GREEN INFRASTRUCTURE A

WILDLIFE HABITAT

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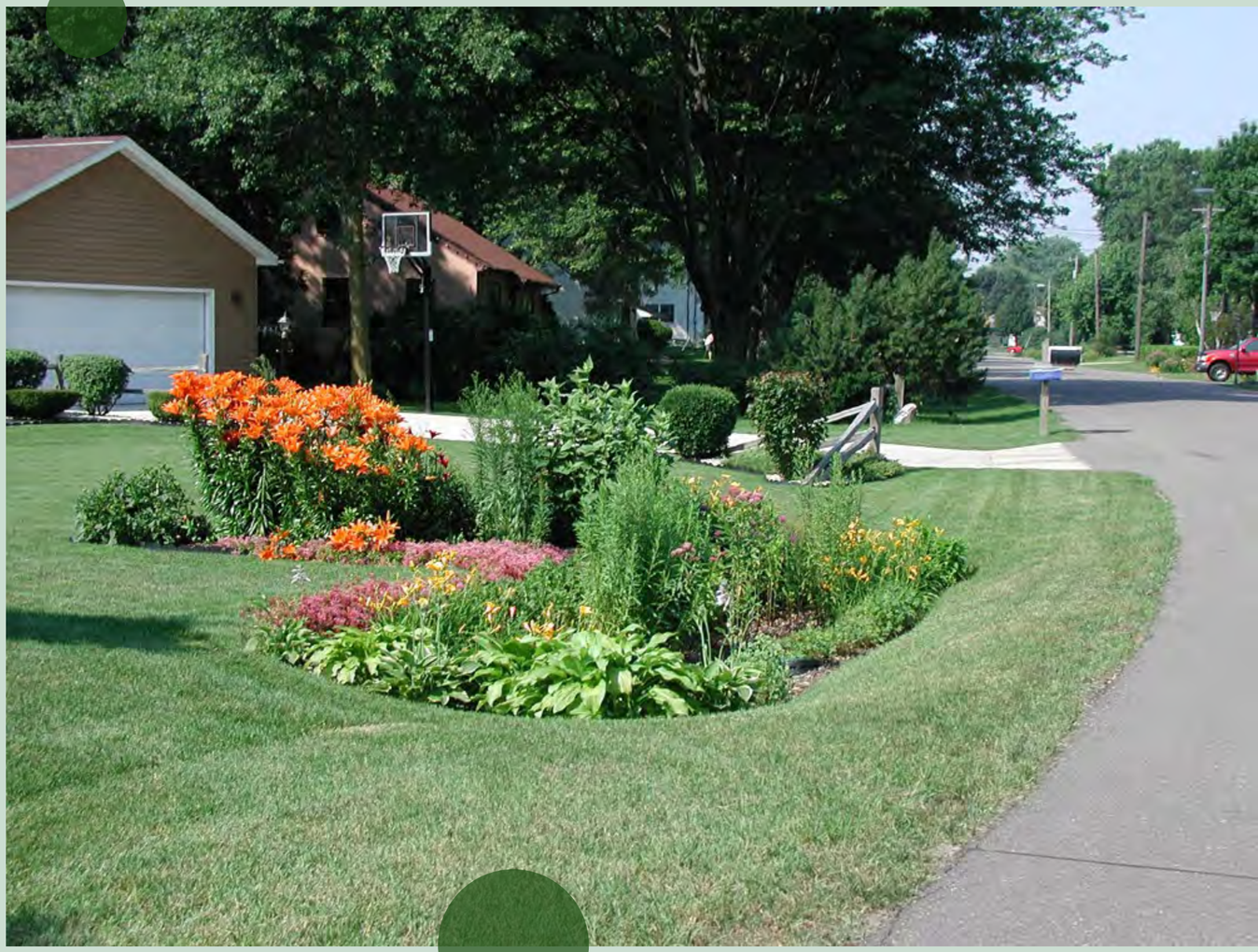
GREEN INFRASTRUCTURE AS
WILDLIFE HABITAT

WELCOME TO OUR PRESENTATION

Green infrastructure can provide many benefits including:

- Stormwater storage
- Water quality treatment
- Improved neighborhood aesthetics
- Wildlife habitat



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GREEN INFRASTRUCTURE AS
WILDLIFE HABITAT

Definition of Green Infrastructure

"the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters."

- 2019 Federal Water Infrastructure Improvement Act

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Golden Meir Library

Green Roofs

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Green Roofs

Traditional sedum plantings

University of Wisconsin – Milwaukee
School of Freshwater Science

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Kaiser Center Roof Garden
Oakland, CA
built in the 1960s

