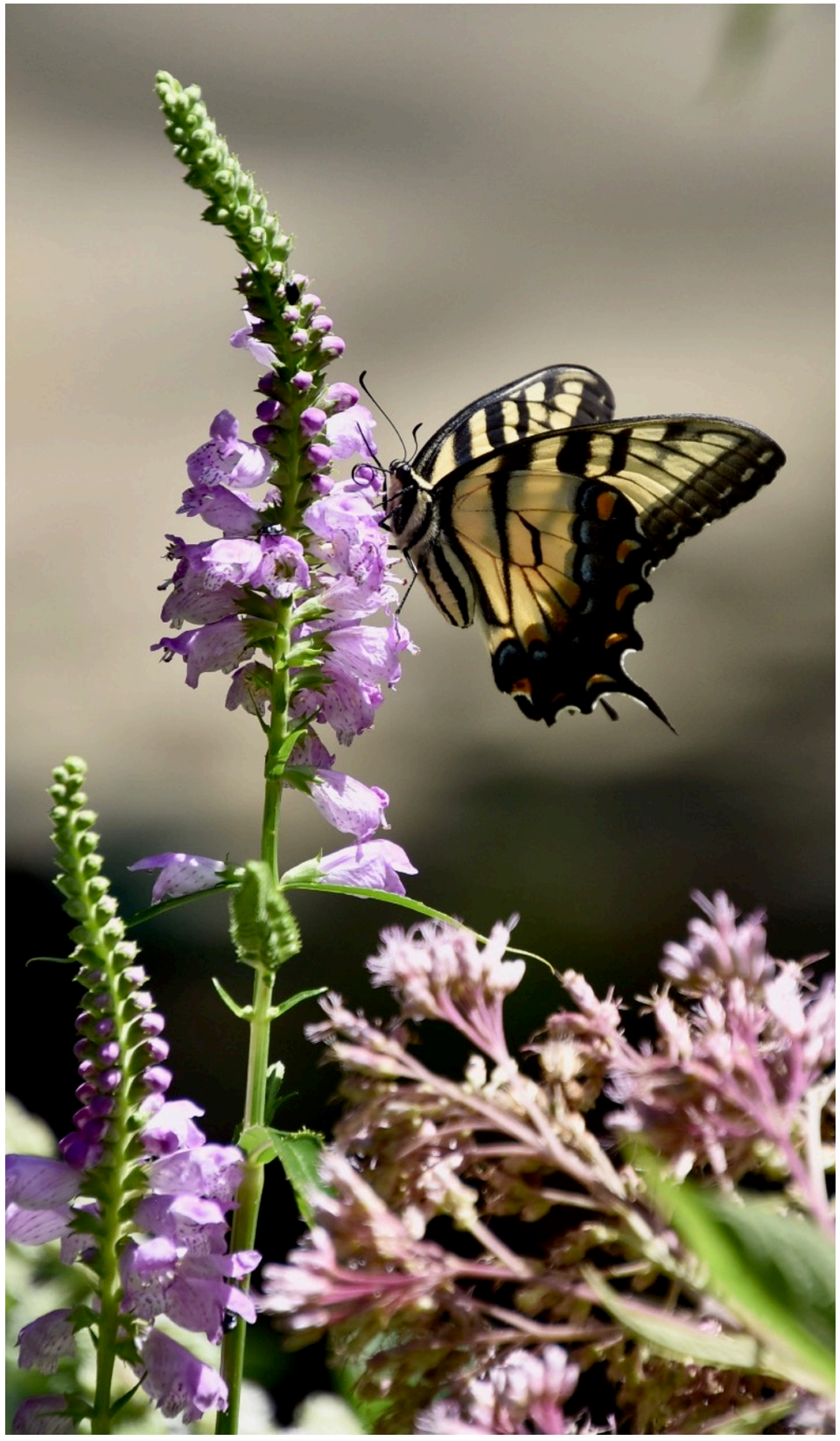
Engaging Zionsville schools could be a key goal.

- While much of the focus on environmental engagement has focussed on K-6 programs, it could also be very powerful to engage older middle school and high school age students. There is a growing energy and awareness, and a real sense of concern, about environmental issues in general right now. Climate change is a huge worry for many students, while pollution and threats to wildlife are very visible and visceral on social media platforms like Instagram.

