

Landscaping the Sustainable Campus™

A guide for adopting a sustainable approach to landscape management on Indiana's universities and colleges



An Indiana Wildlife Federation program

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Since 1938, the Indiana Wildlife Federation has promoted the conservation, sound management, and sustainable use of Indiana's wildlife and wildlife habitat through education, advocacy, and action. A nonprofit, grassroots affiliate of the National Wildlife Federation, IWF is governed by a volunteer Board of Directors representing all areas of the state; our diverse membership consists of over 50 local conservation organizations and over 1,900 individuals, corporations, and businesses.

EXECUTIVE SUMMARY

The *Landscaping the Sustainable Campus* program encourages sustainable and ecologically friendly practices at colleges and universities around Indiana. By enrolling in this program, and forming a partnership with the Indiana Wildlife Federation (IWF), campuses receive guidance, ideas, and helpful resources from IWF regarding how to care for turfgrass in a sustainable fashion and transform areas into wildlife friendly habitats. *Landscaping the Sustainable Campus* demonstrates schools do not need to sacrifice aesthetics for sustainability when designing and maintaining campus grounds. Environmental stewardship can reduce campuses' impacts on Indiana's ecosystems while enhancing their visual appeal and reducing maintenance costs.

Participating institutions in *Landscaping the Sustainable Campus* will, or have begun to, proactively reform conventional landscapes into quality habitats, stimulating healthy populations of birds, insect pollinators, and other wildlife. Completion of this program qualifies campus properties for IWF Wildlife Friendly Campus Certification, and specific practices may count toward USBGC LEED (United States Green Building Council, Leadership in Energy and Environmental Design) certification credits. *Landscaping the Sustainable Campus* emphasizes interdisciplinary learning and engagement of students and administration to build a supportive community, important in furthering campus landscape sustainability.

This program will showcase Indiana universities and colleges as models of sustainable landscaping. Goals include improve water quality by managing stormwater runoff and nutrient use, restoring healthy soil by eliminating excessive pesticide use, revitalizing quality habitats by removing invasive species, replenishing populations of native plants, and conserving water resources through recycling.

SUSTAINABILITY THROUGH LANDSCAPING (pg 5) details the problems with conventional landscaping and show campuses how to solve them. **THE PROGRAM** (pg 7) provides a step-by-step explanation of *Landscaping the Sustainable Campus*, highlighting the program's benefits.

APPLICATION PROCESS (pg 9), and **CERTIFICATION** (pg 10) outline how colleges and universities become eligible

for certification and qualify for various distinctions from IWF and USBGC. **PROGRAM CATEGORIES** (pg 10) specifies recommended practices campuses can adopt to qualify for the certifications.

RESOURCES (pg 13) offers guidance for learning more about sustainable landscaping techniques.

SUSTAINABILITY THROUGH LANDSCAPING

The Problems with Conventional Landscaping

Conventional landscaping—manicured lawns, beds of exotic flower species, rows of non-native trees, etc.—may help shape an appealing, comfortable campus environment, but it also contributes to a wide range of ecological problems. Practices used to maintain conventional campus landscapes can jeopardize wildlife populations, impair water quality, and contribute to human health problems.

Risks to Wildlife

Campuses that settle for conventional landscapes threaten the well-being of wild birds, fish, amphibians, and mammals. Turfgrass lawns, though aesthetically pleasing, do not offer a viable food source or habitat for many wildlife species. Native wildlife species need four essential resources: food, water, shelter, and a place to raise young in order to survive. As more wild space is converted to conventional landscapes, native plant and animal species lose these quality resources and face fierce competition from invading species.



Raingardens filter stormwater, prevent erosion, and provide attractive patches of wildlife habitat.

Photo by SustainIndy, Indianapolis Department of Public Works

Often, invasive and non-indigenous species appear first in a disrupted landscape. Invasives can regenerate from roots as opposed to starting from seed, and without natural predators or normal control mechanisms, they can spread exponentially and become dominant. These non-indigenous species, such as Japanese honeysuckle (*Lonicera japonica*) and garlic mustard (*Alliaria petiolata*) grow and reproduce rapidly, adapt to a variety of habitat conditions, and easily access resources. Invading species often defend themselves by releasing chemicals or altering the habitat in ways that discourage the growth of natives. For example, the dense thickets of multiflora rose (*Rosa multiflora*) and European privet (*Ligustrum vulgare*) found in woods, fields, and prairies shade out native plants. The spreading of non-native species can alter habitat structure, food web dynamics, and distribution of native species resulting in reduced

biodiversity, or species richness.

Fighting invasive species for space, light, water, nutrients, and food is only one of many challenges faced by native animal and plant species. Chemicals applied to land can leach into nearby streams, creeks, or ponds during storm events. Consumption of contaminated water or food resources can adversely affect wildlife health, reducing their chance of survival and reproduction.¹ Pesticides contribute to amphibian abnormalities, bird and fish kills, and pollinator and insect population declines.² In a nationwide US Geological Survey (USGS) survey, 90% of water samples collected from agricultural and urban streams tested positive for pesticides. The researchers found pesticides in a similar percentage of fish tissue samples. In waterways, the presence of pesticides alone does not always have a negative effect on aquatic life. The degree to which pesticides affect wildlife depends on dosage, the wildlife's proximity to application, number of applications, and how long the chemical persists in nature. Of the samples collected by USGS, pesticide concentrations in 57% of agricultural streams and 83% of urban streams exceeded the Environmental Protection Agency's (EPA) threshold for healthy aquatic life.³

Wildlife survives best in areas with abundant resources and safe habitats. Eliminating wild spaces, and implementing common practices used in conventional landscaping, will drive out local wildlife and encourage the spread of invasive species.