Green Roofs

Enhanced green roofs with trees, shrubs, and even water features

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Rain Gardens

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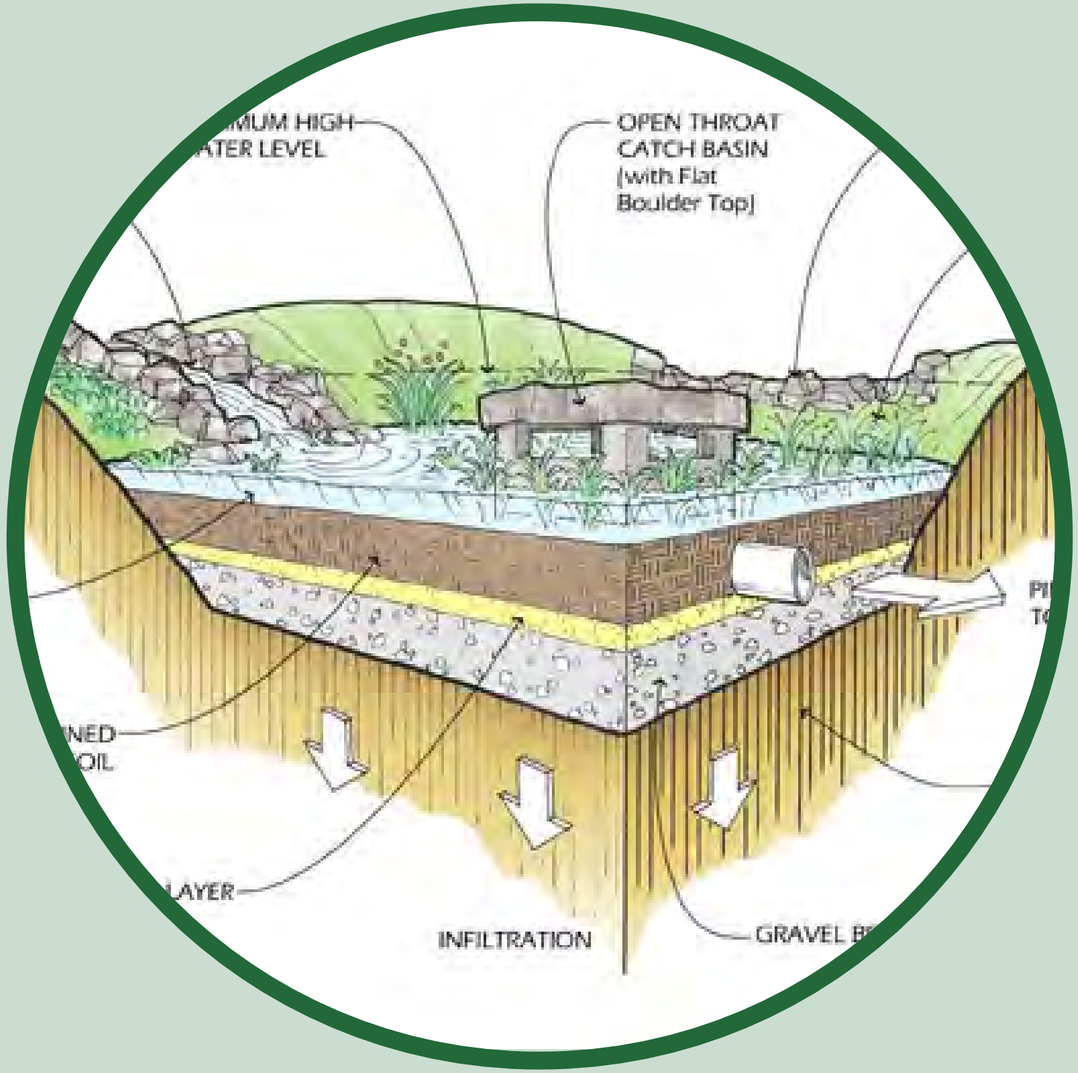

Rain Gardens

Systems that infiltrate stormwater trough an engineered soil and discharge directly into the ground or through an underdrain system.

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Rain Gardens

Systems that do not filter water through the soil but store water on the surface and act as stormwater detention systems

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Bio-Swales

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Treatment Wetlands

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So Why Design Green Infrastructure for Wildlife?

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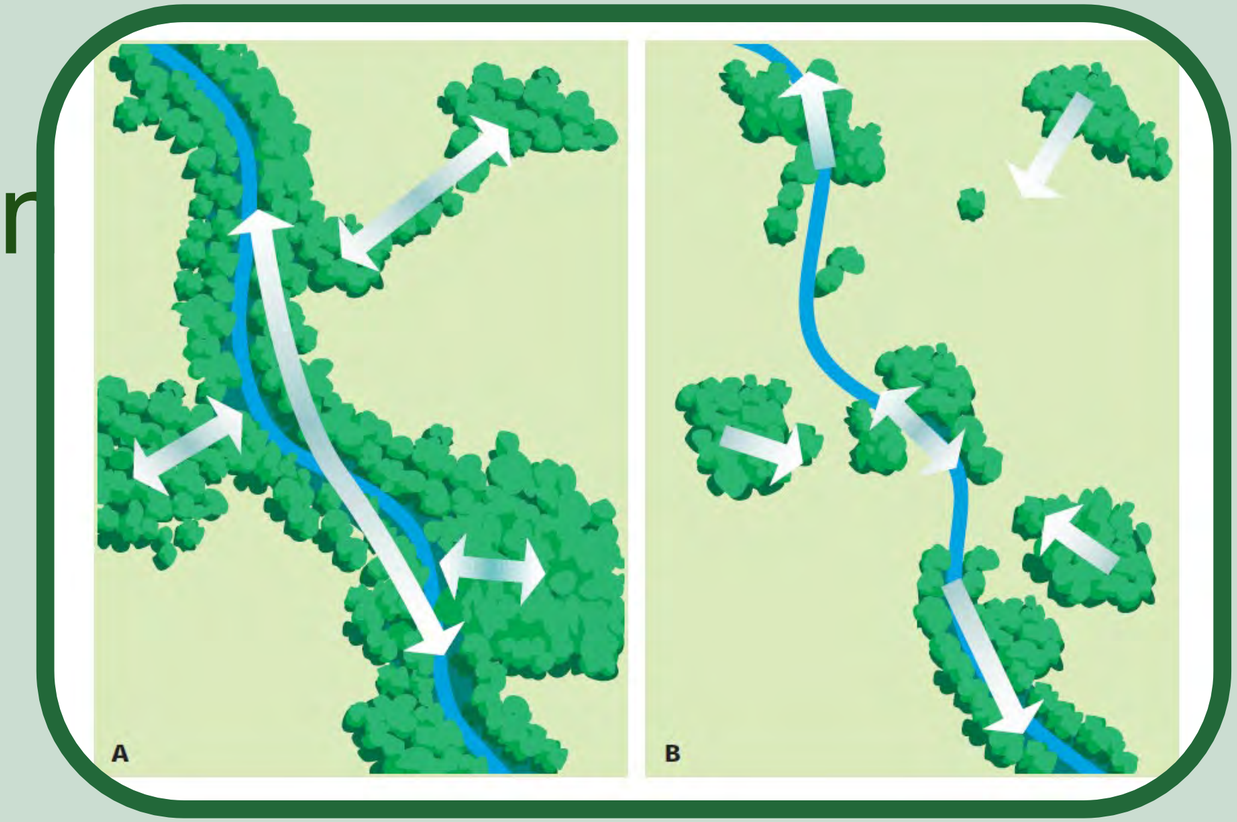
So Why Design Green Infrastructure for Wildlife?



