Healthy Lakes and Rivers –
5 simple best practices for clean water & wildlife habitat

Your shore—your lake.

Three Lakes Waterfront Association

- Feb. 27th, 2021

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Wisconsin Lakes Partnership

UWEX Extension

Extension UNIVERSITY OF WISCONSIN-MADISON

University of Wisconsin-Stevens Point
College of Natural Resources

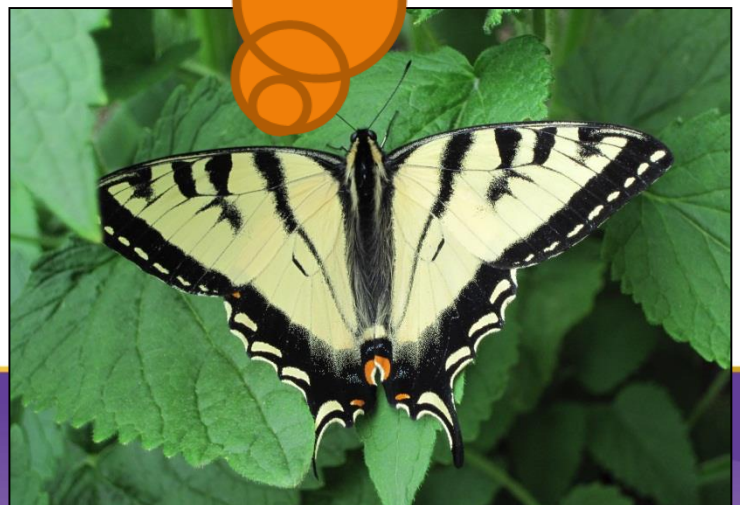
Talk outline

Healthy Lakes and Rivers Initiative overview:

- How did we get to championing this initiative?
- 5 simple best practices – holistic approach to property management

1. Technical assistance and guidance [via fact sheets and companion documents that coach landowners through best practice use];
2. Discuss scale challenge;
3. DIY option - take technical assistance tools and run with it vs. grant support
4. Helping lakeshore property owners solve problems on their shorelands while controlling runoff and/or bolstering habitat

- Review simple best practices and guidance documents: fish sticks; 350 ft.^{2} native plantings; rock infiltration; diversion; rain garden
- Grant requirements / timing
- Share web site
- Q and A



Values and functions of an intact & vegetated lakeshore area

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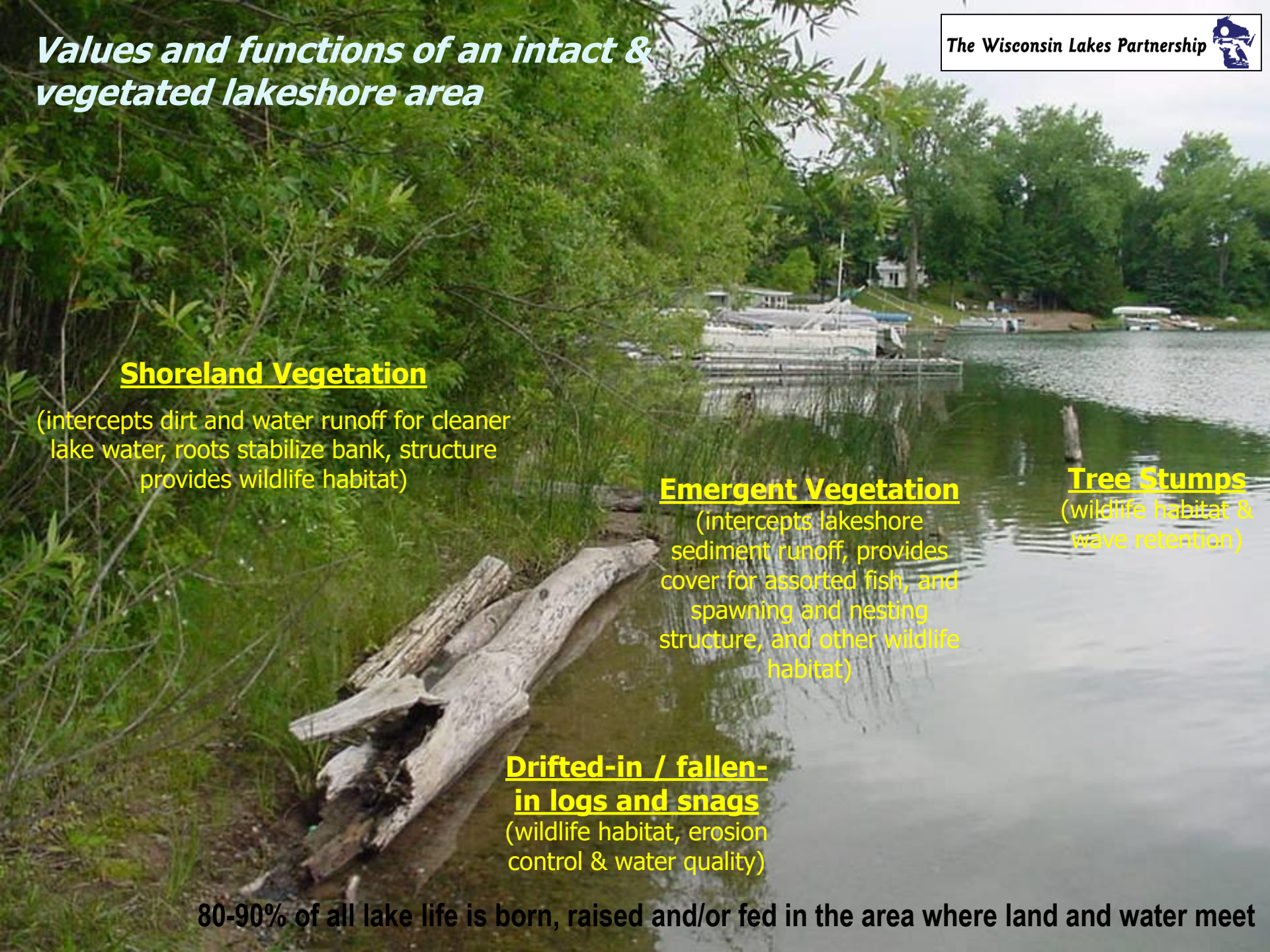


Shoreland Vegetation

(intercepts dirt and water runoff for cleaner lake water, roots stabilize bank, structure provides wildlife habitat)

Emergent Vegetation

(intercepts lakeshore sediment runoff, provides cover for assorted fish, and spawning and nesting structure, and other wildlife habitat)

Tree Stumps

(wildlife habitat & wave retention)

Drifted-in / fallen-in logs and snags

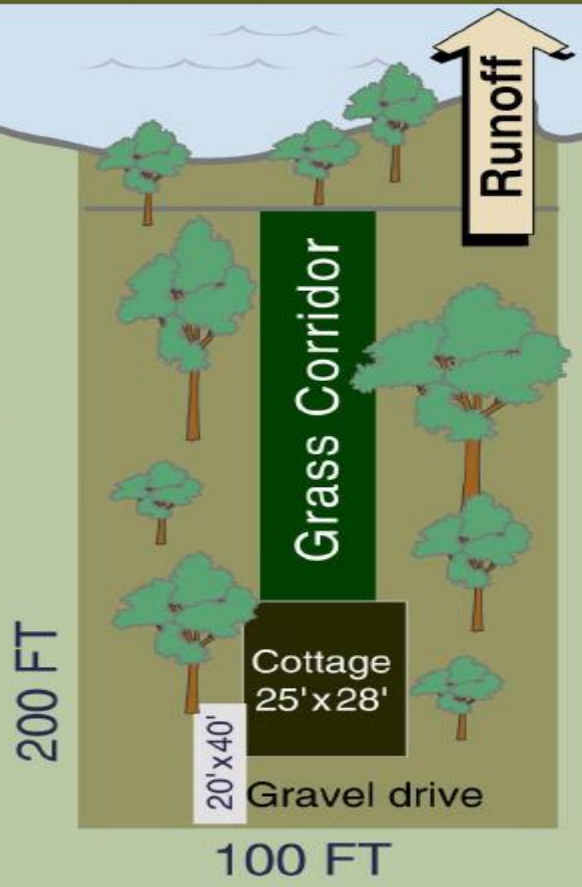
(wildlife habitat, erosion control & water quality)

80-90% of all lake life is born, raised and/or fed in the area where land and water meet

Laine Cabin, Long Lake Chippewa County

1940s development – Apr.-Oct. phosphorus/sediment runoff model

- maple-beech forest
- 6% slope to lake
- grass corridor 20'-wide
- cottage 700 ft^2 perimeter
- gravel drive 800 ft^2
- 35'-wide buffer strip

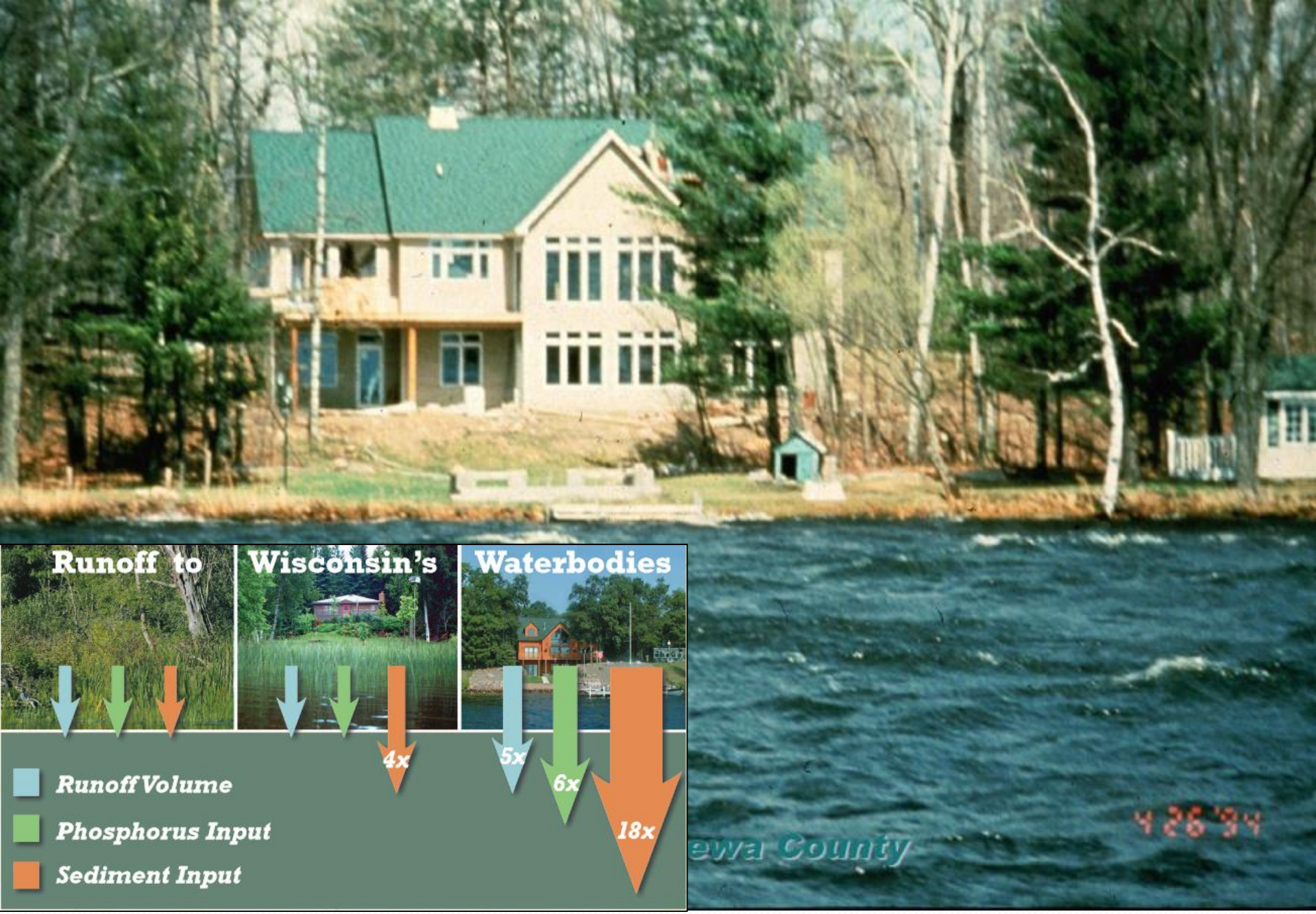


IMPACT ON LAKE
(April - Oct.)