Nutrient Overload

Nutrients found in most commercial lawn fertilizers, especially phosphorus and nitrogen, can wreak havoc on ecosystems near the site of application and many miles away. Lawns cover 40 million acres, or 1.9%, of the United States, making turfgrass the largest irrigated crop, and potentially leading to exorbitant levels of fertilizer use.⁴ People often apply excessive amounts of nutrients to their lawns, which then wash into storm drains or directly into creeks and rivers. In addition to lawn care nutrients, stormwater carries toxic chemicals, sediment, and debris from streets and parking lots.

Every lawn is part of a watershed, an area of land that drains to one location. The land use (agricultural, urban, suburban, commercial, etc.) in a watershed and how this land is maintained can affect water quality in Indiana and hundreds of miles downstream in the Mississippi River. For

example, Indiana is the smallest state in the Mississippi River Basin Watershed (the largest watershed nationwide), but the 3rd largest contributor of phosphorus to the dead zone in the Gulf of Mexico, an area the USGS claims is devoid of aquatic life.⁵ As of 2011, this area has grown to 6,765 square miles, bigger than the state of Connecticut.⁶ Only the Baltic Sea contains a larger hypoxic zone.

Algal blooms, the result of severe nutrient runoff into waterways, pose a significant problem for Indiana. Algae can cover lakes and slow-moving streams, shading underwater plants. The lack of sunlight inhibits photosynthesis, or the process plants use to create oxygen and convert sunlight into energy for growth. Consequential oxygen depletion adversely affects aquatic life and often results in massive fish kills. Algal blooms also impair water quality and disrupt

healthy populations by altering natural food webs, and some algae create toxins that can be dangerous to human and wildlife health.⁷

In Indiana, a state known for its subpar water quality, a concerted effort is needed to limit nutrient runoff into waterways from numerous sources such as agricultural, commercial, industrial, and urban areas. Due to noticeable increases statewide in algal blooms from nutrient overloading, it is imperative that individuals and institutions alike choose the right fertilizer and best land maintenance practices.



A tall, warm-season native grass, Switchgrass (*Panicum virgatum*) creates good habitat cover and nesting space for wildlife. Switchgrass helps manage soil erosion when planted in herbaceous buffers.

Conventional Landscaping

The consequences of a conventional approach to design and landscaping highlight the need for a transformative shift to more ecologically sustainable campus grounds.

University landscape design should consider the needs of both humans and wildlife by exploring sustainable options.⁸ Impervious surfaces pervade most developed areas and create "heat islands," or localized areas of especially warm temperatures. This heat island effect can warm stormwater runoff and, consequently, water temperatures in streams, causing stress for aquatic wildlife. In particular, this change can slow metabolism and reduce reproduction among wildlife and also alter oxygen availability.⁹

Impervious surfaces also increase the amount of surface runoff, especially during strong storm events when large quantities of water quickly move off land causing soil to erode. Sediment can carry toxins and pollutants into the

water, largely affecting stream health. In a given watershed, impervious surfaces that cover as little as 10% of the land can cause stream degradation, according to the Federal Stream Corridor Restoration Handbook. In areas completely or three-fourths covered by impervious surfaces, 55% of the area's water becomes surface water runoff, whereas only 5% of the water deeply infiltrates the ground. Of the water in natural areas—areas with less than 10% of impervious surfaces—50% infiltrates the soil and only 10% becomes surface runoff.¹⁰ This difference indicates the importance of pervious surfaces, critical in keeping sediment and water on land longer. Pervious surfaces function to both decelerate surface water runoff and mitigate the heat island effect.



The sedum plants growing on this green roof in Muncie absorb stormwater and slow surface runoff. Green roofs naturally insulate and attract a variety of insects and birds.
Photo by White River Watershed Project

Aiming for carefully manicured lawns may be a landscaping and aesthetic norm, but schools should evaluate how their conventional landscaping practices affect regional ecosystems. Ideally, campuses will reduce lawn areas and replace them with an array of habitat types (prairies, meadows, wetlands, forest, etc). More practically, schools should find a healthy balance of turfgrass and natural habitat areas to create an attractive and wildlife friendly campus.¹¹

Solutions

To address the concerns mentioned above, IWF's *Landscaping the Sustainable Campus* will guide your school in creating a landscaping plan that blends innovative, sustainable techniques with conventional methods. Through this comprehensive framework, university faculty, staff, and students will work together to improve campus sustainability through wise landscaping. The five-pronged approach will include:

1. **Sustainable Lawn Maintenance & Landscaping**
2. **Pesticide/Herbicide Use Reduction**
3. **Invasive Species Eradication**
4. **Native Plant Species Selection**
5. **Water Conservation, Retention, and Recycling**

Successful conservation practices rely on a strong network of support and leadership to get the plan into action. Each campus will develop a specialized approach applicable to the needs of its particular landscape. Adopting a landscape sustainability plan is an important first move as a campus in conserving Indiana's native wildlife and quality resources.

THE PROGRAM

Schools participating in *Landscaping the Sustainable Campus* commit to creating and implementing a landscaping plan that integrates specific sustainable elements.

Your Campus, Your Goals

Schools will set goals and priorities depending on the level of certification they wish to achieve. A custom plan will be created based on the school's interests, needs, and resources. IWF will advise schools on which elements to incorporate into individual plans based on the current campus landscape. For schools that have already engaged in practices similar to those recommended by IWF, new or more advanced improvements to campus operations will be suggested. The flexibility of a customizable plan allows schools to work within their limitations and encourage project diversity among participating schools statewide. The project leaders and timeline will be set by the university staff.



Grasses such as Prairie dropseed (*Sporobolus heterolepis*) are often used in prairie restorations, providing food and shelter for wildlife.

Benefits of the Program

Landscaping the Sustainable Campus promotes diversity of Indiana's wildlife by guiding campuses to restore clean water and healthy habitats. By managing stormwater and nutrient pollution, restoration and conservation-focused campuses will greatly benefit Indiana's ecosystems. In addition to creating sustainable environments in which both humans and wildlife can thrive, this program provides several other advantages for schools including educational op-

portunities, economic value, public recognition, and sustainability certifications.