Urban areas are unfriendly environments for wildlife in part due to the fragmentation of habitats.

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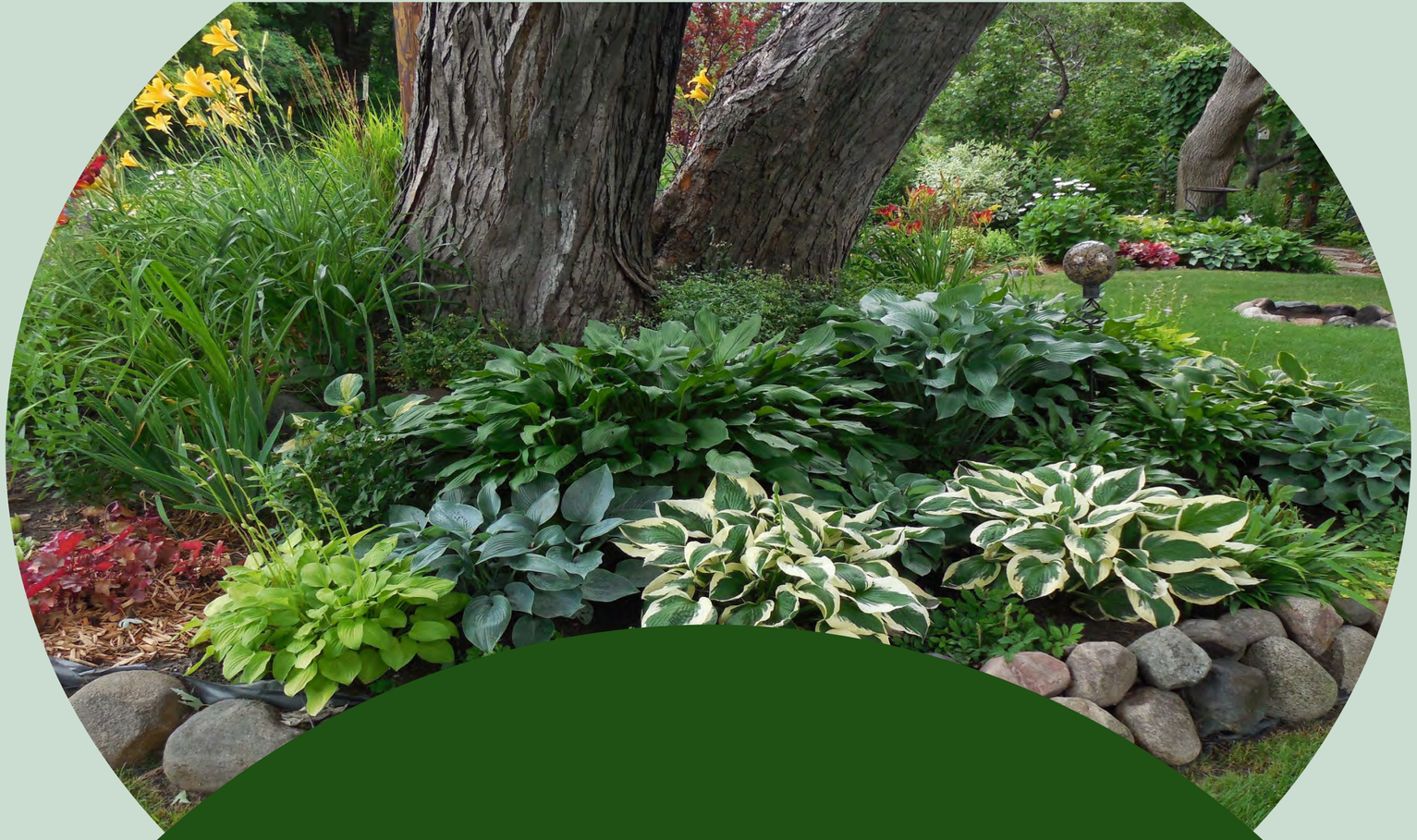

If we could connect isolated wildlife habitats through backyard landscaping, we could reduce the fragmentation in urban environments.