- 1,000 ft^3 runoff to lake
- 0.03 lbs. phos. to lake
- 20 lbs. sediment to lake

Source: Wisconsin Dept. of Natural Resources

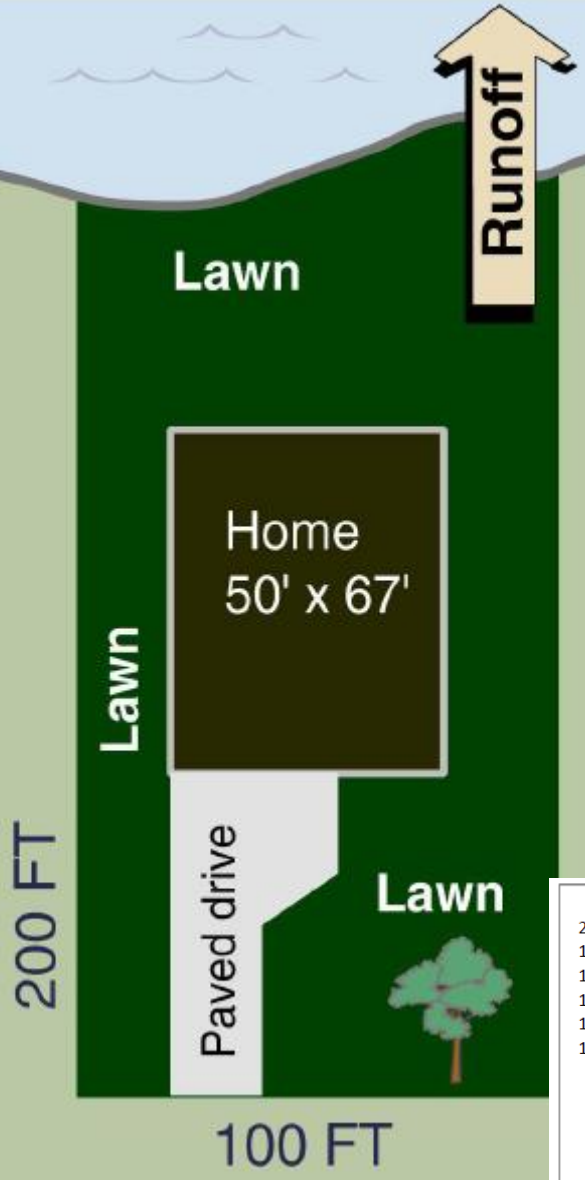
The Wisconsin Lakes Partnership



Wisconsin Department of Natural Resources memo from John Panuska 11/6/94. Graphic by Wisconsin Lakes Partnership.

1990s development – Apr.-Oct. phosphorus/sediment runoff model

- maintained lawn, soil graded
- 6% slope to lake
- home 3,350 ft²
  perimeter
- paved drive 770 ft²



IMPACT ON LAKE
(April - Oct.)

- 5,000 ft³ runoff to lake
- 0.20 lbs. phos. to lake
- 90 lbs. sediment to lake

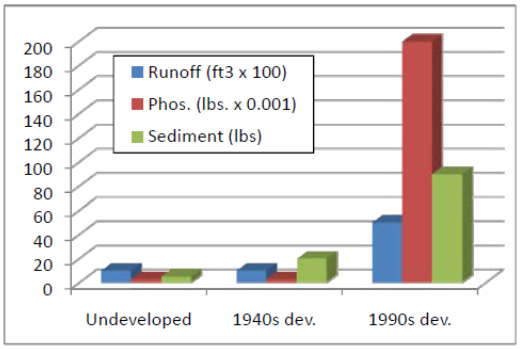
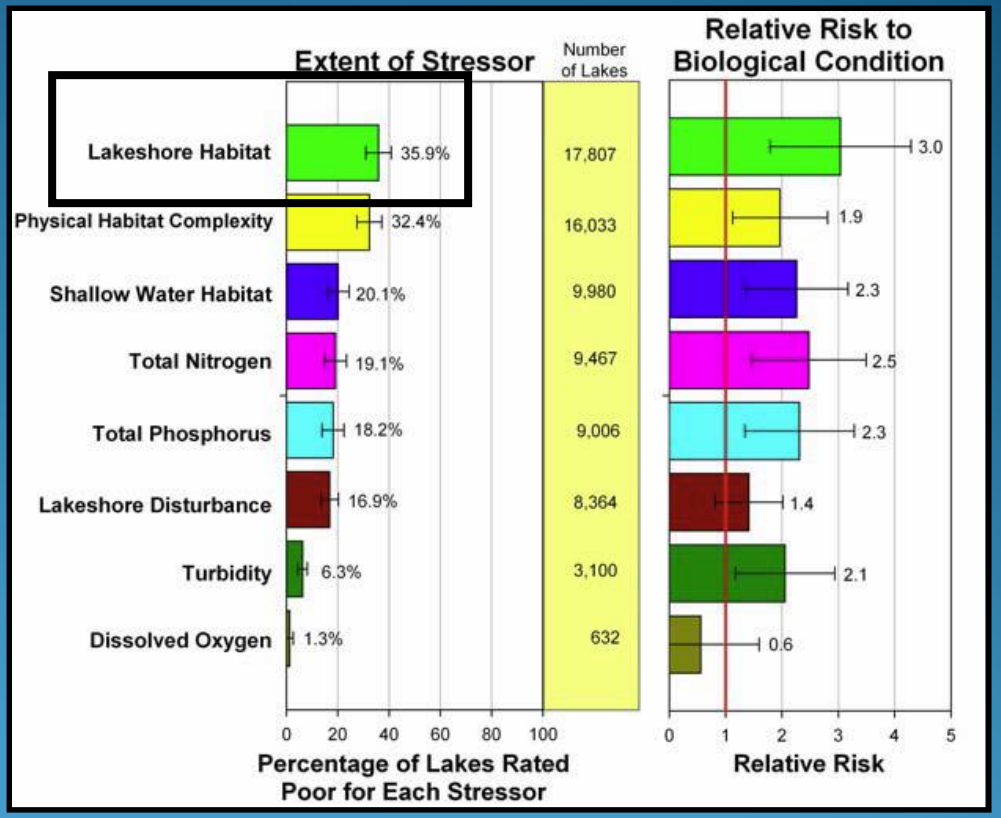


Figure 2. A modern, developed lakefront property contributes a significant amount of runoff, sediments, and nutrients to the lake. Adapted from: WI Lakes Partnership.

Source: Wisconsin Dept. of Natural Resources

National Lakes Assessment (NLA)

- First-ever baseline study of the condition of the nation's lakes.
- The latest in a series of surveys of the nation's aquatic resources.
- Unbiased estimates of the condition of natural and man-made freshwater lakes, ponds, and reservoirs greater than 10 acres and at least one meter deep.
- A total of 1,028 lakes were sampled for the NLA during summer 2007, representing the condition of about 50,000 lakes nationwide.



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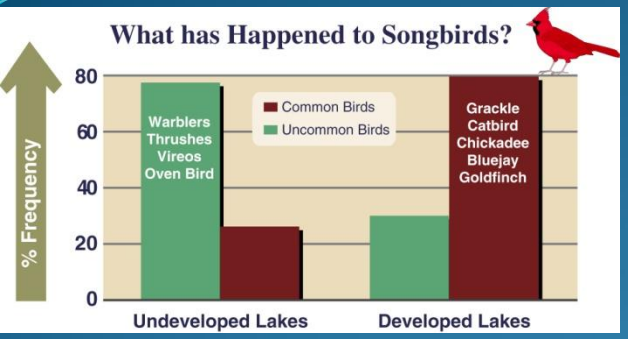
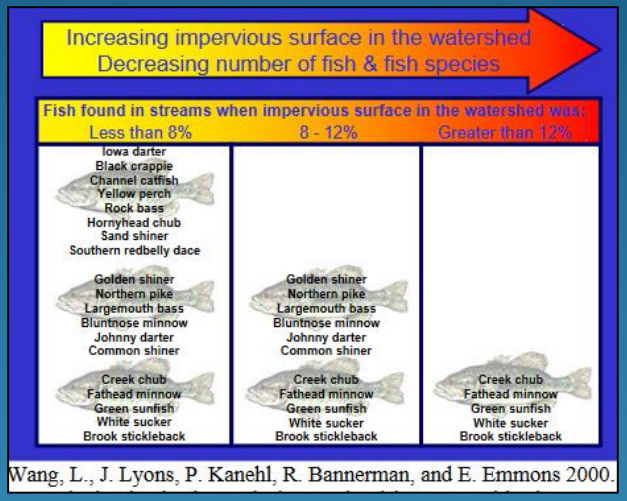
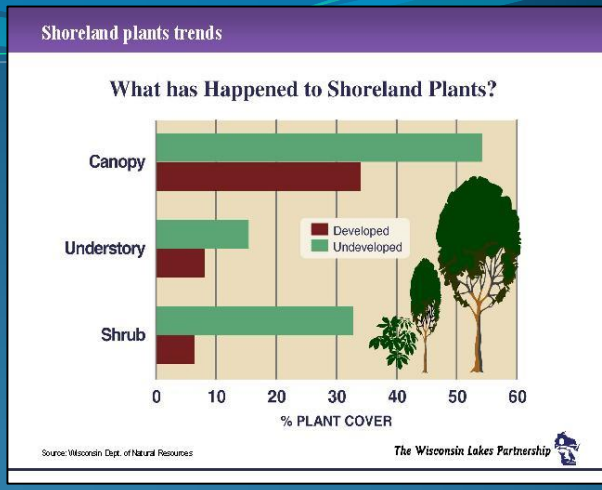
Various research over the last few decades helps to illuminate the effects of unsound development



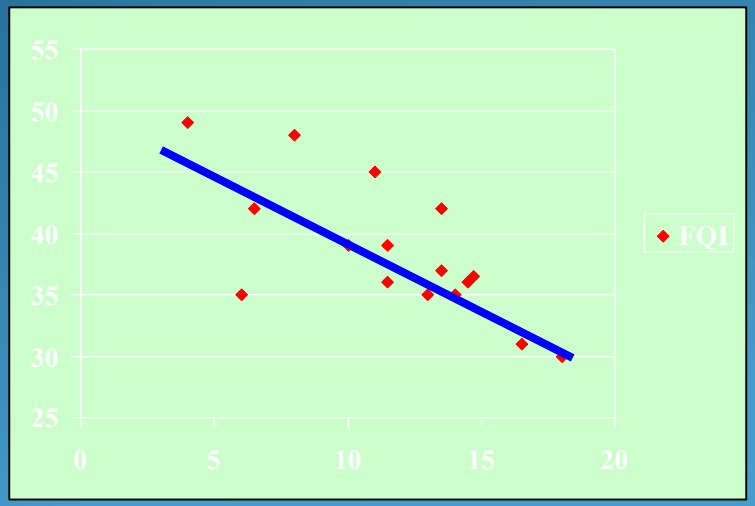
Lindsay et al. 2003



Wang, L., J. Lyons, P. Kanehl, R. Bannerman, and E. Emmons 2000.