Educational Opportunities

Landscaping the Sustainable Campus not only increases campuses' ecological diversity; it transforms them into outdoor learning environments for students, administration, and community members. For example, campuses could use their revamped landscapes to teach students and visitors about pollinator species at risk, invasive species important to eradicate, and species interaction. University faculty could use the projects for lessons or interdisciplinary courses on sustainability. Understanding the interactions between humans and environment, and the associated roles played by technology, design, and collaboration, is critical for a sustainable future.¹² By demonstrating best conservation practices, university and college grounds set positive examples for residents and private homeowners. An ecologically friendly landscape that is also aesthetically pleasing can strengthen biodiversity and people's connections with nature, fostering an exceptional learning atmosphere.

As students guide their campus to a more sustainable approach, they will become the voice of landscape sustainability on campus. IWF highly encourages involving students in as many phases of the program as possible.

Economic Value

Sustainable landscape reduces long-term maintenance costs. Choosing a sustainable landscaping plan will reduce fertilizer, pesticide, and water consumption. Planting native perennials that survive from year to year and require less maintenance avoids the costs of planting short-lived, care-intensive annuals. Native plants use less water because they are adapted to climate conditions, reducing the need for irrigation systems. Their extensive root systems filter toxins and sediments before they reach lakes, rivers, and creeks. These strong root systems can effectively hold soil and reduce erosion, important in keeping natural habitats intact.¹³

The initial costs of implementing sustainable practices can be higher than conventional maintenance costs, but over time this investment pays for itself as illustrated by the following examples. In 2003, EPA transformed two acres of lawn into a sustainable habitat for wildlife by planting hundreds of native plants and sowing seeds. EPA estimated by using this approach, the financial savings per year was \$3,000.¹⁴ The University of Michigan installed an efficient irrigation system, saving \$141,000 annually and using 68% less water.¹⁵ Harvard University conducted a study in 2008 on a 1-acre sample plot, which it expanded to 25-acres, showing the benefits to soil health (presence of bacteria,

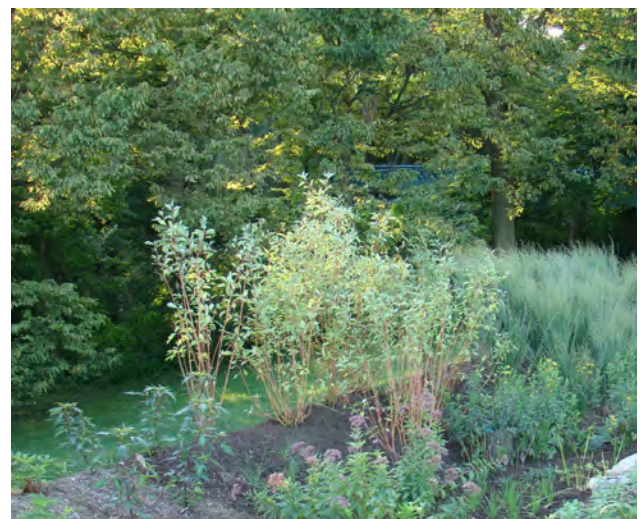
fungi, and microorganisms) created by forgoing the use of synthetic fertilizers and pesticides. Recycling yard waste (grass clippings, leaves) and composting organic matter for fertilizer, saves Harvard University \$45,000 annually.¹⁶

More locally, the Nature Conservancy's Indianapolis office installed a vegetated green roof, covering the 7,500 sq. ft. area with a mix of sedum. During storms, the water not used by the vegetation is collected in a 2,500 gallon cistern, reducing the building's water use by 83%.¹⁷

In each example, sustainable management practices that also protect natural resources contribute to significant long-term savings.

Public Recognition

Participating schools will be recognized on IWF's website and by the National Wildlife Federation for their strong commitment to sustainability. IWF will publish articles on campus projects in its quarterly magazine, *Hoosier Conservation*, and a variety of social media networks. Schools may choose to feature landscaping projects in campus newsletters, emails, or magazines. To promote sustainability among students, faculty, and staff, IWF will provide resources to help schools organize forums and events for discussing sustainable landscape strategies.



This rain garden at the Indianapolis Museum of Art collects stormwater runoff and improves water quality by removing pollutants, recharging groundwater, and preventing soil erosion.
Photo: Indianapolis Museum of Art

Additional Certifications

Qualify for USBGC LEED Certification

For those schools interested in or committed to pursuing USGBC LEED certification for their buildings, participating in *Landscaping the Sustainable Campus* will help achieve points toward certification. Several strategies apply toward LEED certification. For example, new construction and major renovations can receive credits for water-efficient

landscaping and protecting or restoring native habitats.¹⁸ Landscape elements complementing the LEED certification program are indicated with an (*) in the [PROGRAM CATEGORIES](#) section (see page 10).



This IWF-certified schoolyard habitat, located at Cold Spring Environmental School in Indianapolis, functions as a living laboratory for students to learn and explore.

[IWF Wildlife Friendly Habitat Certification](#)

Schools may also qualify for the IWF Wildlife Friendly Certification Program. IWF tailors the certification process to each property, and schools will receive professional assistance to develop strategies for meeting the four criteria of the program: minimizing environmental damage, planting native species, controlling invasive species, and connecting natural habitats. Many of these criteria can be met through *Landscaping the Sustainable Campus*. All certified properties will supply food, water, and shelter for wildlife throughout all four seasons. A fee is required for certification; it covers technical assistance and consultation from IWF's Wildlife Biologist. In addition, certified campuses will receive benefits such as public recognition and media opportunities, help organizing on-campus workshops and events, and continued access to resources, as well as a certification sign for the campus.