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GREEN INFRASTRUCTURE AS
WILDLIFE HABITAT

OUR VISION

If everyone reduced their lawn and landscaped with more native plants, we could have more livable cities with:

- **Better air quality**
- **Reduced heat island effects**
- **Better water quality**
- **Reduced crime**
- **Better wildlife habitat**

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So Why Design Green Infrastructure for Wildlife?

If you were a migrating bird which neighborhood to the right, would you stop in?

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Green Infrastructure
as Wildlife Habitat

WHAT DO ALL ANIMALS NEED?

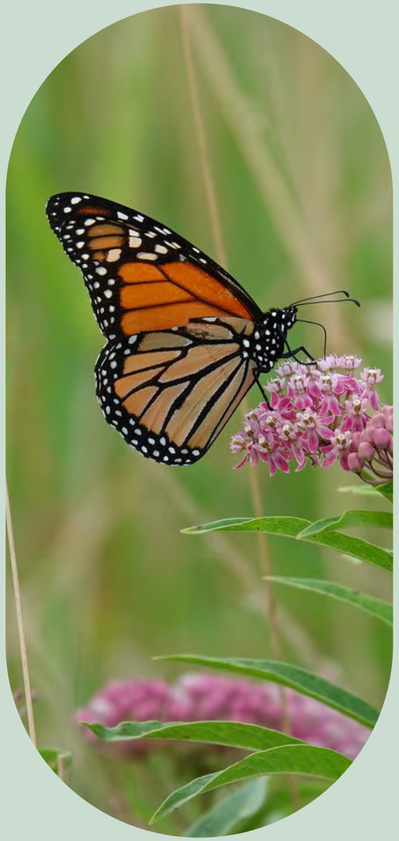
Food

Water

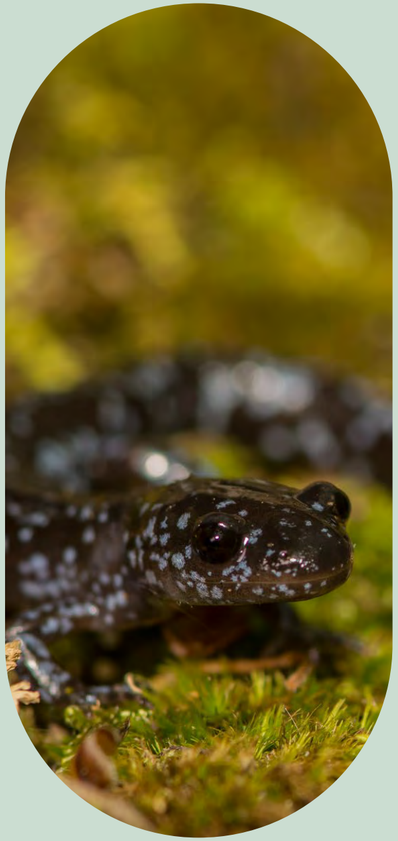
Shelter & Breeding Sites

Birds

Mammals



Insects
(Pollinators)



Amphibians

Reptiles

Green Infrastructure as Wildlife Habitat

TYPES OF WILDLIFE

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Green Infrastructure as Wildlife Habitat

FOOD SOURCES

Plants

Nectar, Pollen, Leaves

Seeds & Berries

Insects &

Other Animals

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Green Infrastructure as Wildlife Habitat

FOOD: PLANT LEAVE

- Common food source for insects and mammals.
- Diversity is key.

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GREAT WOODY CATERPILLAR HOST SPECIES

White Oak

River Birch

Thimbleberry

Prairie Rose

Chokecherry

Prairie Willow

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GREAT HERBACEOUS CATERPILLAR HOST SPECIES

Showy Goldenrod

Short's Aster

Wild Strawberry

Leadplant

Common Bur Sedge

Wild Lupine

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FOOD: NECTAR

- Food source for insects, a few bird, and mammals.
- Again diversity is important.

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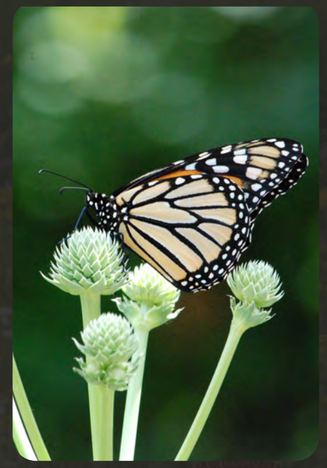
Danielle Bell/Native Roots

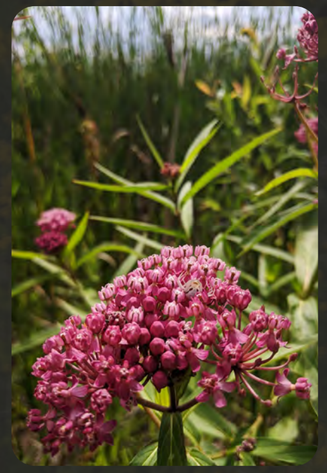
Green Infrastructure as Wildlife Habitat