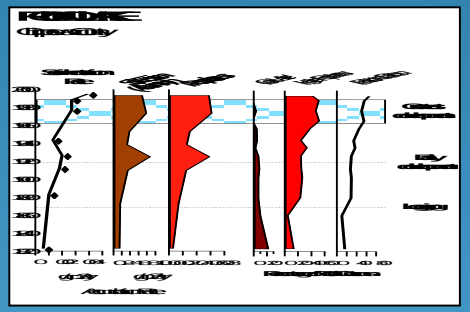


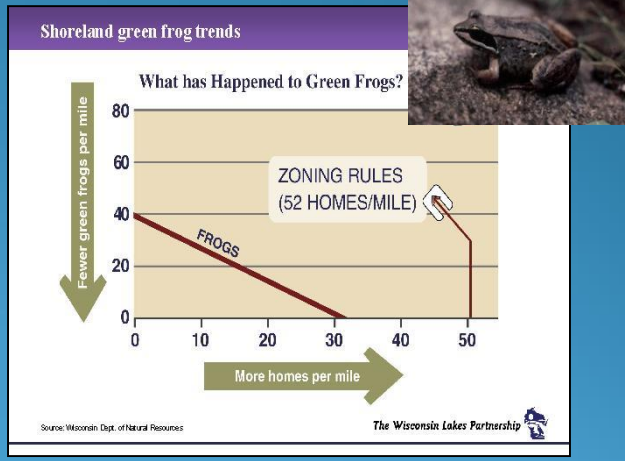
Elias et al. 2003

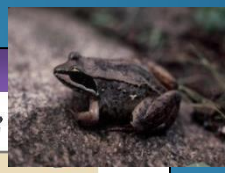


Dwellings/km shoreline

Hatzenbeler et al. 2004







Woodford et al. 2002

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THE HEALTHY SHORE LIST

HOW DOES *YOUR* WATERFRONT CHECK OUT?

✔

___ **PLANT A BUFFER ZONE OF NATIVE VEGETATION CLOSE TO SHORE**
The tangle of roots filters impure runoff from your cottage and slows erosion of the soil

___ **SWEAR OFF PESTICIDES AND HERBICIDES**
They end up in the water and are bad news for aquatic life

___ **OPT FOR A FLOATING OR PIPE DOCK**
It causes the least disturbance to the shoreline lakebed

___ **MOOR THE SWIM RAFT FARTHER OUT TO SAVE SHORE PLANTS**
Birds nest and fish spawn in those things you call "weeds." Don't tear them out

___ **"SOFTEN" HARD WALKWAYS AND DRIVES**
Unlike asphalt, pea gravel or wood chips soak up runoff

___ **PRESERVE YOUR PROPERTY'S MATURE TREES**
Their deep roots stabilize the slope down to the water

___ **FORGO FERTILIZERS/UPGRADE YOUR LEAKY SEPTIC SYSTEM**
Both send phosphorus into the lake, fuelling algae growth and depleting oxygen

___ **LEAVE FALLEN TREES AND BRANCHES IN THE SHALLOWS**
Wood nourishes all sorts of underwater critters and provides cover for fish

___ **KEEP OIL AND GAS WELL AWAY FROM THE WATER'S EDGE**
Even a minor spill has big consequences for vulnerable lake dwellers

___ **USE UNTREATED WOOD FOR SHORELINE STRUCTURES LIKE DOCKS**
Preservative-free materials, such as cedar, are pricier but much safer for aquatic inhabitants

___ **KICK THE COTTAGE LAWN HABIT**
Turf lets up to 55 per cent of rainfall wash away

___ **REPLACE THAT CRUMBLING CONCRETE BREAKWALL**
A gently regraded slope withstands waves and looks a lot nicer

___ **SHARE YOUR WATERFRONT WISDOM WITH NEIGHBOURS**
Healthy-shore practices benefit everybody, from cottagers to fish

FOR MORE INFORMATION, TURN OVER >

WISCONSIN DNR
Department of Natural Resources

PROGRAM OVERVIEW

Healthy Lakes took 1 year to develop and launched in 2014.

Additional contributors include: Cheryl Clemens, Karen Engelbretson, Max Grueneberg, John Haack, Dave Kafura, Chrissy Kozik, Jesha LaMarche, Flory Olson, Tim Parks, Bret Shaw, Scott Toshner, Bone Lake Management District, Maine Lake Smart Program, and Vermont Lake Wise Program.

WISCONSIN DNR
Department of Natural Resources

PROGRAM OVERVIEW

Goal: protect and improve the health of Wisconsin lakes and rivers by increasing shoreland property owner participation in habitat restoration and runoff and erosion control projects.

Best management practices for surface water:

Healthy Lakes isn't for everyone or everywhere.

Not intended for complex sites where engineering design/review needed

Managing Runoff - Design Tool

DECISION TOOL:

MANAGING RUNOFF WITH HEALTHY LAKES PRACTICES

Seek Engineering Assistance When…

- Construction occurs on slopes >20%.
- More than 20,000 square feet are cleared.
- More than two acres drains to an eroded area.
- Severe gully erosion (at least one foot deep) is present.
- You are not comfortable implementing solutions on your own.

Not for complex sites where engineering design/review is necessary.

Photo: Vilas County Land & Water Conservation Department

Supporting Technical Materials

Statewide Plan

- Implementation focus

Fact Sheets

- 5 Best Practices
- Funding & Admin FAQs

Technical Guidance

- More project installation detail

WISCONSIN DNR
Department of Natural Resources

PROGRAM OVERVIEW

2019 Healthy Lakes & Rivers Action Plan

- Apply for Healthy Lakes & Rivers grant funding, or
- Integrate into local planning efforts, or
- Do it yourself.

LOCAL CHAMPIONS RULE
/ 1:09:46

Coaching First Time Applicants

- Is Healthy Lakes & Rivers a good fit? https://healthylakeswi.com/best-practices/choosing-best-practices/
- Design plans must be approved prior to implementation (first time applicants only)
  - Try to have available prior to November 1
  - Can apply without them but grant agreement will be conditioned on design plan approval prior to implementation
  - Applications without completed design plans won't compete as well
- Projects required for regulatory purposes, including shoreland mitigation are not eligible

TRAINING???

Practice #1: Fish Sticks

Pewaukee Lake, Waukesha County (Tom Koepp)