- Many older students feel concerned but unsure how to direct their energy, and it could be both helpful and fun to reach out to them. It would be good to connect with the science teachers and club leaders (for example for classes such as AP environmental science and biology, and the green club) where there could be potential for projects such as creating native plant gardens on school grounds and studying the impacts of town conservation efforts. Additionally, there are clubs and classes that may have the potential to be a good way of expanding the reach of the material and making the efforts more inclusive - including photography, journalism, mass media, digital design and Harbinger (which produces print and video news for the school) classes at ZCHS.

- The level of talent and professionalism in such areas as video editing / graphic design skills at ZCHS is incredibly impressive, and connecting with these students could both enhance the town's conservation efforts and engage the wider community.

- Carmel has a Mayor's Youth Council, and a Carmel Green Teens Micro-Grant program to encourage youth-led environmental projects in the City, while Carmel Green Initiative have close ties to Carmel Schools through their Promise Project. These could potentially serve as inspiring models for Zionsville as we strengthen environmental initiatives in the town.



7. Build a Conservation Hardscape

- One of the biggest sources of insect decline is light pollution. The following would ideally be instituted on all town property and required on all new developments, and their adoption elsewhere encouraged through education on town media and at the nature center. If at all possible, incentives or assistance with purchase (such as bulk purchase through the town) could assist this.
    - All town outdoor lights should be replaced with yellow LED bulbs when they are due for replacement, and all new lights on town property (and in new developments) should ideally be required to be yellow LEDs.
    - Motion sensors should be used on all town security lights to reduce moth mortality (and reduce carbon footprint).
    - Where possible, and for all new lights, shades should be fitted that direct the light down - this both increases effectiveness of the lighting and reduces the impact on insects.
- Other recommendations from Dr Tallamy that could be instituted on all town properties, and encouraged through education include:
    - Installing window well covers to prevent small creatures from becoming trapped.
    - Setting mower heights to no lower than 3 inches (and preferably 4 inches) and avoid mowing in the evenings to reduce wildlife mortality and reduce water consumption.
    - Installing small water features with bubblers for wildlife.
    - Instead of large bee ‘hotels’, using smaller, dispersed bee houses to reduce predation and disease.

8. Create Caterpillar Pupation Sites Under Your Trees

- More than 90% of the caterpillars do not pupate on their host plants; most drop to the ground to find pupation sites in leaf litter or under the soil. Where the area under trees is compacted, mortality can be high.

- If areas under trees could be planted with groundcover and left with fallen leaf cover (and, where possible, have logs left to rot) rather than mowed lawn that would be preferable.

- Fallen leaves not only act as an excellent mulch, they also provide overwintering habitat for many insects. If residents and town landscapers could be encouraged to use leaf litter on their beds and leave it around the base of trees wherever possible that could have a significant impact (in addition to reducing carbon emissions from leaf blowers and saving money on purchased mulch).

- This could be put into practice on town properties and perhaps this information shared with residents ahead of or in connection with town leaf and brush collections. [There is wonderful information on the #LeaveTheLeaves campaign at the Xerces Society].

9. Do Not Spray or Fertilize

- Insecticide and herbicide use is incompatible with the goals of the Homegrown National Park.

- Prophylactic chemical use and treatment without documented need should be avoided on all town properties and discouraged elsewhere.

- Neonicotinoid use is particularly prevalent and concerning. Residue levels on ornamental plants have been found to far exceed lethal concentrations for honey bees and bumble bees, while research also indicates that neonicotinoids can lead to changes in foraging behavior, reduced predator avoidance, delayed development and reduced reproduction in bees even at very low residue levels. These systemic insecticides can impact other benign and beneficial insects, and have impacts through the trophic levels.

- The town should actively seek to source plants and seeds that have not been treated with neonicotinoids (as is commonly the case with many commercial nurseries and sees suppliers), and should encourage residents to do the same.

- Pyrethroid pesticides, widely used in mosquito control, are also a real concern. Mosquito fogging kills insects indiscriminately and the pyrethroid pesticides typically used can be highly toxic to bees. Research indicates that some pyrethroid insecticides may have toxic effects in humans, affecting fertility, the immune system, cardiovascular and hepatic metabolism and enzymatic activity.