NECTAR PLANTS

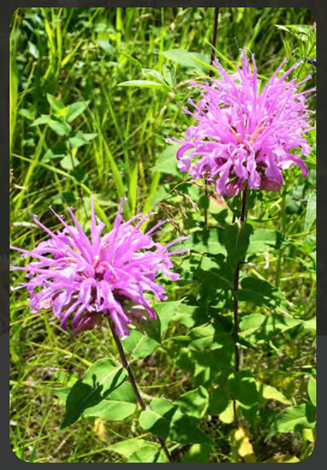
Cardinal Flower



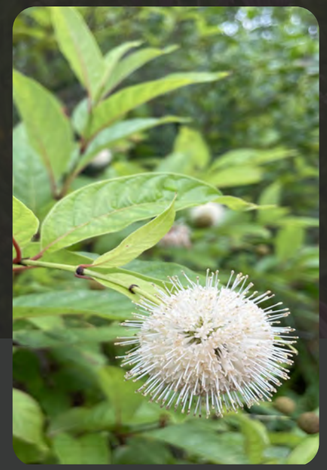
Rattlesnake Master



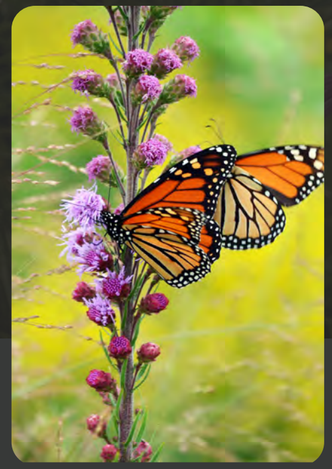
Marsh Milkweed



Wild Bergamot



Buttonbush



Any Blazing Star

Green Infrastructure as Wildlife Habitat

FOOD: POLLEN

Common food source for some types of insects

Includes bees, wasps, ants, flies, butterflies, moths, beetles, mites, plus opportunistic species

Once again diversity is key

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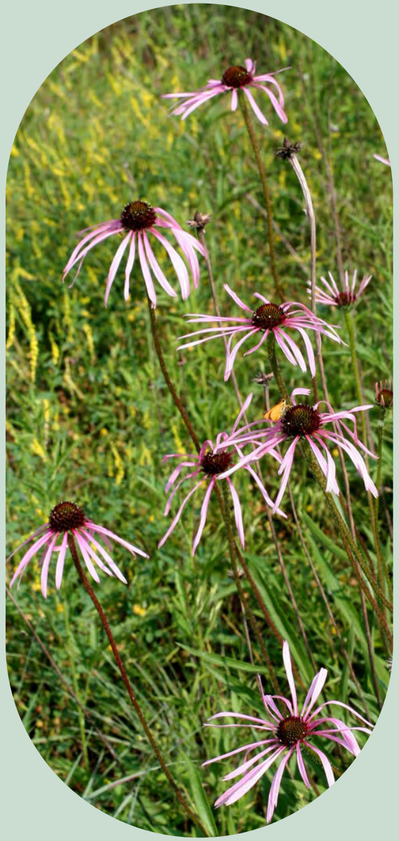
Prairie Willow

Cream Wild Indigo



Pale Purple Coneflower

Showy Goldenrod

Smooth Blue Aster

POLLEN PLANTS

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FOOD: INSECTS & INVERTEBRATES

Texas.713 via Flickr

Richy! via Flickr

- Food source for reptiles, amphibians, birds, insects, and mammals.
- By having plants to support insects, you are supporting other wildlife.

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Green Infrastructure
as Wildlife Habitat

FOOD: BERRIES & SEEDS

- Food source for many birds, mammals, insects, and sometimes even people!

Green Infrastructure as Wildlife Habitat

BERRY & SEED PLANTS

Fragrant Sumac

Nannyberry

Gray Dogwood

Black Chokeberry

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WATER

- Small or large
- Dew on plants
- Ponded water in swales, treatment wetlands, and rain gardens
- Duration and size water determines wildlife
  - Water can be added in a variety of ways to traditional GI to enhance wildlife value
  - Pool before entering rain garden
  - Drain placement to allow limited pooling

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Mathew Fells

Danielle Bell/Native Roots

Green Infrastructure as Wildlife Habitat

SHELTER

- Depends on size and plants.
- Even small areas can serve as nesting and overwintering sites for insects.
- With more area, bird nesting locations.
- More options by including shrubs and trees.

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Green Infrastructure as Wildlife Habitat

SHELTER

- Bare soil- Insects.
- Dead stems- Insects.
- Dead leaves- Lots of insects, amphibians, and reptiles.
- With insects comes food for other animals.

Lydia Fravel

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SHELTER: MANMADE

- Greatest diversity with natural shelter.
- Constructed are good option when not possible.

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TIMING

- Ensure bloom throughout the growing season.
- Early bloomers important.

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COMBINATION

- Support food webs.
- Closer to natural communities.
- Larger impact when combined when in areas with other wildlife habitat characteristics.

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MINIMIZE CHEMICALS

- Many herbicides and pesticides kill non-target species.
- Disrupt communities.

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Eric Fidler

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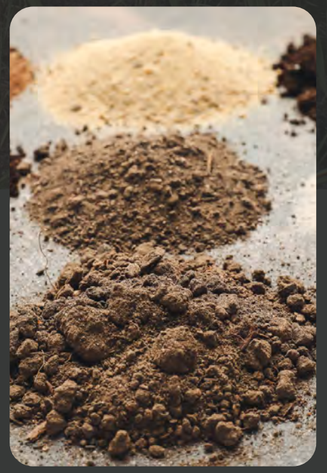
CONSIDERATIONS FOR PLANTS

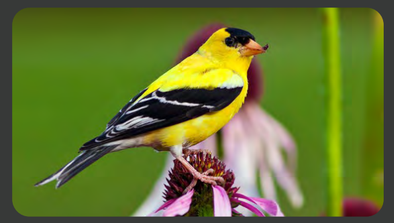
Type of GI

Salt

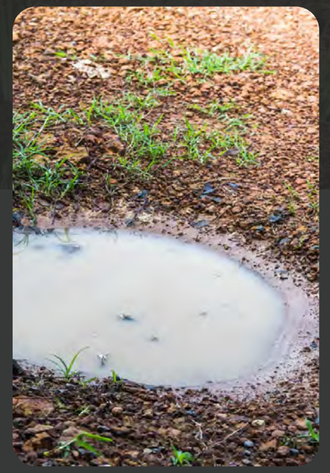
Sun



Type of Soil



Wildlife to Attract



Moisture

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Planting Zones

- Not one sizes fits all.
- Depends on type and location.