- Commit to no-mow or 350 ft^2 native planting at the base

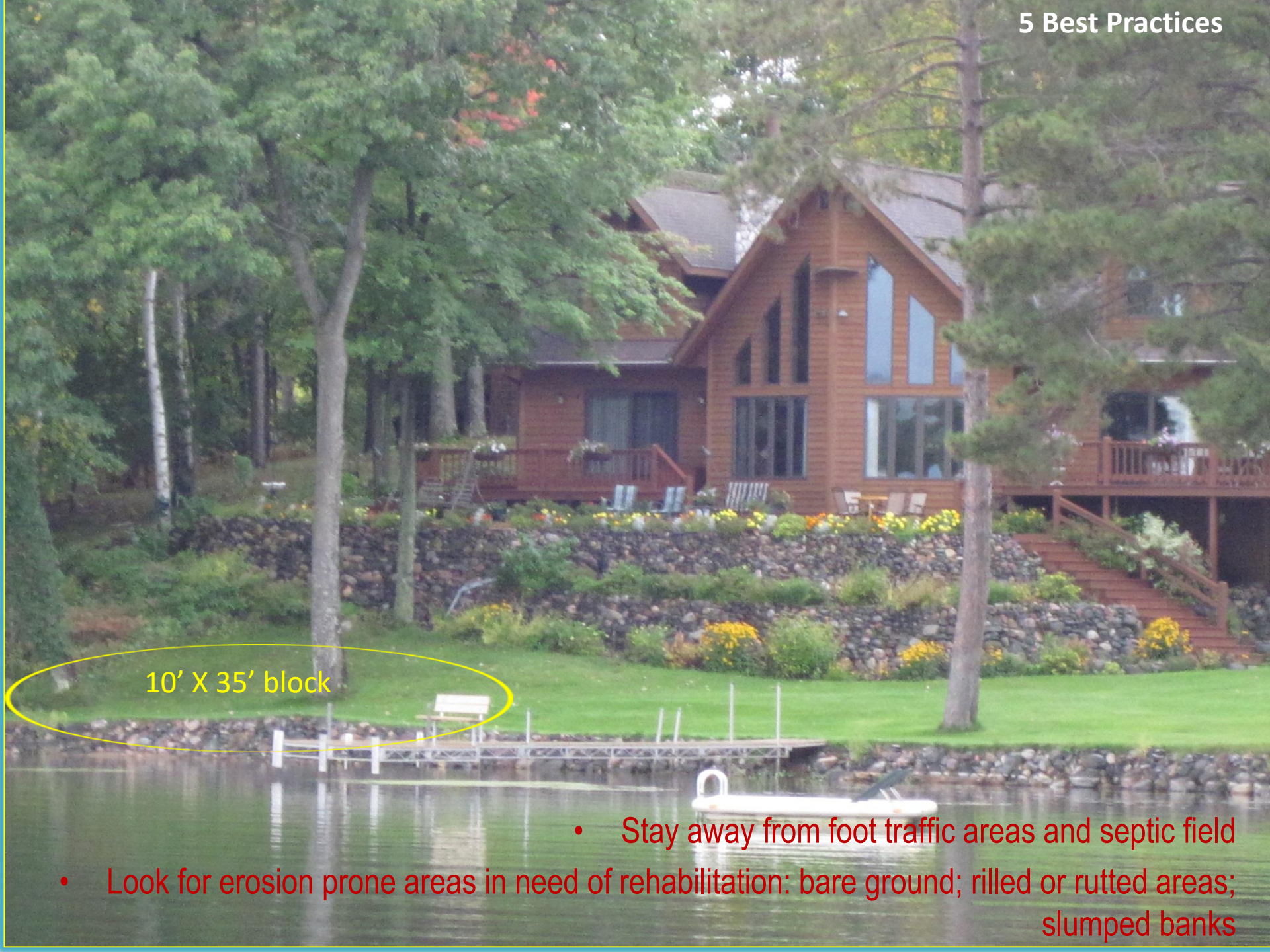
Healthy Lakes

Practice #2: 350 ft^2 Native Plantings

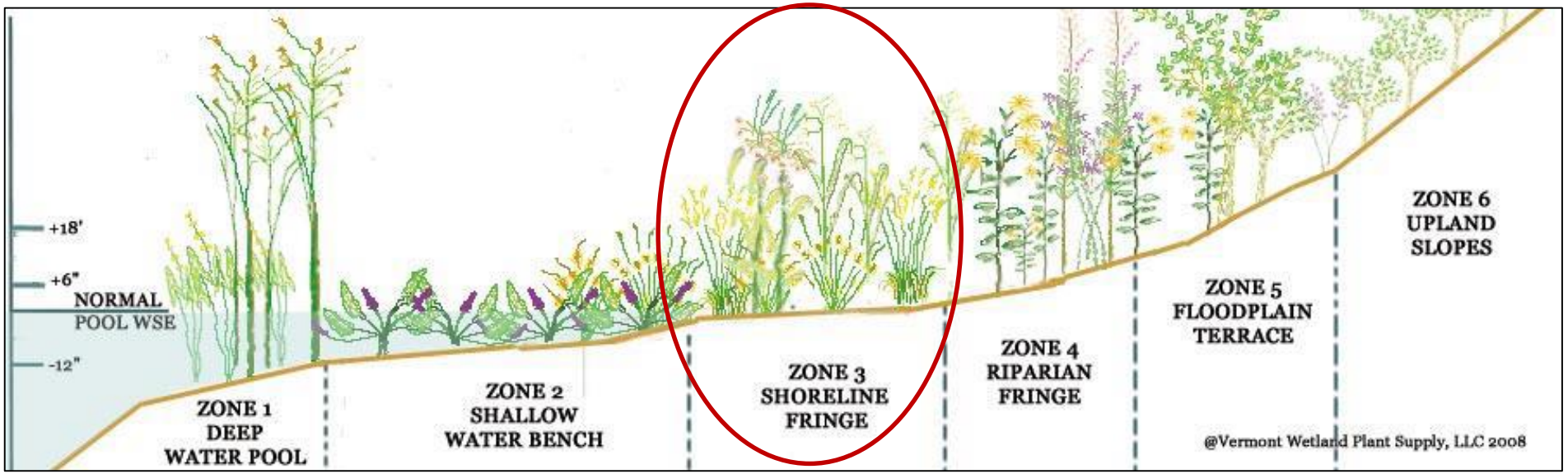
(Robert Korth)

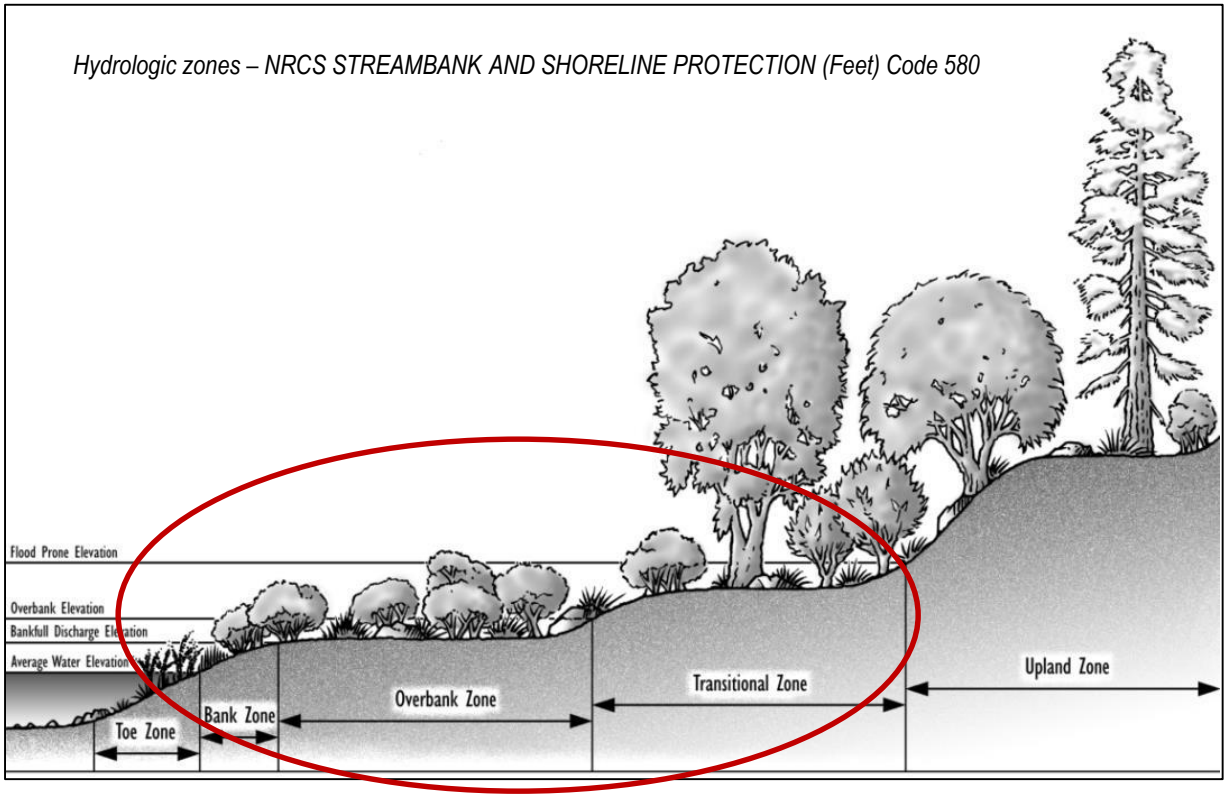
- 350 contiguous ft^2 at least 10 feet wide
- Fit to site in terms of shaping the planting bed
- Fencing may be required

Healthy Lakes & Rivers



- Stay away from foot traffic areas and septic field
- Look for erosion prone areas in need of rehabilitation: bare ground; rilled or rutted areas; slumped banks





Transition zone

FACT SHEET SERIES:

NATIVE PLANTINGS

MAINTENANCE

COSTS

- Range: $480 – $2400 *(average = $1000)*
- Healthy Lakes grant funding available: *$1000 per 350 ft² area*

MATERIALS

- Black plastic or herbicide
- Native plants
- Bulb auger or hand trowel
- Mulch
- Watering equipment

DNR PERMIT

POSSIBLY REQUIRED

(If using herbicides in or adjacent to lakeshore)

NATIVE PLANTINGS, a transition zone best practice, are template planting plans designed for a contiguous area of at least 350 ft². Each template has a corresponding list of native plants suited to the given soil conditions and function of the plan, including lakeshore, bird/butterfly habitat, woodland, low-growing, deer resistant, and bare soil area plantings.

PURPOSE

Native plantings improve wildlife habitat, slow runoff water, and promote natural beauty. Each template described above serves all of these functions to some degree, but one may be better than another given your property's unique site characteristics and areas of concern. For example, the bird/butterfly template includes flowers that attract these types of wildlife.

HOW TO BUILD

It may be necessary to work with your local land and water conservation department or a landscaper to design and/or install these plantings. Check with your local zoning department to determine if any permits are necessary. Planting specifications and densities follow Wisconsin Biology Technical Note 1: Shoreland Habitat.

Detailed guidance is found here: http://healthylakeswi.com.

1. Find a location

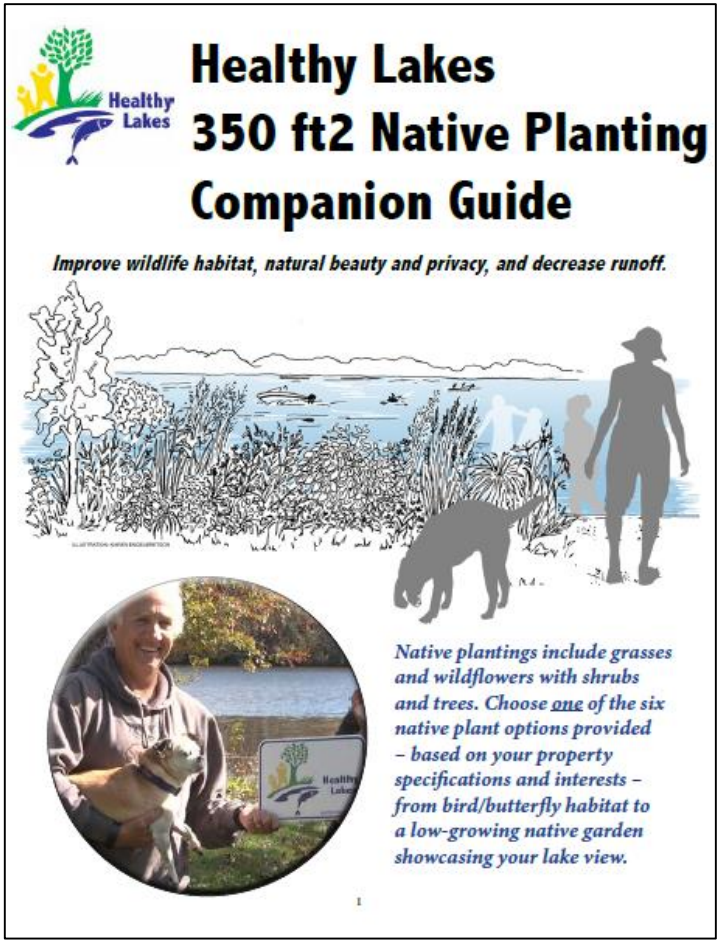
350 ft² native plantings should begin, if possible, at the typical lakeshore edge (i.e. Ordinary High Water Mark), be at least 10 feet wide – parallel or perpendicular to the shore, and contiguous rather than planted in patches. The final shape and orientation to the lakeshore are up to you. Choose an area of turf grass you wish to revert back to a more natural state or an already vegetated area you would like to augment. Try to choose a location in full or partial sun.

2. Determine soil type

It's important to understand what type of soil is in the planting location because that will determine which native plants can survive and thrive. The fact sheet links provide tools and guidance to help determine your soil type. Most of the template plans have two plant lists – one for moister soils and one for drier soils.

PROJECT TIMELINE

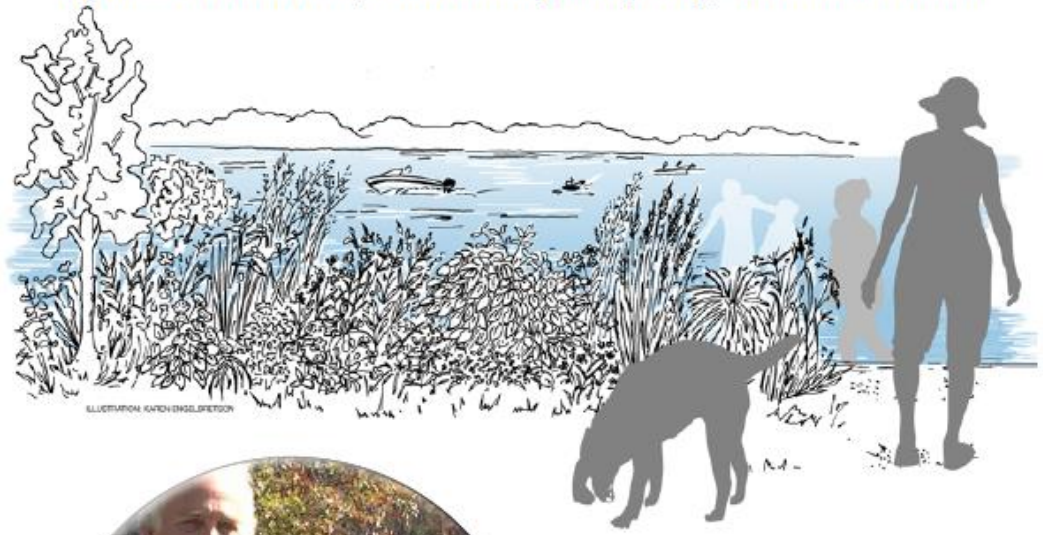
SITE PREP	INSTALLATION	MAINTENANCE	PROJECT END	
6 WEEKS - 6 MONTHS	1-2 DAYS	2 YEARS	3 YEARS	Ongoing weeding may be necessary in subsequent years.