- As a safer, cheaper and more effective alternative, Dr Tallamy advocates the use of mosquito dunks - commercially available tablets containing larvicide. Frequent disposal of even small amounts of standing water can also be very effective for mosquito management on smaller properties.

- Native planting around pond edges provides habitat for natural predators of mosquitos and mosquito larvae (such as dragonflies, damselflies, birds and bats), and greatly helps to reduce mosquito populations.

•Fertilizer use is also unnecessary in areas of native planting, and high nitrogen soils may actually favor non-native and invasive species. Given the pollution associated with fertilizer run-off into waterways, in addition to purchase and application costs, fertilizer use should be avoided as much as possible.

•The complex root systems of native plants play a key role in soil health and in the hydrologic cycle, helping to reduce run off into waterways and improve water quality. With the combination of this important role and their contribution to mosquito control, native plants should be planted around all retention and ornamental ponds on town properties and in new developments, and encouraged in neighborhoods. As an added benefit, geese will typically not congregate around ponds that are edged with tall vegetation, and native planting around ponds is an extremely effective and economic goose deterrent.

While recognizing the potential conflict if the business interests of some residents may be affected by active discouragement of insect control services, the town should seek to actively inform residents of the underlying science, and to use ecological pest management practices on town property. Information and education for residents should include:

- Education about plant-insect interactions - including that herbivory by native insects will typically not kill a healthy plant. Evidence of herbivory indicates that a plant is, in fact, contributing to the ecosystem and should be welcomed - it does not indicate the need for insecticide use.

- In a stable ecosystem with sufficient biodiversity, insect levels are kept largely in check by natural predators (and parasitoids), including many of the birds that are such a welcome sight in our gardens.

- Alternatives to pesticides - such as companion planting and physical removal of non-native insects.

- ‘Pesticide Syndrome’ - unnecessary pesticide use can lead to pesticide resistance and the elimination of natural predators, leading to a cycle of increased need for and reliance on pesticides.

- Requesting that residents consider choosing plants and seeds that have not been treated with neonicotinoids, and that they ask about this when purchasing - increasing demand for neonicotinoid-free plants will help to encourage changes in supply chain practices.

- Education of the benefits of native plantings around the edges of retention ponds.

10. Educate your Neighborhood Civic Association

- Material from the joint INPS & IWF Landscaping with Natives initiative is specifically aimed at this issue and will be freely available online. Highlighting availability of this material through town media channels could be beneficial for residents.

- Perhaps the Town could consider hosting a (virtual) presentation by INPS & IWF aimed at neighborhood groups and HOAs. An environmental strategic planning meeting which includes representatives from HOA boards could also be considered.

- The financial benefits and cost savings associated with an ecologically sensitive approach to landscaping should be highlighted. These include reduced maintenance costs associated with turf-grass and non-native plant maintenance (mowing, fertilizing and irrigation plus replacement of non-native annuals) and reduced costs associated with chemical use (pesticides, fertilizers, mosquito control and algal control).

10 Policy Recommendations for Zionsville

1. Pass native plant ordinances.

- Mandate the use of native plants in landscaping around municipal buildings, in parks, medians, verges and all other common areas, and in all new developments. These would ideally require 100% native plants; or at a minimum 70% native plants - research indicates that 70% of plant biomass is a threshold level below which the probability of sustaining some local bird populations plummets to zero.
- Additionally, require a 50% reduction in maintained turf-grass areas wherever possible on town owned properties and a less than 50% area of maintained turf-grass in all new developments.
- Planting plans should ideally both incorporate members of keystone genera and consider the diversity of native plants in order to maximize conservation benefits.
- The latest scientific research should be incorporated into planting plans wherever possible.
- In all town-owned areas, provenance of seed and plants used should be carefully considered and straight native species (as opposed to cultivars) should be used unless there is specific need (such as disease resistance).

2. Update weed and vegetation control ordinances.

Ensure that they support and do not prevent the use native plants (for example due to height restrictions).

3. Tighten town ordinances.

In addition to the plants covered in the Terrestrial Plant Rule, all species designated as invasive by the Invasive Plant Advisory Committee should be prohibited in municipal areas and new developments, and discouraged in all areas.