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Develop a Planting Plan

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Develop a Planting Plan

Consider different levels of plantings within the basin.

https://stormwater.pca.state.mn.us/index.php/Minnesota_plant_lists

Minnesota Stormwater Manual

Search | Search Help | Log in

Minnesota plant lists

Page Content

This page introduces sources for the selection of plants for stormwater BMPs, salt tolerance, green roofs, and trees.

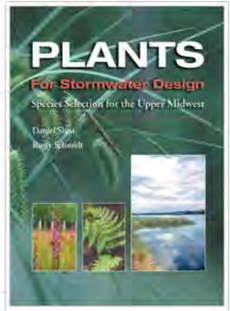
Example of a rain garden planted with native vegetation.

Plants for Stormwater Design

An excellent resource applicable to a wide variety of vegetated BMPs, including bioretention BMPs, is ***Plants for stormwater design*** by Shaw and Schmidt (2003).

- Section 1: Table of contents; acknowledgements; intro; using guide; environmental influences on plants; plant considerations and species for stormwater management practices; stormwater management practices; literature cited.
- Section 2: Table of plant species included in guide; range of applicability map; plant species descriptions, genera A–E.
- Section 3: Plant species descriptions, genera F-S.
- Section 4: Plant species descriptions, genera T-Z; plant descriptions bibliography; appendix 1: planting and maintenance recommendations; appendix 2: vegetation and hydrology data for 3 Twin Cities stormwater projects.

Information: Information on plants for green roofs has been updated. This updated information is summarized below. See green roofs or trees.



Links

Below are links to additional pages in this manual that address plants.

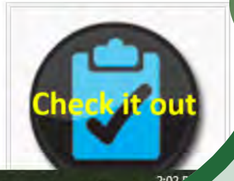
- Salt tolerant plants
- Pollinator friendly Best Management Practices for stormwater management
- Bioretention
- Trees

Sources for stormwater BMP plant material selection

The following agencies provide up to date information on plant material selection for vegetated stormwater BMPs .

- Minnesota Pollution Control Agency
- Rice Creek Watershed District: click on the Best Management Practices browser
- Minnesota Department of Transportation - Seeding manual, 2014 edition
- Minnesota Board of Water and Soil Resources: native vegetation and seed mixes

There are two specific situations in which these above sources should not be used: high salt concentrations (in spray and soil) and green roofs. Recommendations on salt tolerant and green roof plant material selection are given below.



NAVIGATION
Main page
Table of contents
Index (Categories)
What's new
Response to comments
Future updates
Events
In the News
Funding
Recent changes
Help
Export to pdf

TOOLS
What links here
Related changes
Special pages
Printable version
Permanent link
Page information

MPCA LINKS
MPCA Homepage
Stormwater
Policies / Disclaimers

Type here to search

78°F Mostly sunny

[Minnesota plant lists - Minnesota Stormwater Manual (state.mn.us)]

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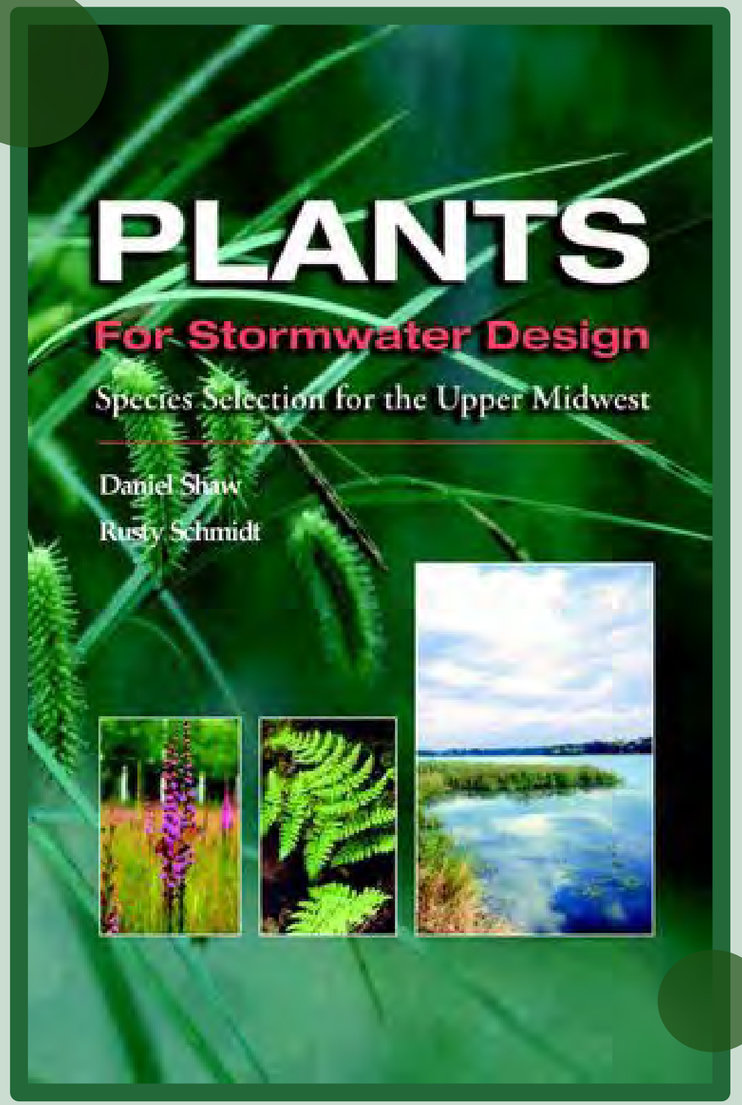
Develop a Planting Plan