The Wildlife Friendly Certification Program was created to revitalize Indiana's struggling wildlife habitats. In neighborhoods, workplaces, or developing areas, property owners and planners can follow the guidelines established by the Wildlife Friendly Certification Program to create the kind of viable and sustainable habitat currently disappearing from Indiana. With assistance from IWF, properties can attract birds, insects, amphibians, and other wildlife, while providing valuable services to the property owners and local community. Successfully implemented projects will gain IWF's unique Wildlife Friendly certification, illustrating a commitment to defending Hoosier wildlife. IWF offers habitat certification programs for private land, public spaces, and areas under development.¹⁹

APPLICATION PROCESS

To be eligible for certification through this program, a school must accomplish the following:

[Meet to Discuss Goals](#)

IWF and the school must meet to discuss campus goals and limitations. Questions or concerns will be addressed at this point and throughout the process.

[Statement of Agreement](#)

The leader for this program, as determined by the campus administrators and staff, must sign a statement of agreement. This non-binding agreement states a school wishes to pursue the certification and acknowledges flexibility for a school to make changes to the landscape plan as needed and agreed upon by IWF.

[Sustainable Landscape Plan](#)

A participating school must create new or amend an existing comprehensive campus landscape plan to describe current landscape management practices, goals to incorporate and/or increase sustainable conservation practices, and an agenda for how the plan will be executed. The timeline for completing selected practices is determined by the school.

[Implementation of New Project\(s\)](#)

A participating school is requested to implement at least one new project, classified as a practice on the ground selected from [PROGRAM CATEGORIES](#) or suggested by a school and approved by IWF.

By design, the new project(s) will address surface runoff and/or add quality habitat space to campus property such as a prairie planting, riparian buffer restoration, or bioretention feature. Technical assistance and recommendations will be offered from IWF.

Current practices are eligible to count toward program criteria in addition to the new project(s) necessary for certification. Schools unable to complete this requirement must establish a plan to add sustainable elements to their landscape in the near future and meet criteria set forth in [Levels of Certification](#) as a minimum for certification.

[Final Meeting & Reporting](#)

To apply for certification, a school must submit the landscape plan and a detailed report explaining all new projects in accordance with the program. Schools will achieve certification upon approval of the plan, progress toward attaining goals, and a final visit with IWF.

CERTIFICATION

A school will be awarded certification once the application process outlined above is complete. As part of this program, a school can receive a sign stating the campus is a *Certified Sustainable Campus Landscape*. The level of certification will be determined by the number of practices completed from the five program categories.

Additional recognition is available, such as press releases, articles, and social media outreach. A website (www.indianawildlife.org/suscampus.htm) for this program has been created with the intent to share updates on campus projects and express congratulations to schools that earn certification. An article describing a school's efforts and progress can be published in the IWF quarterly magazine, *Hoosier Conservation*.

After certification and contingent on the school continuing to incorporate sustainable landscaping practices, technical assistance is available from IWF.

PROGRAM CATEGORIES

The following are specific actions suggested by IWF to achieve landscape sustainability. By design, some actions are less specific to allow flexibility when developing a strategy tailored to a particular school's objectives and resources. Schools can choose practices from the numbered lists, integrate them into their campus plans, and apply them toward the desired certification level.

Sustainable Lawn Maintenance & Landscaping

The school pledges to develop and implement a sophisticated plan for the monitoring and application of fertilizer. A simple soil test can determine nutrient concentrations and guide fertilizing plans.

1. Submit a letter of support for the Phosphorus-free Lawn Fertilizer Campaign to IWF. Create a Clean Water team online as part of the Clear Choices, Clean Water movement to track total phosphorus saved and encourage community support. Develop a sustainable lawn fertilizing plan that limits the use of excess nutrients, such as phosphorus. Consult the four Rs before fertilizing: right product, right rate, right time, and right place.²⁰
 - a. *Right product*: Conduct a soil test to determine the appropriate levels of nutrients for your lawn and understand the present conditions of your soil. Buy phosphorus-free lawn fertilizer for mature grass. For a new or nutrient deficient lawn, consider a fertilizer low in phosphorus.
 - b. *Right rate*: Avoid over-fertilizing by consulting the rate recommendations on the fertilizer bag.
 - c. *Right time*: Fertilize minimally, preferably in the fall. Never fertilize when the ground is frozen.

Levels of Certification

Schools may achieve different levels of certification by completing specified sustainability goals listed in the **PROGRAM CATEGORIES** section. Goals are cumulative: a school that has reached Level 1, for instance, should complete four more goals, including at least one from a new category, in order to reach Level 2.

Level 1: Wildlife Sponsor

Complete a total of four landscape sustainability goals from three categories

Level 2: Sustainability Advocate

Complete a total of eight landscape sustainability goals from four categories

Level 3: Conservation Champion

Complete a total of twelve landscape sustainability goals from five categories

- d. *Right place*: Use proper equipment, a drop spreader or rotary spreader, to apply fertilizer efficiently. Avoid fertilizing near water or impervious surfaces. Clean impervious surfaces (e.g. sidewalk, driveway) of any fertilizer spills or grass clippings to prevent them from reaching our rivers and creeks.
2. Mow higher (only top 1/3 of grass) to develop and maintain a strong root system, an important aspect of healthy soil. Healthy, established turf grass decreases soil erosion and helps keep nutrients on your lawn.
 3. Design a composting system to collect yard waste (grass clippings, fallen leaves, branches) and recycle it as mulch. This organic material already contains nutrients that microbes can release to replenish the soil. Rich soil absorbs and filters rainfall.
 4. Encourage students to lead research projects to determine the success of sustainable practices and consider innovative approaches to improve these practices on campus.

Pesticide/Herbicide Use Reduction

The school pledges to reduce chemical use on pests on campus property.

1. Develop an efficient and effective Integrated Pest Man-

agement (IPM) plan by selecting products that are least harmful to humans and the environment.* Begin implementation of the IPM plan.

2. Identify which pests to target and determine the best eradication approach for each pest. Use spot treatment, if needed, to control weeds and insect pests.
3. Avoid applying chemicals near water sources, especially areas prone to erosion, to keep toxic compounds from reaching aquatic ecosystems, and avoid applying them in high-traffic areas to reduce health risk to students.
4. Use alternative, chemical-free forms of weed and pest management such as insecticidal soap, weed removal by hand, and companion planting. Organize community members to help with weed pulling in major problem areas.
5. Reduce insecticide and herbicide applications at incremental rates of 25% over the next four years, with a goal of completely eliminating pesticide use on campus property.