Fact sheet & companion technical guidance for each of the five Healthy Lakes best practices

Healthy Lakes 350 ft² Native Planting Companion Guide

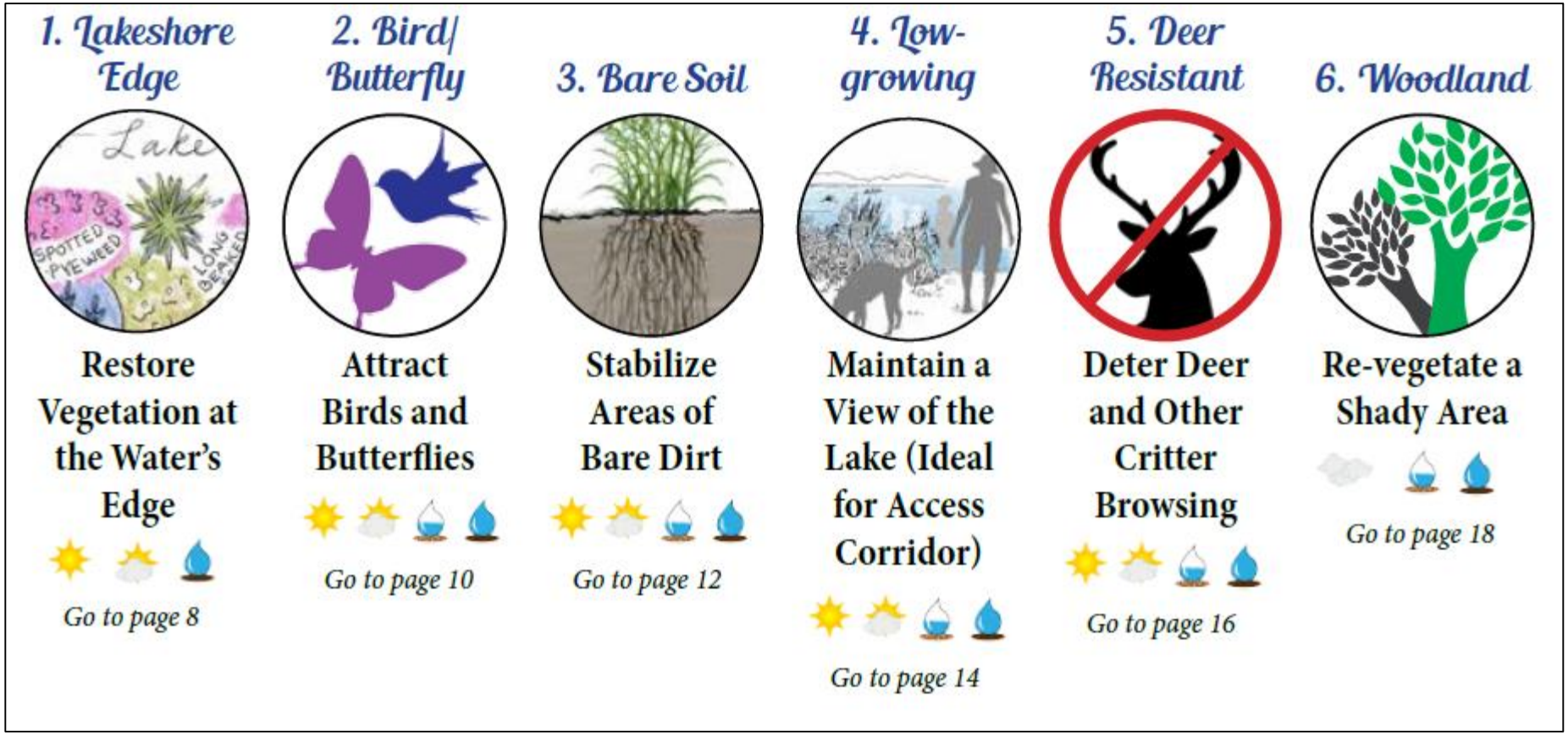
Improve wildlife habitat, natural beauty and privacy, and decrease runoff.



Native plantings include grasses and wildflowers with shrubs and trees. Choose one of the six native plant options provided – based on your property specifications and interests – from bird/ butterfly habitat to a low-growing native garden showcasing your lake view.

Get your copy at:
< https://healthylakeswi.com/ >

6 planting options to choose from



Barriers broken down / best practice upsides for landowners

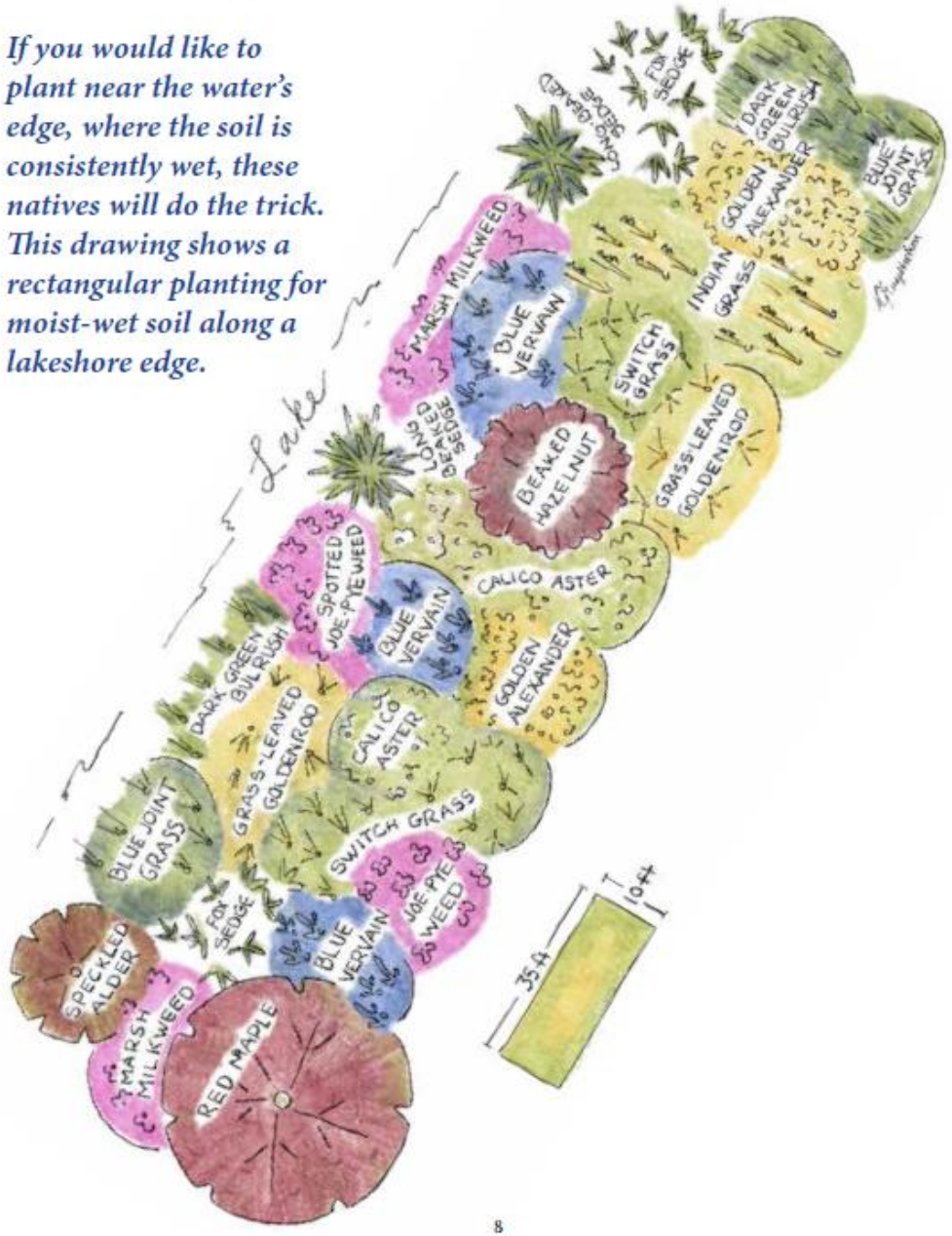
1. Looks matter—paying attention to aesthetics
2. Using "*native garden*" verbiage
3. Helping landowners address challenges around water runoff and habitat rehabilitation

Lakeshore Edge

Restore vegetation at the water's edge.

FULL SUN PARTIAL SUN

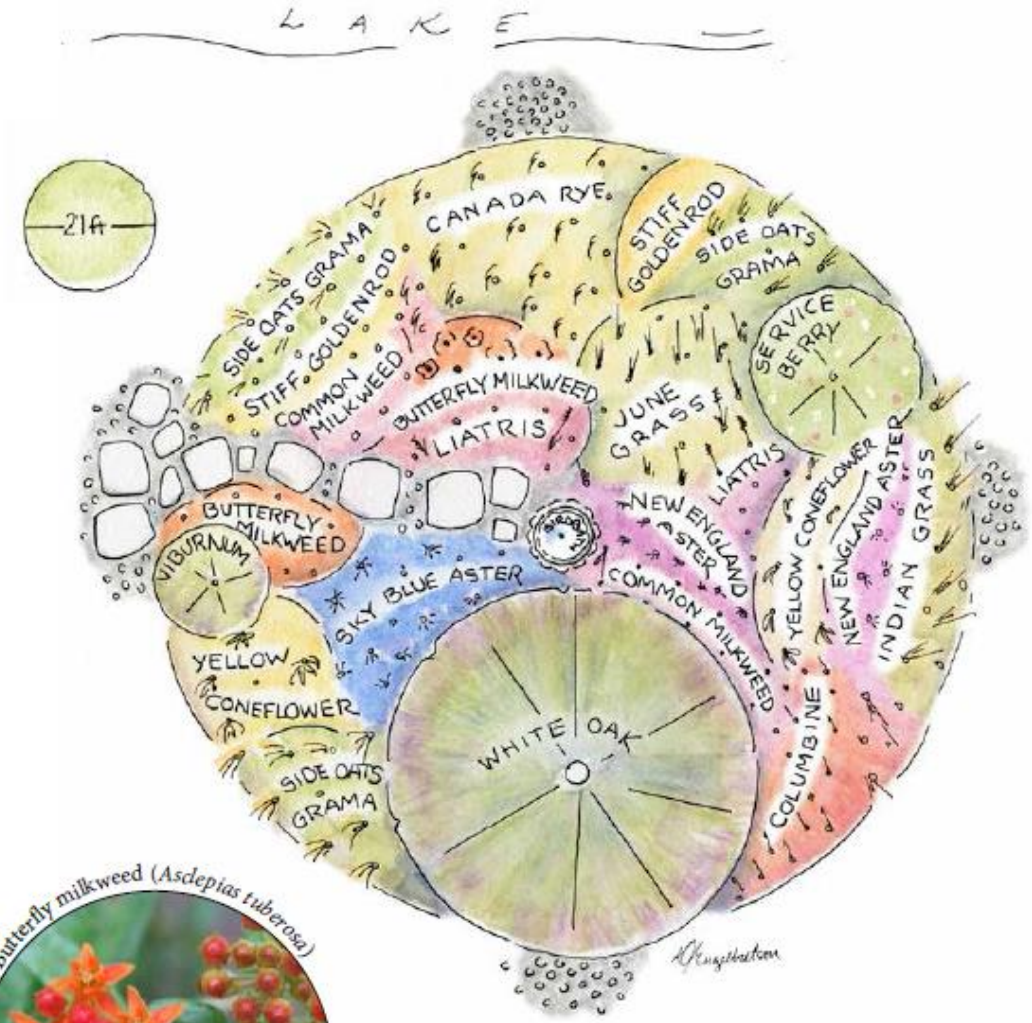
If you would like to plant near the water's edge, where the soil is consistently wet, these natives will do the trick. This drawing shows a rectangular planting for moist-wet soil along a lakeshore edge.