Plants for Stormwater Design
Species Selection for the Upper Midwest

- by Daniel Shaw and Rusty Schmidt
- Published by the Minnesota Pollution Control Agency
- Full color, 370 pages. Includes detailed information for 131 plant species.
- $39.50



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RAIN GARDEN PLANT GUIDE

Use this guide to select the best plant mix for your Rain Garden

MMSD
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Bird and Butterfly Mix	Height	Bloom	Color
Wildflowers			
Wild Columbine: *Aquilegia canadensis*	1-3'	Apr-June	Pink/Yellow
Cardinal Flower: *Lobelia cardinalis*	3-5'	July-Sept	Red
New England Aster: *Aster novae-angliae*	3-6'	Sept-Oct	Light Purple
Butterfly Weed: *Asclepias tuberosa*	2-3'	Jun-Sep	Orange
Blue Vervain: *Verbena hastata*	3-5'	Jul-Sep	Blue/Purple
Grasses/Sedges			
Switchgrass: *Panicum virgatum*	4-6'	May-Sep	

Wild Columbine: Flower and Leaves

New England Aster: Flower and Leaves

Blue Vervain: Flower and Leaves

Cardinal Flower: Flower and Leaves

Butterfly Weed: Flower and Leaves

Switch Grass: Full-Grown Plant and Leaves

[Green Infrastructure - Manage water where is falls - MMSD]

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GREEN INFRASTRUCTURE AS
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MONITORING AND MAINTENANCE

Green infrastructure are gardens, and like all gardens will require monitoring and maintenance to fully function.

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Monitoring and Maintenance

If facilities are properly planned and designed (*protected from sediment and compaction and incorporating a sufficient pretreatment area*), a rainwater basin is likely to retain its effectiveness for well over 20 years.

Table 1. Typical Maintenance Activities for Bioretention Areas

Source: Center for Watershed Protection, 2001

Activity	Frequency
Water plants	As necessary during first growing season
Water as necessary during dry periods	As needed after first growing season
Re-mulch void areas	As needed
Treat diseased trees and shrubs	As needed
Inspect soil and repair eroded areas	Monthly
Remove litter and debris	Monthly
Add additional mulch	Once per year

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Monitoring and Maintenance

Watering to maintain lush vegetation is necessary. Even though they are stormwater facilities, between storms because of the engineered soil and drains they tend to be dry environments and need watering between storms.

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MONITORING AND MAINTENANCE

For watering, consider a capture and reuse system. Why not capture some of that treated stormwater and reuse it to water the garden.

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Monitoring and Maintenance

The facility should be inspected annually for sediment trapped in the pretreatment area and in the garden itself.

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MONITORING AND MAINTENANCE

Also, inspect after major rainstorms. Prolonged standing water will reveal whether the engineered soils or underdrains are clogged, and warrants replacement and possibly the system to be started over (possibly with salvaged plants).

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Monitoring and Maintenance

Invasive species need to be controlled as soon as they are discovered to prevent them from spreading in the device or to other places.

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MONITORING AND MAINTENANCE

In the first year, rainwater gardens require vigilant weeding (monthly during the growing season). The need for weeding will decrease as plants become established.

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Monitoring and Maintenance

In the spring, standing dead plant debris will need to be removed.

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MONITORING AND MAINTENANCE

Leave plants standing in the winter as these provide shelter for insects and wildlife.

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Monitoring and Maintenance

Trees and shrubs should be pruned as necessary to keep a neat appearance and maintain the health of the plants.

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MONITORING AND MAINTENANCE

Note: that some plants like ornamental grasses may be more aggressive, therefore if you want to maintain a showier appearance you will need to periodically replace plants.

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Monitoring and Maintenance

Control of unwanted wildlife, like deer, rabbits, wood chucks, mice, or muskrats, maybe needed to protect important plants.