Invasive Species Eradication

The school pledges to identify invasive plant species (described as those species aggressive in growth with a strong tendency to dominate natives), eliminate invasive species, and reduce use of exotic species, those not native to Indiana, on campus property.

1. Develop a removal strategy plan for all invasive species that sets goals for eliminating these species from specific areas of campus and creating healthy habitat structures.*
2. Minimize use of exotic plants by selecting Indiana native species for new or recently restored areas.
3. Preserve natural areas owned by the university, such as prairie or wetlands, through restoration efforts, and keep them free of non-indigenous plant species.*
4. Plan and host community stewardship days to help remove invasive species and teach community members and students about the importance of restoring habitats back to natural conditions.
5. Incorporate studies of invasive species into biology, botany, and ecology classes and fieldwork. When possible, offer these classes to students in various departments, such as landscape architecture or design.
6. Keep invasive species under control by conducting annual, or more frequent, assessments to determine the

* Strategies marked (*) could qualify as a credit for the USGBC LEED program, please see the program online for specific details at www.usgbc.org/LEED/.

best way to remove or prevent the spread of these troublesome species.

Native Plant Species Selection

The school pledges to incorporate native plant species into landscaped areas and increase the number of native plants on campus grounds.

1. Landscape areas disrupted by construction or renovation projects with only native tree, flower, and shrub species. Natives are better adapted to Indiana's climate and important for wildlife.*
2. In flower beds or gardens, gradually replace annuals with native perennials.
3. Plant native species along roadways and parking lots as filter strips to reduce toxic runoff from paved areas. Include native trees in your design to improve air quality and offer shade.
4. Install native plants, especially tall grasses, near lakes and streams to provide a natural buffer. Riparian buffers should be at least 35 feet wide; whereas herbaceous filter strips for areas prone to soil erosion should be 20 feet wide. Buffers also deter nuisance wildlife, such as Canada geese.
5. Add diversity to your campus by planting a variety of habitats—meadow, forest, wetland—and reducing lawn area. Introduce a wide range of plant species to provide year-round food and shelter for a variety of wildlife species.*
6. Connect habitat areas when selecting new sites for native plant installations to provide safe corridors for wildlife to travel and migrate. Large blocks of native habitats placed close together best facilitate animals' movement in search of food, water, and space.



Prairies filled with native grasses provide invaluable wildlife habitat and do not require extensive maintenance.

Water Conservation, Retention, and Recycling

The school pledges to conserve and recycle water used in campus landscaping.

1. Water turfgrass and plants only when necessary, preferably in the morning. Use in-ground moisture valves to determine when your landscape requires water. Watering in the afternoon can lead to evaporation, whereas watering at night encourages fungus growth in lawns and beds.
2. Install timers or quick shut-off valves on sprinkler systems to conserve water.
3. Use rain barrels or cisterns to collect stormwater for lawns and flowerbeds.*
4. Build rain gardens and vegetated bioswales to slow stormwater runoff, filter chemicals, and control erosion. Redesigning areas of turfgrass and impervious surface can help keep water on the property longer, recharge groundwater resources, and decrease the frequency or severity of sewer overflow events.*
5. Use pervious surfaces (paving stones, pervious concrete, porous asphalt) to reduce the amount of surface water runoff, which can collect nutrients and toxins from entering rivers and creeks. Reducing runoff will help alleviate stress on aquatic life.*
6. Install a vegetated “green roof” on suitable buildings to mitigate stormwater runoff and the effect of heat islands. Depending on the frequency of rainstorms and amount of precipitation, this type of roof can retain a large amount of stormwater runoff. The additional heat from dark roofs can contribute to an increase in water temperature, affecting wildlife species’ metabolism and reproduction. Other benefits of green roofs include reductions in energy use, air pollution from emissions, and human health risks.*



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On the leading edge of research and innovation, Indiana’s universities and colleges are perfect locations for sustainable landscapes. *Landscaping the Sustainable Campus* will engage students, creating an opportunity to educate the future generations of conservationists about the importance of preserving nature. Around the state, campuses can increase biodiversity by establishing a variety of habitats filled with native flora. With conservation practices in place, wildlife will benefit from improved water quality, soil health, and habitat space. IWF challenges your campus to become the next leader in landscape sustainability.

Start the discussion today by contacting the Indiana Wildlife Federation!

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 18. For detailed information, refer to the newest version of the LEED program at <http://www.usgbc.org/LEED/>.
 19. For a program brochure, please visit <http://www.indianawildlife.org/CertificationPrograms.htm>.
 20. *Responsible Fertilizer Practices*. (2010, June). Retrieved April 8, 2011, from Clear Choices, Clean Water: www.clearchoicescleanwater.org
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RESOURCES

Certifications

IWF Wildlife Friendly Habitat Program

<http://www.indianawildlife.org/wildlifeHabitat.htm>

This website has specific, detailed resources for the habitat certification program including an informational brochure and an explanation of the benefits to enrolling.

United States Green Building Council LEED Program

<http://www.usgbc.org/LEED/>

This certification program is adaptable to a variety of building types including commercial and residential. To earn certification, a building must meet certain requirements and improve specific features such as water efficiency, energy use, use of resources, etc. Check the latest version of LEED to see if your plan qualifies for credits specifically within the Sustainable Sites and Water Efficiency categories. Use the website to find information for [new construction and major renovation](#), [existing buildings](#), and the [Green Campus Campaign](#).

USGBC's Center for Green Schools (www.centerforgreen-schools.org) has great resources for [getting students involved](#) and [examples of LEED schools](#).