4. Designate no mow zones.

Designate no mow zones in appropriate areas and adopt reduced mowing schedules as widely as possible throughout the town - both to benefit wildlife and to reduce maintenance costs. Ideally this should be combined with educational signage and media outreach.

5. Address light pollution in town ordinances.

All town outdoor lights should be replaced with yellow LED bulbs when they are due for replacement, and all new lights on town property and in new developments should be required to be yellow LEDs. Motion sensors should be fitted on all new (and ideally on all) security lights to reduce moth mortality (and reduce carbon footprint). Where possible, and for all new lights, shades should be fitted that direct the light down to both increase effectiveness of the lighting and reduce the impact on insects.

6. Consider requiring window well covers.

These could be required on all town and new properties.

7. Reduce chemical use in all public areas.

Stop prophylactic chemical use and treatment without documented need; stop or significantly reduce fertilizer use on town-maintained properties. Require native plantings around all retention ponds on town properties and in new developments.

8. Re-examine town landscaping and maintenance practices.

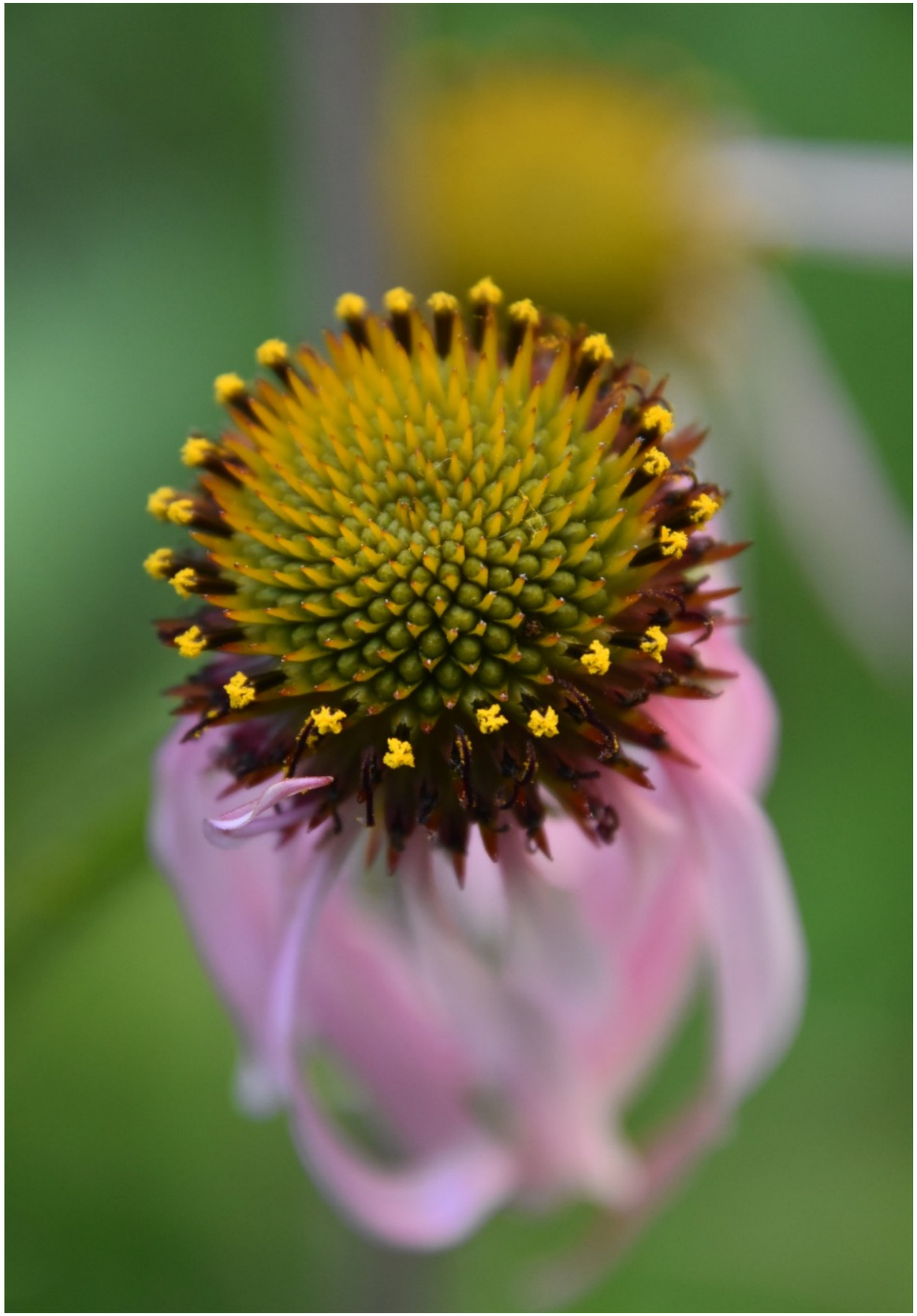
Ensure that practices include the latest research supporting conservation. This should include, but not be limited to, consideration of wildlife in setting mower blade heights and mowing times; best practices for maintenance of areas around trees; best practices for maintaining overwintering habitat. Education regarding these issues should be provided to all landscaping staff and contractors.