Bird/Butterfly

Attract birds and butterflies.

FULL SUN PARTIAL SUN

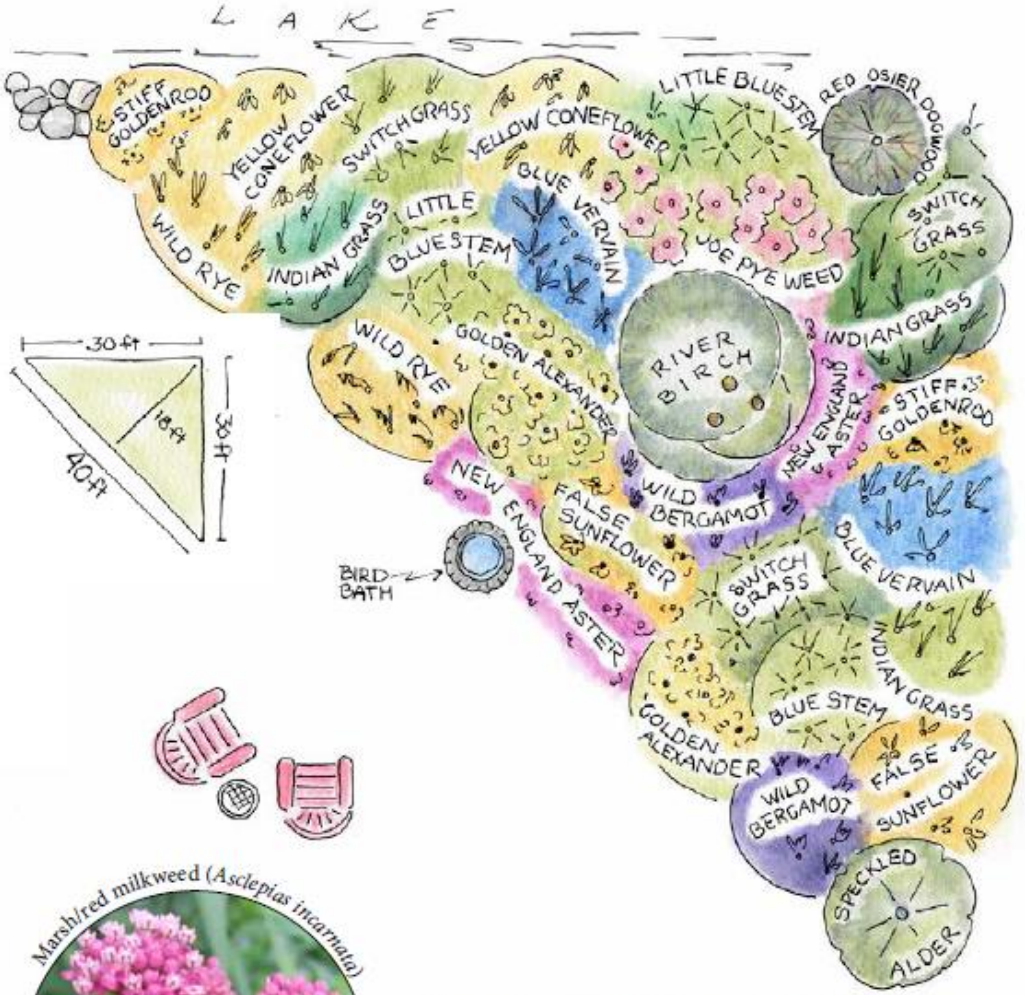


If you would like to attract songbirds, moths, butterflies, and hummingbirds, this option has flowering plants that will do just that. This circular drawing for dry-medium soil invites a flow of pollinators and migratory birds.

Bare Soil

Stabilize areas of bare dirt.

FULL SUN PARTIAL SUN



Marsh/red milkweed (*Asclepias incarnata*)

These natives will help to stabilize exposed ground or other soil with erosion challenges. This triangular drawing for moist-wet soils shows how you can beautify a bare lot corner along the lakeshore.

Buffers affect birds

- Shoreline buffers provide habitat for
  - Eagles, loons, great blue herons, wood ducks and more

Lawns provide habitat for

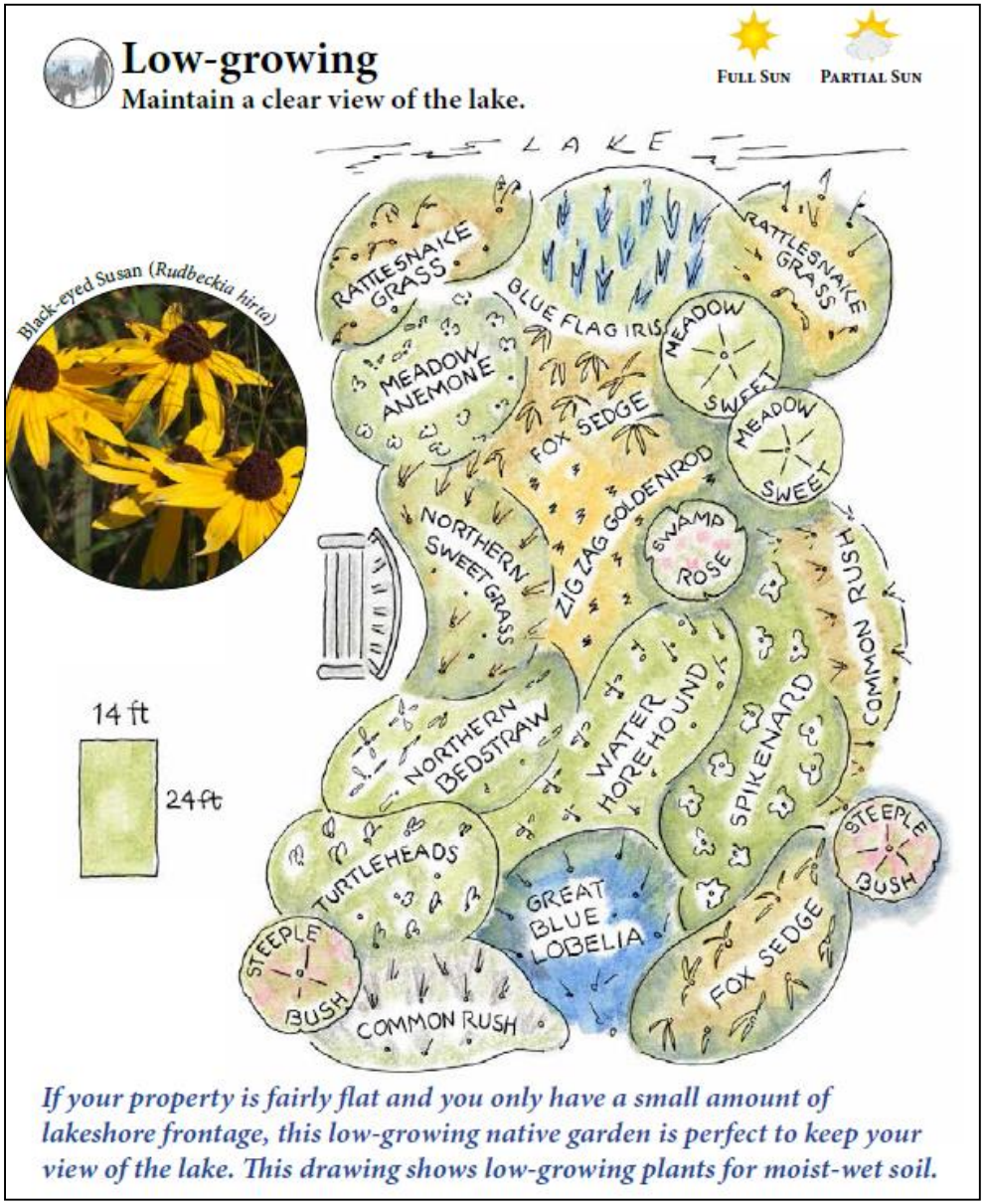
- Canada geese

Geese avoid buffers because they can conceal predators such as coyotes, foxes and raccoons

Goose video at youtube.com/watch?v=9Oef1C_kPNI

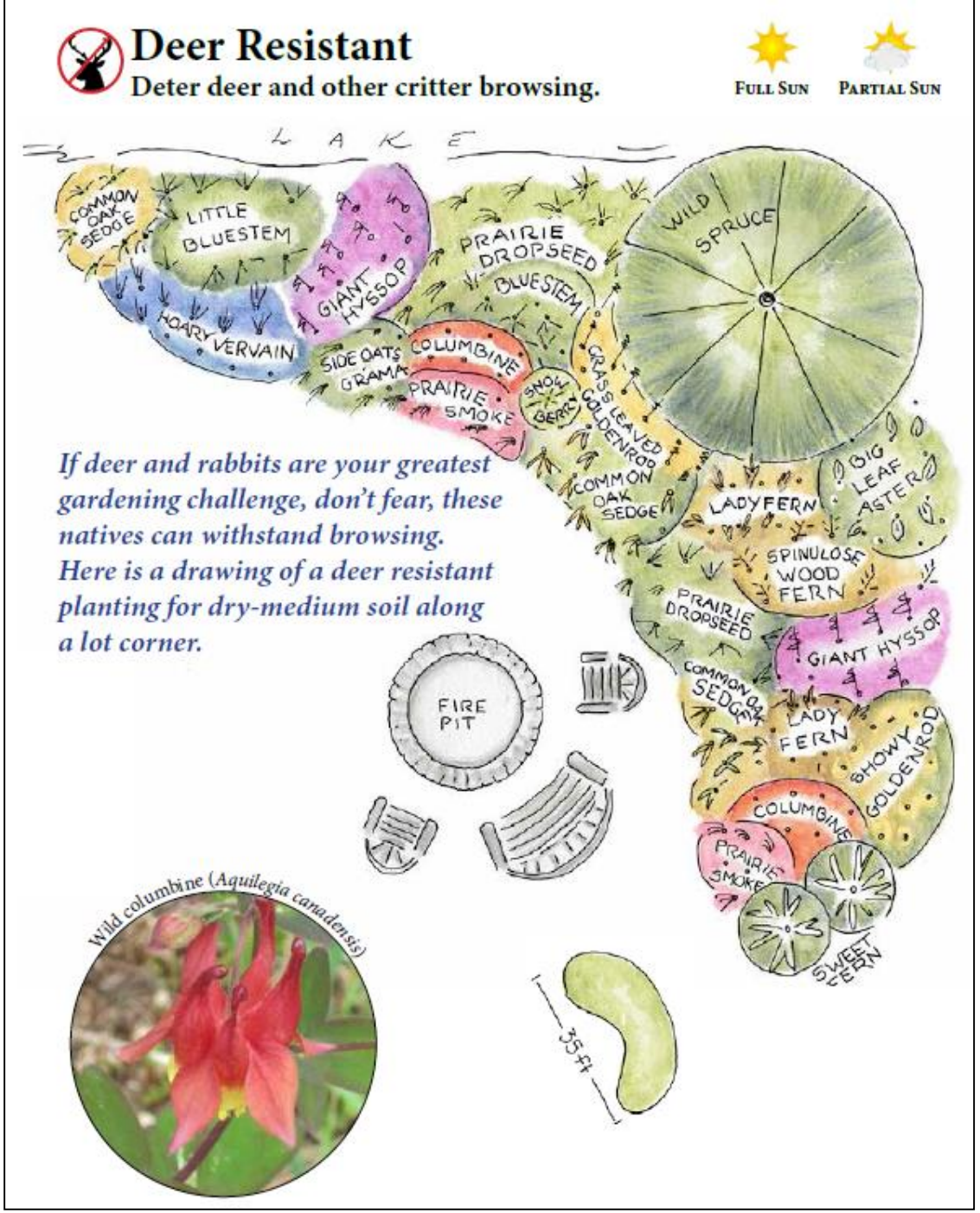
Barriers addressed / upsides of best practice for landowners