Demonstration Projects

Ball State University

<http://cms.bsu.edu/About/Geothermal/GreenCampus.aspx>

Ball State has committed to using only phosphorus-free fertilizers on campus lawns! The university has also replaced sections of lawn with native vegetation in order to improve water filtration and wildlife habitat, and it plans to install bioswales.

Butler University

<http://www.butler.edu/butler-goes-green/>

Butler's grounds crew uses a variety of innovative sustainability practices in their maintenance of the campus landscape, from using composted leaf and flower waste in planting beds to recycling the oil used in groundskeeping equipment.

DePauw University

<http://prindleinstitute.depauw.edu/>

DePauw's Prindle Institute for Ethics is LEED Gold-certified—its design features Indiana limestone and locally harvested trees. Also, the surrounding landscape incorporates a stunning diversity of native plants and its maintenance utilizes no lawn fertilizers, insecticides, or herbicides.

Earlham College

<http://legacy.earlham.edu/environment/content/landuseandstewardship.html>

Taking great care to reduce the impacts of its lawn care reg-

imen, Earlham fertilizes its campus's lawns only once a year and selectively applies herbicides only on its athletic fields. Earlham grounds rely almost exclusively on rainwater; only the athletic fields and new trees are irrigated.

Goshen College

<http://www.goshen.edu/news/pressarchive/09-07-10-native-plantings503.html>

Goshen is undertaking a massive campus landscape overhaul, transforming 55 acres of conventional lawn to native plantings over the next few years, resulting in major reductions in pesticide and fertilizer applications, water consumption, and mowing, while also creating abundant habitat for native pollinators and local wildlife on campus.

Indiana University

<http://homepages.indiana.edu/web/page/normal/14640.html>

IU, a 2009 Tree Campus USA, is an Indiana leader in natural preservation and remediation. The school does ecological remediation at two hazardous waste sites and has converted over one thousand acres of university-owned property to the IU Research and Teaching Preserve.

Indiana University-Purdue University Indianapolis

<http://www.sustainable.iupui.edu/>

Started in April 2011, the IUPUI Office of Sustainability will provide an opportunity for IUPUI to formulate a comprehensive plan coordinating current activities and future projects. To date, IUPUI has offered summer grants for sustainability projects such as installing rain barrels at the Glick Eye Center.

Marian University

<http://www.marian.edu/ecolab/Pages/default.aspx>

Marian utilizes only phosphorus-free fertilizers to maintain its lawns, and its campus includes a protected wetland area known as EcoLab used for student and community environmental education.

University of Notre Dame

<http://green.nd.edu/sustainability-at-nd/water/>

Notre Dame has upgraded to a water-saving irrigation system that automatically shuts off sprinklers in the event of rain and is installing flow meters in areas with high irrigation needs; the school expects to reduce its water consumption by 55% through these efforts.

Purdue University

http://www.purdue.edu/sustainability/pages/sustainability_initi.html

Purdue, with its extensive tree conservation program and participation in Tree Campus USA, actively protects the school's 8,000 trees from damage and requires that con-

struction projects impacting outdoor areas include a landscape protection plan. An extensive Purdue Arboretum is also in the works, and Purdue has pledged to go phosphorus-free in its fertilizer applications.

Sustainable Lawn Maintenance & Landscaping

IWF Phosphorus-free Lawn Fertilizer Campaign

<http://www.indianawildlife.org/phosphorus.htm>

As previously mentioned, nutrient overloading of waterways due to fertilizer runoff often results in devastating damage to local flora and fauna. IWF's Phosphorus-Free Campaign educates Indiana residents about the dangers of fertilizer runoff, in particular about the negative consequences of over-applying of phosphorus to lawns. Across the state, residents, companies, and schools have pledged to choose phosphorus-free fertilizers for their lawns, helping to protect Indiana's wildlife.

Clear Choices, Clean Water

<http://www.clearchoicescleanwater.org/>

Partnering with IWF to encourage the use of Phosphorus-free lawn fertilizer, this strategic outreach campaign raises awareness about the connection between lawn care practices and the quality of Indiana's lakes and streams. For the first year, the group focused on changing to phosphorus-free lawn fertilizer for mature turf grass. Clear Choices, Clean Water will choose a new landscaping-related action item each year. This website provides a variety of resources, including a video spot, P-free pledge, and list of phosphorus-free suppliers. When a campus signs our pledge online, it will go through this program.

Lawn Reform Coalition

<http://www.lawnreform.org/>

A great resource for all lawn owners, this website describes the basic needs of a lawn and offers environmentally-friendly techniques for establishing lawns.

US Department of Agriculture, Natural Resources Conservation Service (USDA NRCS), Backyard Conservation

<http://www.nrcs.usda.gov/feature/backyard/>

Here, NRCS provides recommendations for a number of conservation practices including mulching, nutrient management, water conservation, planting trees, etc. Implementing these suggestions can help restore an area and make it attractive to wildlife.

Data/Research

Indiana Department of Environmental Management, Blue-Green Algae

<http://www.in.gov/idem/algae/>

This government agency publishes notices on recent health concerns with algae and presentations on the problems of algal blooms. This website is useful for understanding the state's perspective on phosphorus in our ecosystems.

Indiana Lakes Management Society

<http://www.indianalakes.org/lawnCare.htm>

ILMS provides news updates and information concerning Indiana Lakes. This group works to conserve lakes along with the surrounding natural habitats through management, policy, and restoration efforts.

Indiana University Clean Lakes Program

<http://www.indiana.edu/~clp/index.php>

The Indiana Clean Lakes Program has been assessing phosphorus concentrations, and consequences for Indiana's waters, for over 20 years. Check current and past phosphorus concentrations on virtually all public lakes in Indiana, or read summaries of statewide conditions over the years.

IUPUI Center for Earth and Environmental Science

<http://www.cees.iupui.edu/index.htm>

This website contains information on Eagle Creek Watershed Alliance (ECWA) and the Upper White River Watershed Alliance (UWRWA) in addition to the work by IUPUI. CEES carefully studies algae and its correlation to nutrient pollution in Indiana. The group has focused much of its research on how phosphorus affects water quality and algae growth. Visit the CEES website for updates and information on water quality issues in Central Indiana.