9. Explore policy options to encourage adoption of best practices.

Encourage adoption of best practices by businesses, the school district, neighborhoods and residents, including possibly financial assistance (in addition to providing access to information and resources).

10. Legislate for an ongoing commitment to conservation and sustainability.

Ensure meaningful change beyond the term of this administration. A comprehensive environmental strategic plan should be drawn up, circulated for stakeholder and expert review and made public for residents. Assessment of implementation and review of the plan should ideally be required on a scheduled, regular basis.



10 ways to Demonstrate, Educate and Celebrate - Influencing Behavior Beyond Policy.

Behavior change can also be effectively encouraged through positive reinforcement of good conservation practices and increased access to educational and financial resources.

1. Showcase Demonstration Areas.

The Town Hall (discussed below) and the Nature Center would be excellent areas to showcase ideas and provide education on the town's conservation efforts. Areas around municipal buildings, the village, trails and road verges could also be used as demonstration areas. Zionsville is very fortunate to have excellent existing native plant habitat in a number of town parks; increased signage and media focus could enhance their impact and educational value.

2. Highlight the Financial Benefits.

Provide educational resources and opportunities for residents and businesses to learn about the potentially significant financial advantages associated with adopting best conservation practices.

3. Incentivize Best Practices.

Businesses, schools, community buildings and neighborhoods could be encouraged to adopt best practices with incentives, including being highlighted in town media and being supplied with signage to advertise their commitment.

4. Consider Signage to Highlight and Educate.

There are a number of non-profit organizations that can provide excellent signage for those committing to ecologically sustainable practices (Xerces Society, IWF, INPS among others). Zionsville could highlight these programs and / or consider Zionsville-specific signage, given to groups or residents who adopt best conservation practices and primarily use native plants in their landscaping. There could be different levels of adoption, and town media attention on those participating.

5. Coordinate with Partners.

A great deal of work is already being done on these issues in Indiana. Coordinating closely and fostering partnerships with groups working on these issues is key to accessing expertise while reducing costs for the town. INPS, IWF, the Indianapolis Office of Land Stewardship, Indiana SWCDs and Purdue University among others have extensive educational material freely available online. Zionsville could provide links to these resources on town media and could consider hosting a virtual meeting to bring representatives of these groups together to help in conservation strategic planning. Partnering with these organizations can also bring benefits to Zionsville residents - for example IWF provides educational programming (such as Monarch butterfly tagging) and educational signage for Certified Trails and Habitats, while INPS have various biodiversity and educational grants available.

6. Focus on Invasives.

Foster close coordination with the Indiana Invasive Species Council, Southern Indiana Cooperative Invasives Management (SICIM), their Indiana Invasives Initiative and the (in development) Boone County CISMA. Host a 'weed wrangle'; educate residents about resources for invasive control and opportunities to help with town invasive management initiatives.

7. Educate to Reduce Chemical Use.

Educate residents on plant-insect interactions, options to reduce chemical use and alternatives to pesticides.