1. View corridor maintained: see swimming children
2. Water / migratory bird support
3. Geese / merganser deterrence / ticks
4. Scale – smaller 350 ft.^{2}



Barriers addressed / upsides of best practice for landowners

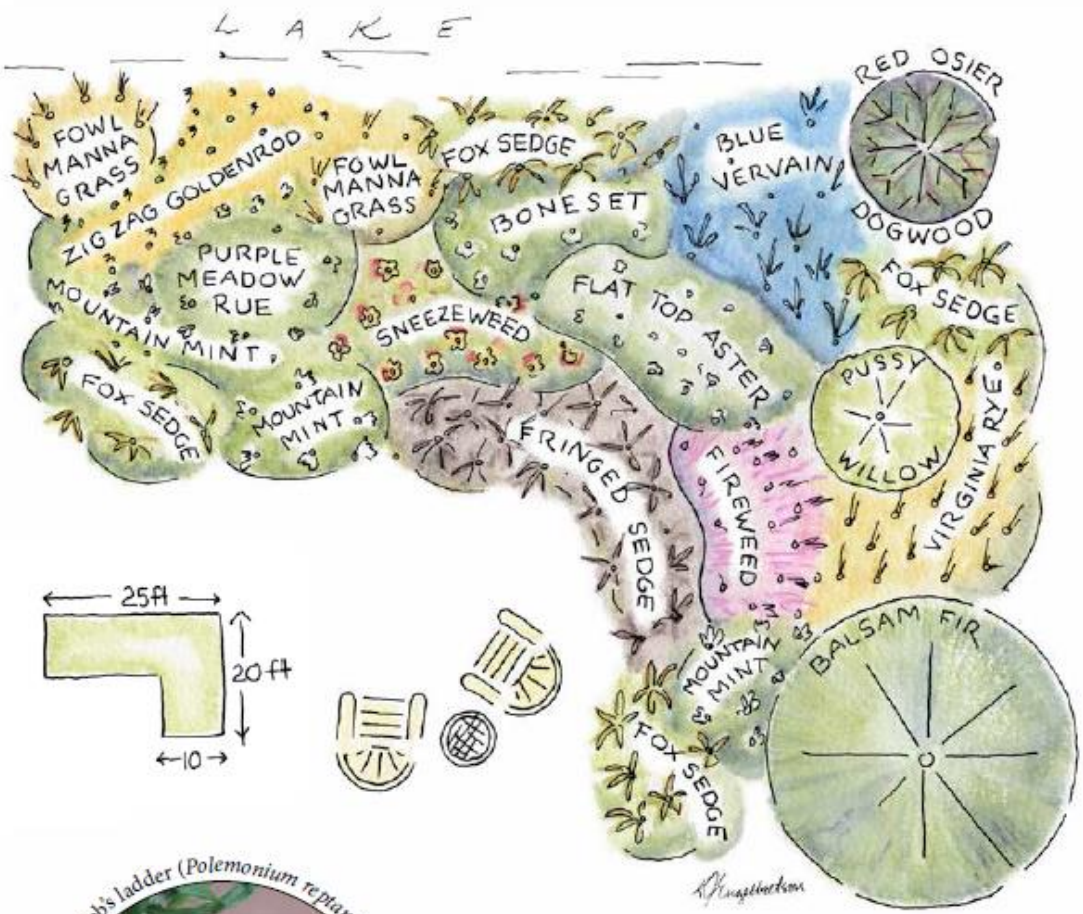
1. Deer and rabbit browse deterrence
2. Aethetics



Woodland

Re-vegetate a shady area.

SHADE



If your lakeshore is wooded and shady, these native plants are hearty enough to survive with less than four hours of sunlight each day. This drawing shows what you would plant in moist-wet soil in a shady corner.

Dry-Medium Soil

Healthy Lakes grant funding requires all the plants in the list to be used unless an approved substitution is made (page 20).

	Plant Type	Flower Color	Bloom Time	Height Range	Total Plants
Woody	Wild spruce (*Picea glauca*)	Cones	May-June	90-110 feet	1 tree
	Common snowberry (*Symphoricarpos albus*)	White	June-July	2-3 feet	1 shrub
	Sweet fern (*Comptonia peregrina*)	Red	May-June	2-3 feet	2 shrubs
					1 Tree and 3 Shrubs
Grasses	Common oak sedge (*Carex pensylvanica*)	Green/Tan	May-June	.5-1 foot	6/spot x 3 spots = 18 total
	Little bluestem grass (*Schizachyrium scoparium*)	White	June-Aug.	2-3 feet	6/spot x 3 spots = 18 total
	Prairie dropseed (*Sporobolus heterolepis*)	Tan	July-Aug.	2-3 feet	6/spot x 3 spots = 18 total
	Side oats grama grass (*Bouteloua curtipendula*)	Tan	July-Aug.	1-3 feet	6/spot x 3 spots = 18 total
					72 grasses, rushes, & sedges
Wildflowers	Big-leaved aster (*Aster macrophyllus*)	White	Aug.-Oct.	1 foot	6/spot x 2 spots = 12 total
	Common lady fern (*Athyrium filix-femina*)	Brown sori	n/a	2-3 feet	3/spot x 2 spots = 6 total
	Grass-leaved goldenrod (*Euthamia graminifolia*)	Yellow	July-Aug.	1-3 feet	6/spot x 2 spots = 12 total
	Hoary vervain (*Verbena stricta*)	Blue	July-Sept.	1-3 feet	6/spot x 2 spots = 12 total
	Prairie-smoke (*Geum triflorum*)	Pink to purplish	April-June	4-16 inches	6/spot x 2 spots = 12 total
	Purple giant hyssop (*Agastache scrophulariaefolia*)	Pink	Aug.-Sept.	3-5 feet	6/spot x 2 spots = 12 total
	Showy goldenrod (*Solidago speciosa*)	Yellow	July-Oct.	3-5 feet	6/spot x 2 spots = 12 total
	Wild columbine (*Aquilegia canadensis*)	Red	April-June	1-3 feet	6/spot x 2 spots = 12 total
	Spinulose wood fern (*Dryopteris carthusiana*)	Brown sori	n/a	2-3 feet	3/spot x 2 spots = 6 total
					96 Wildflowers

Moist-Wet Soil

	Plant Type	Flower Color	Bloom Time	Height Range	Total Plants
Woody	Tamarack (*Larix laricina*)	Cones	(pollen shed)	40-80 feet	1 tree
	Beaked hazelnut (*Corylus cornuta*)	Reddish-brown	March-May	10-16 feet	1 shrub
	Black chokeberry (*Aronia melanocarpa*)	White	May-July	6-8 feet	1 shrub
					1 Tree and 2 Shrubs
Grasses	Common fox sedge (*Carex stipata*)	Brown leaves	June-July	1-3 feet	6/spot x 3 spots = 18 total
	Fox sedge (*Carex vulpinoidea*)	Brown leaves	April-May	2-3 feet	6/spot x 3 spots = 18 total
	Indian grass (*Sorghastrum nutans*)	Brown leaves	Aug.-Sept.	4-6 feet	6/spot x 3 spots = 18 total
	Prairie cordgrass (*Spartina pectinata*)	Tan leaves	Aug.-Sept.	6-8 feet	6/spot x 3 spots = 18 total
					72 grasses, rushes, & sedges
Wildflowers	Blue vervain (*Verbena hastata*)	Blue	July-Sept.	3-5 feet	6/spot x 2 spots = 12 total
	Common ironweed (*Vernonia fasciculata*)	Violet / purple	July-Sept.	2-6 feet	6/spot x 2 spots = 12 total
	Great St. John's wort (*Hypericum pyramidatum*)	Yellow	May-July	4-6 feet	6/spot x 2 spots = 12 total
	Interrupted fern (*Osmunda claytoniana*)	Brown sori	n/a	4-6 feet	3/spot x 2 spots = 6 total
	Ostrich fern (*Matteuccia struthiopteris*)	Brown sori	n/a	3-4 feet	3/spot x 2 spots = 6 total
	Spotted Joe-pye-weed (*Eupatorium maculatum*)	Pink	July-Sept.	4-6 feet	6/spot x 2 spots = 12 total
	Stiff goldenrod (*Solidago rigida*)	Yellow	Aug.-Oct.	3-4 feet	6/spot x 2 spots = 12 total
	Wild bergamot (*Monarda fistulosa*)	Lavender	June-Aug.	2-4 feet	6/spot x 2 spots = 12 total
	Yellow avens (*Geum aleppicum*)	Yellow	June-Aug.	2-3 feet	6/spot x 2 spots = 12 total
					96 Wildflowers

SHORELAND HABITAT

(Acres)

CODE 643A (Interim)

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

Area adjacent to a waterbody or watercourse in a non-agricultural setting that is vegetated with a *diverse** mixture of native species that can include grasses, grass-like species, forbs, shrubs, and trees.

II. Purposes

A. Provide habitat (food, shelter, nesting sites, over-winter cover) for aquatic and terrestrial fauna.

B. Enhance *littoral zone* (shallow water) habitat function for a broad range of vertebrate and invertebrate species by providing shade and cover with overhanging vegetation, and promoting natural recovery of emergent species.

C. Provide a source of detritus (decomposing organic matter) and large woody cover for aquatic organisms.

D. Provide shade to lower water temperatures and facilitate higher dissolved oxygen concentrations to improve habitat for aquatic organisms.