Purdue University Turf Tips

<http://www.agry.purdue.edu/turf/>

Purdue's scientists have developed many projects examining turfgrass and Indiana soils. By studying local soil samples, researchers have determined that the majority of Indiana lawns do not require supplemental phosphorus. As part of Purdue's Turfgrass Program, this website has several publications with lawn care information. Refer to this information before you fertilize your lawn.

Gardening

Garden guides

<http://www.gardenguides.com/plants/>

This website helps with designing a garden, understanding harmful pests, and guiding the practice of organic gardening. This guide has useful articles and research for every level of gardening.

National Wildlife Federation, Garden for Life

<http://www.nwf.org/Get-Outside.aspx>

As IWF's national affiliate, this nonprofit organization has tremendous resources for outdoor activities including gardening. Part of their "Get Outside" campaign engaging kids to explore nature and provides suggestions for fun-filled days outdoors such as building bird feeders or creating a compost bin. Amongst these family friendly activities, NWF has recommendations for more advanced gardeners interested in conservation.

United States National Arboretum

<http://www.usna.usda.gov/index.html>

Horticulturists at this federal organization have developed resources to provide tips on everything from basic to advanced gardening.

Professional maintenance

Engledow Group

<http://www.engledow.com/>

A central Indiana company, Engledow has committed to be phosphorus-free on their company property. See their letter of support at www.indianawildlife.org/phosphorus.htm. Looking beyond choosing the right fertilizers, Engledow focuses on a number of sustainable practices as a professional, trusted expert in landscaping.

Hoosier Aquatic Management

<http://www.haminc.org/index.htm>

This company focuses on habitat restoration and erosion control to revive areas as natural, wildlife friendly habitats.

Scotts Miracle-Gro Company

<http://www.scotts.com/smg/home/home1.jsp>

This company promotes wildlife friendly landscaping by advising consumers to incorporate sustainable lawn maintenance practices and through their plans for a phosphorus-free Turf Builder line. They will continue to offer a starter fertilizer with phosphorus for establishing new lawns or repairing nutrient deficient lawns.

TruGreen

<http://www.trugreen.com/>

For several years, TruGreen has been a phosphorus-free company and well-established as a leader in sustainable, professional lawn care.

Soil testing

Purdue University, Soil Testing for Lawns

<http://www.agry.purdue.edu/turf/pubs/ay-18.pdf>

From the Purdue Turfgrass Science Program, this fact sheet explains how to take a sample of your soil and get it tested for nutrient levels.

Purdue University, Soil Testing Labs

<http://www.agry.purdue.edu/ext/soiltest.html>

Purdue has compiled a list of labs that test your soil to determine the current levels of nutrients and suggest the best fertilizer for your area.

Scotts Miracle-Gro Company, Soil Test Reports

<http://www.scottsoiltest.com/>

This lawn care company has a simple, quick soil testing program. If desired, they will send instructions for collecting a representative sample of your soil and the bag to mail the sample. After a few days, you can download the results that

indicate your soil's health and the recommended amount of nutrients to apply.

Pesticide/Herbicide Use

Office of State Chemist

http://www.isco.purdue.edu/pesticide/index_pest1.html

As a state agency with authority over pesticide use, this website provides information on the latest alerts of rules and articles of interest. This site hosts important information on regulations for professional applicators.

USDA NRCS, Pest Management

<http://www.nrcs.usda.gov/feature/backyard/pestmgmt.html>

This informative website describes how to identify pests and best manage pesticide use. NRCS covers a wide array of pests and suggests additional ways to control these problems without using pesticides.

US Environmental Protection Agency (EPA), Controlling Pests

<http://www.epa.gov/pesticides/lawncafe/>

This government agency supports an Integrated Pest Management program to reduce pest damage with minimal risk for humans. For lawn and garden care specifically, a natural approach with the concept referred to as Greenscaping is recommended. This program encourages a limited and targeted use of pesticides.

Invasive Species Eradication

Indiana Department of Natural Resources

<http://www.in.gov/dnr/3123.htm>

This state agency offers detailed information on the latest sightings of invasive species in Indiana and the best management practices for removing these species. Information on current task forces or councils designed to target eradication of invasive species is available.

Invasive Plant Atlas of United States

<http://www.invasiveplantatlas.org/list.html?id=98>

INPAWS provides a list of thirty-seven exotic species, with a description, background history, and pictures that are helpful in identification for each.

Midwest Invasive Plant Network

<http://www.mipn.org/>

This organization supplies great resources for ways to control and manage invasive species including how to prevent their spread and detect species early. Also online, this network presents how to form a Cooperative Weed Management Area and gives detailed examples from around the Midwest.

Purdue University, CAPS Program

<http://extension.entm.purdue.edu/CAPS/>

Annually, scientists at Purdue publish the "Most Unwant-

ed” Invasive Plant Pest List through the Indiana Cooperative Agricultural Pest Survey (CAPS). On this website, pests can be searched by county, habitat, or name. For each species of plant or insect, there is a description and pictures with more information.

The Nature Conservancy

<http://www.nature.org/wherewework/northamerica/states/indiana/>

This non-profit organization clarifies the basic understanding of exotic species and gives updates on specific species of interest. This website provides links to partner organizations that work to eradicate invasive species in Indiana.

USDA, Invasive Species

<http://www.invasivespeciesinfo.gov/unitedstates/in.shtml>

This website has specific information on invasive species for each state. Recent news articles and updates are easily accessible, helping visitors discover and understand the current threats.

Native Plant Species Selection

Cardno JFNew

<http://www.cardnojfnew.com/>

As ecological consulting company, Cardno JFNew focuses on restoration of ecosystems and conservation of natural resources. This company operates a native plant nursery; its Indiana office earned IWF’s Wildlife Friendly Certification. Use Cardno JFNew’s “NativeBrowser” to select which native plants are best for your area.