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MONITORING AND MAINTENANCE

A Good Inspection Form:

- Is specific to the type of BMP.
- Has a checklist of what to look for.
- Rates the condition of major components.
- Has a list of repair & maintenance strategies.
- Has a section for inspector notes.
- Includes photos.

nent C: Bioretention Basin BMP Inspection
Waukesha County, Wisconsin

me: _____ Inspection Date: _____

Description: _____ BMP ID Number: _____

Code Key:

N/A = Not Applicable	M = Monitor (potential for future problem)	NP = Not a Problem	WN = Work Needed

INFLOW POINTS

Assessment	Code	Comments
Obstruction: vegetation/debris/sediment		
Erosion/undercutting		
Structural condition		
Other (describe)		

PRETREATMENT AREA

Assessment	Code	Comments
Sediment accumulation & debris		
Bare soil/erosion		
Invasive vegetation		
Other (describe)		

BIORETENTION CELL

Assessment	Code	Comments
Standing water		
Sediment & debris accumulation		
Vegetation height/type		
Bare soil/erosion		
Invasive vegetation (estimate a %)		
eds/algae cover (estimate a %)		
s breaking down or floating away		
oil is plugged		
ndition		

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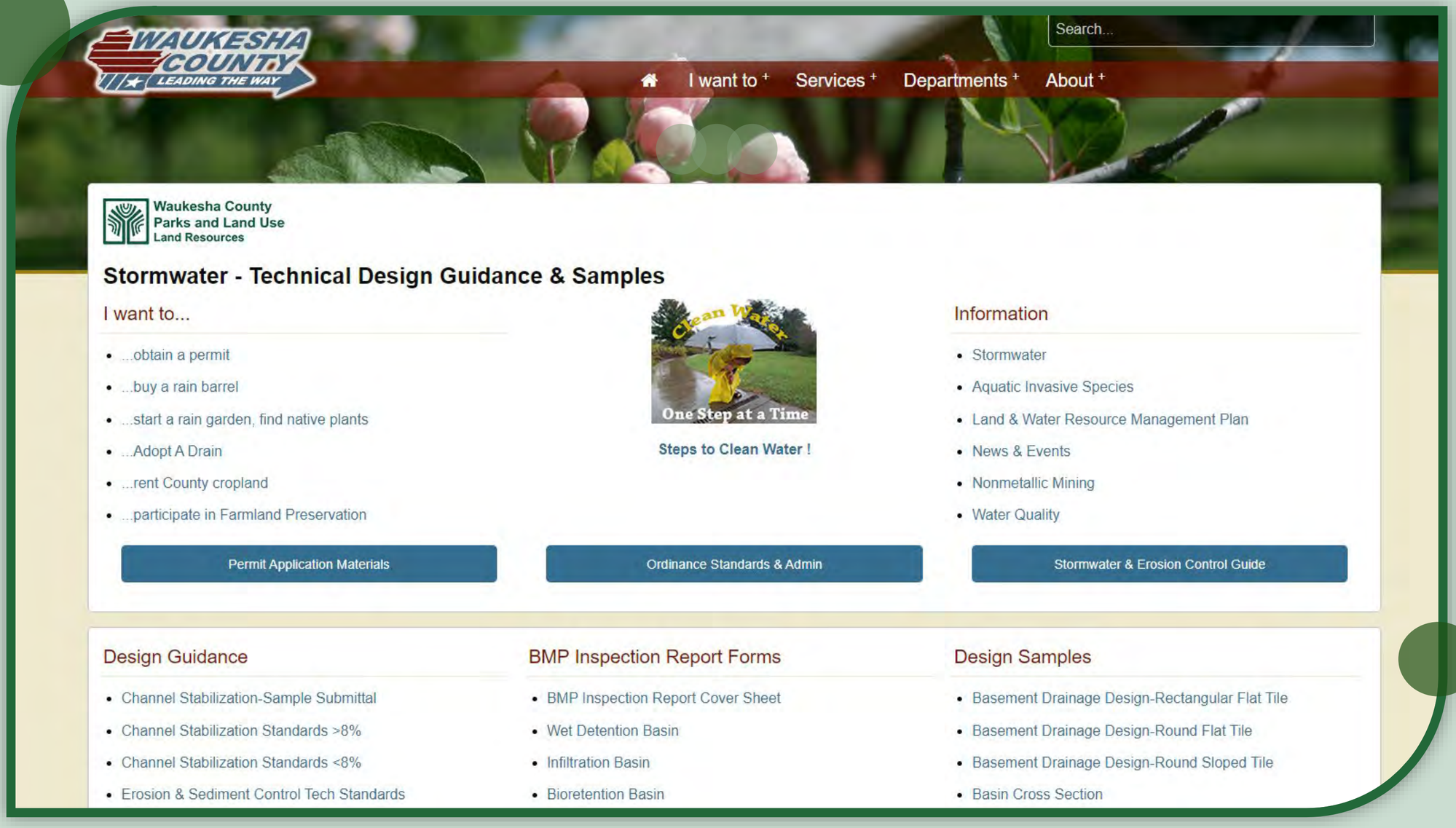

https://www.waukeshacounty.gov/landandparks/land-and-water-conservation/stormwater/stormwater-technical-design/

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Funding and Technical Assistance Opportunities

01. Milwaukee Metropolitan Sewerage District- Green Infrastructure Partnership Program

02. Wisconsin Department of Natural Resources– Surface Water Grants

03. Fund for Lake Michigan

04. Sustain our Great Lakes

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Funding and Technical Assistance Opportunities

05. Sweet Water– Mini Grants

06. Root-Pike Watershed Initiative Network

07. Green Schools Consortium of Milwaukee

08. Reflo - Sustainable Water Solutions

09. Fresh Coast Guardians Resource Center

10. Talk to your municipality

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GREEN INFRASTRUCTURE AS
WILDLIFE HABITAT

CONCLUSTION

With good design green infrastructure can serve many functions from:

- Stormwater storage,
- Water quality treatment,
- Improved neighborhood aesthetics,
- but also, Wildlife habitat

Western Great Lakes Bird & Bat OBSERVATORY

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THANK YOU

GREEN INFRASTRUCTURE AS WILDLIFE HABITAT

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