8. Engage the Schools.

Engage Zionsville schools and students, with an emphasis on older, middle and high school age students in addition to the younger age group who have typically been the focus of environmental programs. Consider science and environmental students, but also those involved in the arts and media programs at the schools. Consider models used in other towns, such as Carmel's Carmel Green's 'Teen Micro Grant' program and 'Promise Project' as potential models.

9. Highlight Action.

Celebrate the many achievements and efforts already happening in Zionsville on town social media. Perhaps residents could nominate individuals and community efforts they feel have made a contribution?

10. Celebrate Zionsville's Environmental Heritage.

Celebrate the 20 year anniversary of Zionsville's NWF Certification - perhaps Dr Tallamy could be invited to speak at a virtual town event? Encourage residents and neighborhoods to share photos and videos of native plant landscaping and the wildlife it supports for virtual tours and social media posts; consider a town wildlife and native plant photo competition, or coordinating with arts groups to support similar initiatives.

Examining the Financial Benefits: The Ridgefield Nature Park.

The Ridgefield subdivision in Fishers provides an excellent example of some of the many benefits associated with ecologically sensitive planning. Due to the high costs of turf grass maintenance, in 2006 a large portion of the mowed turf grass area in the subdivision was converted to a 6.5 acre nature park consisting of native warm season grasses, forbs, trees, and shrubs. Due to the environmental benefits associated with native habitat, cost share funding was received (in part from the Hamilton County Soil & Water Conservation District and the DNR); the initial cost to the neighborhood to plant the habitat was less than the annual maintenance cost to care for the turf grass.

After maintenance expenses, the neighborhood saved $58,608 through year-end 2016.

Other benefits to the residents have included:

- Healthier Retention Ponds: A 2015 study found that nitrates were 59% lower, phosphates 17% lower, dissolved oxygen 49% higher, and water clarity 57% better in the one-acre pond in the nature park than in a 'standard' pond located elsewhere in the neighborhood.

- Less Algal Growth: Due to the reduced pollutants in the pond, algal growth on the Nature Park pond has greatly reduced. As a result, algae control is only completed on an as needed basis, saving the neighborhood further costs.

- Discouraging Geese: With the shoreline vegetation, geese have not visited the Nature Park pond since the conversion.

- Erosion Prevention: The neighborhood pond was plagued by erosion prior to the conversion as the shallow root turf grass did not slow down the runoff of water down the steep banks of the pond nor hold the soil in place. Since the establishment of the Nature Park, erosion has been completely eliminated.

- Increased Wildlife: The native plants included in the Nature Park provide critical wildlife habitat. As a result, the Nature Park as well as the neighborhood have experienced a significant increase in wildlife, including butterflies, bees and hummingbirds.

The Indianapolis Office of Land Stewardship

A Model for Conservation

The Indianapolis Office of Land Stewardship, housed under the Department of Public Works and partnering with the Department of Parks and Recreation, offers an excellent example.

Managing over 1,900 acres of natural area across 37 park properties and over 100,000 square feet of City rain gardens that assist in filtering stormwater runoff, Land Stewardship holds a leadership role by preserving critical wildlife habitats, providing passive recreational opportunities, protecting air quality and addressing stormwater issues. Efforts like these helped Indianapolis earn a Top 10 City for Wildlife designation from the National Wildlife Federation in 2015, 2018 and 2019. The Office of Land Stewardship was honored with an Outstanding Institution Advancing Sustainability award by the City of Indianapolis in 2019.

In their excellent document outlining strategy they highlight the following efforts:

1. Stormwater

- Conversion of agricultural fields and turf grass to native woodlands and wetlands, which naturally manage large volumes of stormwater, and protection of natural areas performing this task, in particular natural wetlands.
- Green infrastructure elements such as rain gardens and bioswales to divert rainwater from storm sewers and waterways. Water running off buildings and streets carries a great deal of contaminants, which are flushed into waterways and city drinking water sources; the more stormwater soaks into the ground, the cleaner the city's waterways and drinking water.
- Promotion of naturalized stream buffers and undeveloped flood plains, reducing flooding and improving water quality.