Earthly Goods

<http://www.earthlygoods.com/>

Located in New Albany, Indiana, this company sells an assortment of seed packets with natives, perennials, annuals, grasses, etc. The seed packets can be customized if desired, and all are laboratory-tested. Earthly Goods’s website provides helpful advice for planting, a monthly newsletter, and ideas for decorative landscaping elements.

Hamilton County Master Gardeners

<http://www.hcmga.org/>

As part of the Purdue Master Gardeners program, HCMGA offers information on how to make a habitat attractive to wildlife including butterflies and insects, ways to compost, and plants to consider based on the season.

Indiana Native Plant and Wildflower Society

<http://www.inpaws.org/>

INPAWS explains how to garden with native plant species, gives opportunities to volunteer, and details how to keep conservation in mind while landscaping.

Keep Indianapolis Beautiful

<http://www.kibi.org/>

This non-profit organization focuses on community improvement projects for Indianapolis often involving tree plantings. Details concerning their various programs are available online and useful to review when brainstorming how to engage the campus community.

Lady Bird Johnson Wildflower Center

<http://wildflower.org/plants/>

From the University of Texas, this resource helps expand knowledge on native wildflowers nationwide. Wildflowers native to Indiana can be identified in the plant database and conservation ideas (i.e. green roofs, sustainable lawns) are addressed.

Spence Restoration Nursery

<http://www.spencenursery.com/Index/home.php>

This company sells a variety of plant mixes depending on your habitat type and provides examples of projects featuring bioswale development, wetland restoration, lake enhancement, prairie establishment, and more.

US EPA, Green Landscaping

<http://www.epa.gov/greenacres/>

For ways to landscape with the environment in mind, this agency presents several educational resources and recommendations. EPA encourages, and explains the numerous benefits of, using native plants in landscaping.

Wild Ones

<http://for-wild.org/>

Focusing on native plants, Wild Ones has many resources on preserving biodiversity of natives, incorporating native landscaping, educating people about the importance of native species.

Water Conservation, Retention, Recycling

American Water Works Association, WaterWiser

<http://www.awwa.org/Resources>

AWWA offers publications on water conservation and utility efficiency through a database of research on sustaining water while keeping it safe for professionals and general interest.

Green Grid

<http://www.greengridroofs.com>

This company has installed green roofs at the Indianapolis Children’s Museum and Ball Memorial Hospital in Muncie. Pictures are available for many projects. Additional information on the benefits of green roofs are discussed.

Hoosier Heartland RC&D Council

<http://www.hhracd.org/urban.htm>

This organization has published an excellent brochure depicting the steps for building a rain garden including what to consider before construction, how to select plants, and

suggestions for maintenance.

Indiana State Department of Health, Water Conservation

<http://www.in.gov/isdh/23257.htm>

The Department of Health suggests common ways to reduce water use around the house and outside. Statistics as to how much water is used for daily activities illustrate the magnitude of damage caused to the environment and utility systems when water is inefficiently managed.

Indianapolis Museum of Art, Rain Garden

<http://www.imamuseum.org/gardens-grounds/museum-grounds/rain-garden>

The Indianapolis Museum of Art installed a rain garden near the greenhouse to collect stormwater runoff from the nearby parking lot. This garden will help recuperate good water quality by removing toxins and reducing soil loss.

Irrigation Association

<http://www.irrigation.org/>

Irrigation Association is a key resource to guide professionals in water management by providing research reports, technical tools, and practices for a more efficient and effective use of water. This website promotes Smart Irrigation Month in July, a project to help the general public understand sustainable water-use practices.

National Geographic, Freshwater

<http://environment.nationalgeographic.com/environment/freshwater>

National Geographic promotes the understanding of freshwater resources worldwide and how best to preserve these supplies. Its educational tools focus on ways to take action and give accounts of practices in place around the world.

Purdue University, Irrigation Practices

<http://www.agry.purdue.edu/turf/pubs/ay-7.pdf>

The turfgrass specialists at Purdue provide basic information on the best irrigation practices including how often to water, how much to use, and how to adapt to uneven land. This fact sheet helps explain how to efficiently water turf grass.

Rain Garden Registry

<http://www.raingardenregistry.com/>

Muncie/Delaware County Stormwater Management partners with Spence Restoration Nursery to give five different design ideas for rain gardens based on color preference and amount of sunlight. Regardless of the design, these gardens will successfully attract wildlife such as birds and butterflies. Additionally, information on rain barrels is provided.

SustainIndy, Department of Public Works

<http://www.indy.gov/eGov/City/DPW/SustainIndy/>

Supporting sustainability in Indianapolis, this program's website has information on several projects including the green roof at the Nature Conservancy Indianapolis office and a bioretention cell near Fall Creek. Ideas for how campuses can collaborate with surrounding communities can be gathered from these city projects.

US EPA, Low Impact Development (LID)

<http://www.epa.gov/owow/NPS/lid/>

EPA lists a number of helpful resources for learning more about low impact development, a sustainable approach to stormwater management. Of particular interest is the Urban Design Tool that explains techniques such as pervious pavers, bioretention cells, bioswales, and cisterns.

US Geological Survey, Water Resources of Indiana

<http://in.water.usgs.gov/>

This resource center has extensive real-time and historical data concerning water quality, streamflow, and groundwater. Reviewing this data is critical to understanding the water resources located in your watershed.

Water Use It Wisely

<http://www.wateruseitwisely.com/>

A list of more than 100 ways to conserve water sparks ideas and interest in water conservation. This site hosts ample resources on regional conservation organizations, xeriscaping, irrigation, efficient appliances, rainwater harvesting, and more water-related topics.

Waterscapes by Landesign

<http://www.waterscapesbylandesign.com/>

This company is located in Indiana and designs water features. On this website, rain barrels and other products such as pumps and filters can be purchased. If purchased through IWF, a portion of the proceeds are given to IWF.