2. Climate Resiliency

- Older forests are carbon sinks, sequestering nearly 5 times as much carbon as turf grass; wetlands and floodplains may be even more effective.
- Conversion of turf grass and agricultural areas to native flora reduces emissions from gas-powered maintenance. The nearly 720 acres transitioned from turf or agriculture to native woodlands, prairies, and wetlands is estimated to amount to roughly 1.2- 2.8 million pounds of carbon that is no longer entering the atmosphere every year.
- Improving air quality - forested areas on Land Stewardship properties are estimated to absorb around 5,292 tons of carbon dioxide every year and 420 tons of air pollutants. Forests, wetlands, and prairies also provide clean air and help cool the environment; trees in particular lower the ambient air temperature.

3. Pollinator Protection & Managed Pollinator Habitat

•Protecting valuable pollinator habitat; converting fallow landscapes to species rich pollinator plantings and enhancing edge habitat with native flora.

4. Species of Special Concern

•Much of the conversion of landscapes to native flora and protecting remaining natural areas is aimed at preserving conditions for Indiana's species of special concern to survive, including the Kirtland's snake, Henslow's sparrow, Northern leopard frog, and American ginseng.

5. Invasive Species Control

•This is central to Land Stewardship's work, as invasive species impact species of special concern, pollinators and water quality.

As part of their Call-to-Action, Land Stewardship are asking people to use native plants in their own landscaping, and to control invasive species on their own property. The Native Planting Area program recognizes residents who use primarily native plantings in their residential landscapes with program designation signage. Registration for the program is free. (Interestingly, they do note that while the City of Indianapolis encourages the use of native planting areas, since many native planting areas have vegetation over 12" tall, it is important to fill out and submit the form to avoid a weed citation. This highlights further the importance of ensuring Zionsville's ordinances are supportive of native plantings).

Zionsville Town Hall

The area around the Town Hall could be an excellent launching pad and showcase of much of what can be achieved.

- People can be concerned that native plants mean they have to have an area of rather wild-looking prairie. This can be wonderful in the right setting, but is by no means all that native plantings need to be. In the area around the Town Hall the town could really showcase what is possible with native plants - it could drastically improve the area and make it an enjoyable space, while also being educational and inspirational.

- Areas of the taller, more prairie-looking plants in some of the large spaces of the plot would look wonderful and provide valuable habitat, while other native plant communities and ideas that people might be inspired to use in more suburban and urban garden areas could be used closer to the building.

- The area could be landscaped predominantly with native species (existing plants can be left in place, all new plants added would ideally be native species) and a real point of highlighting the ecological value of the plants could be made. Plant communities could include those found in woodland and shade areas; a variety of trees and shrubs (which are often ecologically the most valuable in terms of the number of species they support); wetland species around the retention pond; a pollinator area with educational signage about the insect species that the plants support, and more 'landscaped' areas using native plants that might be suitable in smaller, urban, gardens. There are so many incredible native species that are not often used in traditional landscaping but which would be excellent to include.

- Plantings would ideally be based on some of the latest research (for example a December 2019 University of Kentucky study indicated that the layout of gardens strongly influences the extent to which milkweed plants are found and used by Monarch butterflies). This interface of garden design and ecology is fascinating and an exciting field to explore.

- Having interesting, visually appealing educational signage would help to ensure that it is an area that people can both enjoy and learn from.

- I would be very keen to provide drawings and planting designs (at no cost) for your consideration.

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Online Resources

Indiana Invasives Initiative http://www.sicim.info/cisma-project

Indiana Invasive Species Council https://www.entm.purdue.edu/iisc/

Indiana Native Plant Society (INPS) Buy Natives Directory https://indiananativeplants.org/landscaping/where-to-buy/

Indiana Native Plant Society https://indiananativeplants.org/

Indiana Terrestrial Invasive Plant Rule https://www.in.gov/dnr/files/ep-terrestrial_plant_rule.pdf

Indiana Wildlife Federation https://www.indianawildlife.org/

Indianapolis Office of Land Stewardship https://www.indy.gov/activity/land-stewardship

Invasive Plant Advisory Committee, Invasive Plant List https://www.entm.purdue.edu/iisc/pdf/IISC_Plant_List_by_group.pdf

National Wildlife Federation Community Wildlife Habitat https://www.nwf.org/communitywildlifehabitat

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Southern Indiana Cooperative Invasives Management www.sicim.info

The Xerces Society https://xerces.org/