E. Promote shoreland corridors for aquatic and terrestrial flora and fauna.

F. Increase the presence and diversity of native plant and animal species in shoreland areas.

G. Reduce the environmental and visual impact of human activities in the near-shore area.

H. Improve water quality by reducing the amount of sediment and other pollutants, such as pesticides and nutrients in surface runoff.

I. Enhance bank stability by limiting intensive use, and reducing wave impact.

III. Conditions Where Practice Applies

This practice applies, but is not limited to, areas of shoreland development where it is desired to enhance or restore native mixed vegetation for the improvement of fish and wildlife habitat, water quality and bank stability.

Where the primary purpose is to control sediment to environmentally sensitive areas, refer to the Natural Resources Conservation Service (NRCS) Field Office Technical Guide Section IV (FOTG), Standard 393, Filter Strip.

Where the primary purpose is to control bank erosion, refer to NRCS FOTG Standard 580, Streambank and Shoreline Protection to be used in conjunction with this standard.

IV. Federal, State, and Local Laws

Installation and maintenance of shoreland habitat shall comply with all federal, state, and local laws, rules, or regulations. The landowner is responsible for securing required permits. This standard does not contain text of any federal, state, or local laws.

V. Criteria

The Wisconsin Biology Technical Note 1: Shoreland Habitat is an important guidance document to this standard. This can be found either in the NRCS Field Office Technical Guide (FOTG) or on the NRCS website: [http://www.wi.nrcs.usda.gov/fotg/index.html]

A. Establishment

1. Shoreland habitat shall be established by planting a diverse mix of native species that are adapted to site conditions and are representative of area plant communities. Where appropriate, natural recovery techniques may be utilized rather than planting. Refer to county species lists and/or the Wisconsin Biology Technical Note 1: Shoreland Habitat, where applicable.
2. In order to restore the functional values of a shoreland habitat, vegetation shall be vigorous, diverse and structurally complex

Conservation Practice Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local NRCS office or the Standards Oversight Council in Madison, WI at (608) 833-1833. NRCS, WI 7/01

* Words in the standard that are shown in italics are described in X. Definitions. The words are italicized the first time they are used in the text.

Wisconsin Biology Technical Note 1:

Shoreland Habitat

Introduction

Definition of Shoreland Habitat:
An area adjacent to a water body in a non-agricultural setting that is vegetated with a diverse mixture of native species that include grasses, grass-like species, forbs, shrubs, and trees.

Purposes:

- Provide habitat for aquatic and terrestrial fauna
- Enhance adjacent shallow water habitat by providing shade and overhanging vegetation and promoting natural recovery of emergent species
- Promote shoreland corridors
- Increase the presence and diversity of native species
- Reduce the environmental and visual impact of nearby human activities
- Improve water quality
- Enhance bank stability

Interim Standard # 643A, Shoreland Habitat provides specific criteria for Shoreland Habitat establishment and for determining the dimensions of the practice (Section V). It identifies the necessary components of a Shoreland Habitat establishment plan (Section VII), and lists criteria for operation and maintenance of the practice (Section VIII). Local shoreland zoning ordinances and local shoreland restoration design standards may provide additional requirements and guidance. These may include greater buffer depths, more restrictive requirements for viewing/access corridors, and plant selection.

This technical note provides detailed guidance on the following:

Vegetation Establishment Technique ..... p. 2
Plan Components ..... p. 3
Plant Materials Selection and Density ..... p. 4
Additional Planning Considerations ..... p. 7
Steps for Accelerated Recovery ..... p. 9
- Site Preparation
- Planting Techniques

Site Care and Maintenance ..... p. 14
Resources ..... p. 17
Appendices ..... p. 19

CHICAGO BOTANIC GARDEN

Plant lists – work horse species traits:

- Perform in a wide range of ecological settings and climatic conditions
- Provide protection from erosive forces with structure above ground and below—three layers of vegetation
- Penetrating, deep root structures that have rhizomatous, fibrous root systems
- Support wildlife for food and shelter(host/nectar plants for pollinators, migratory birds, etc.)
- Can be propagated relatively easily for sale at native plant nurseries

Root structures important

Fibrous roots that hold soil and absorb energy

Root structures important

Fibrous roots that hold soil and absorb energy

NATIVE Caterpillars Moths and Butterflies and host NATIVE Woodies

Double-toothed Prominent

Honey locust Moth caterpillar

Hackberry Emperor larva photo: Douglas Tallamy

Hackberry Emperor photo: Megan McCarty

Big Poplar Sphinx

In a study published in 2009, Dr. Douglas W. Tallamy, Ph.D, chair of the Department of Entomology and Wildlife Ecology at the University of Delaware specifically addressed the usefulness of native woodies as host plants for our native caterpillars (and obviously therefore moths and butterflies).

We present here a partial list, and the number of Lepidopteran species that rely on them. Please note that two genera (Rhamnus and Frangula) are marked **. Both have species commonly named 'buckthorn'. In fact, both genera have more native than non-native buckthorns.

Keep this list in mind as you think about replacing the ash trees that have succumbed to the emerald ash borer. http://plants.usda.gov/ is an excellent site to check-out any uncertainties.

	Number of species of Caterpillars								
Oaks (Quercus)	557	Beeches (Fagus)	127	Honey-locusts (Gleditsia)	46	Magnolias (Magnolia)	21
Cherries (Prunus)	456	Serviceberry (Amelanchier)	124	New Jersey Tea (Ceanothus)	45	Buttonbush (Cephalanthus)	19
Willows (Salix)	455	Larches or Tamaracks (Larix)	121	Sycamores (Platanus)	45	Redbuds (Cercis)	19
Birches (Betula)	411	Dogwoods (Cornus)	118	Huckleberry (Gaylussacia)	44	Green-briar (Smilax)	19
Poplars (Populus)	367	Firs (Abies)	117	Hackberry (Celtis)	43	Wisterias (Wisteria)	19
Crabapples (Malus)	308	Bayberries (Myrica)	108	Junipers (Juniperus)	42	Redbay (native) (Persea)	18
Maples (Acer)	297	Viburnums (Viburnum)	104	Elders (Sambucus)	42	Bearberry (Arctostaphylos)	17
Blueberries (Vaccinium)	294	Currants (Ribes)	99	Ninebark (Physocarpus)	41	Bald cypresses (Taxodium)	16
Alders (Alnus)	255	Hop Hornbeam (Ostrya)	94	Lilacs (Syringa)	40	Leatherleaf (Chamaedaphne)	15
Hickories (Carya)	235	Hemlocks (Tsuga)	92	Hollies (Ilex)	39	Poison Ivy (Toxicodendron)	15
Elms (Ulmus)	215	Spireas (Spiraea)	89	Sassafras (Sassafras)	38	Sourwood (Oxydendrum)	14
Pines (Pinus)	201	Grapes (Vitis)	79	Honeysuckles (Lonicera)	37	Pepper vine (Ampelopsis)	13
Hawthorns (Crataegus)	168	Douglas-fir (Pseudotsuga)	76	Sweet-gums (Liquidambar)	35	Madrone (Arbutus)	12
Berries (Rubus)	163	Locusts (Robinia)	72	Mountain-laurel (Kalmia)	33	Pawpaw (Asimina)	12
Spruces (Picea)	150	Hornbeams (Carpinus)	68	Buckeyes (Aesculus)	33	Colorado Barberry (Berberis)	12
Ashes (Fraxinus)	149	Mountain ashes (Sorbus)	68	Virginia Creeper (Parthenocissus)	32	Prairie Acacia (Acacia)	11
Linden or Basswood (Tilia)	149	Sweetfern (Comptonia)	64	Red and Black Chokeberries (Photinia)	29	Euonymus (Euonymus)	11
Pears (Pyrus)	138	Witch-hazels (Hamamelis)	63			Buckthorn** (Frangula)	11
Roses (Rosa)	135	Sumacs (Rhus)	58	Black Gums or Tupelo (Nyssa)	26	Spicebush (Lindera)	11
Filberts (Corylus)	131	Rhododendrons (Rhododendron)	51	Snowberries (Symphoricarpos)	25	Fetterbush (Lyonia)	11
Walnut (Juglans)	129	Arborvitaes (Thuja)	50	Buffalo-berries (Shepherdia)	22	Summersweet (Clethra)	10
Chestnuts (Castanea)	127	Persimmons (Diospyros)	46	Tulip-trees (Liriodendron)	21	Buckthorns** (Rhamnus)	10

Double-toothed Prominent (*Nerice bidentata*) larvae feed exclusively on elms (Ulmus), and can be found June through October. Their body shape mimics the toothed shape of American elm, making them hard to spot. The adult moth is small with a wingspan of 3-4 cm.

Honey locust caterpillar feeds on honey locust, and Kentucky coffee trees.

Asterocampa celtis, the Hackberry Emperor caterpillar, feeds exclusively on Hackberry (Celtis) species. Cats overwinter in groups, inside rolled, dead leaves.

Big poplar sphinx larvae (*Pachysphinx occidentalis*) feed on poplars (Populus), and willows (Salix). The adult moth's wingspan is an impressive 13-15 cm. (5-6 inches).

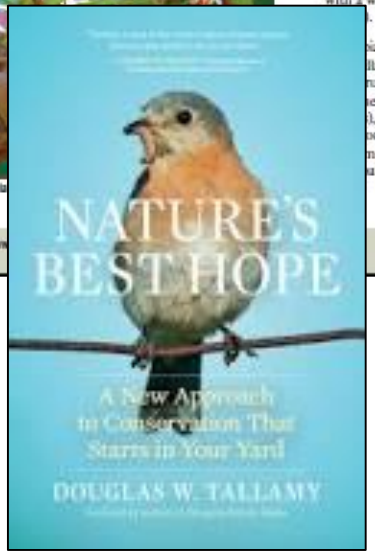
Giant swallowtail (*Papilio cresphontes*) larvae feed on trees and herbs of the citrus family (Rutaceae), prickly ash, hop tree, and common rue. The adult is the largest butterfly in Canada and United States, with a wingspan of 10-16 cm. (3.9-6.3

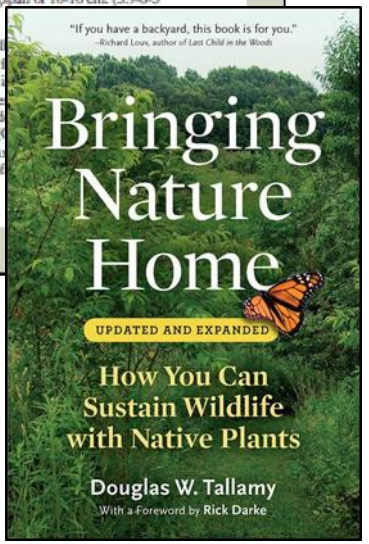
Giant Swallowtail larva defensive red horns extended

Giant Swallowtail photo: Christer Johansson

Cecropia caterpillar

Cecropia





Beyond nuts and berries – Tallamy research

Caterpillars and other protein rich critters

Cues to care examples

- “In settled landscapes, urban or countryside, people expect to see the look of human intention.”
- “To avoid looking neglected, ecologically innovative designs can incorporate cues to care that clearly connote an intentional landscape pattern that conveys the reassuring presence of caretakers.”
- Mowing; showy flowering plants and shrubs; wildlife feeders and houses; trimmed shrubs; plants in rows/drifts; fences/mulch; architectural details/artwork; masonry work; sports team flags; signage; lawn ornaments; fresh painting; sounds; smells; focal plants

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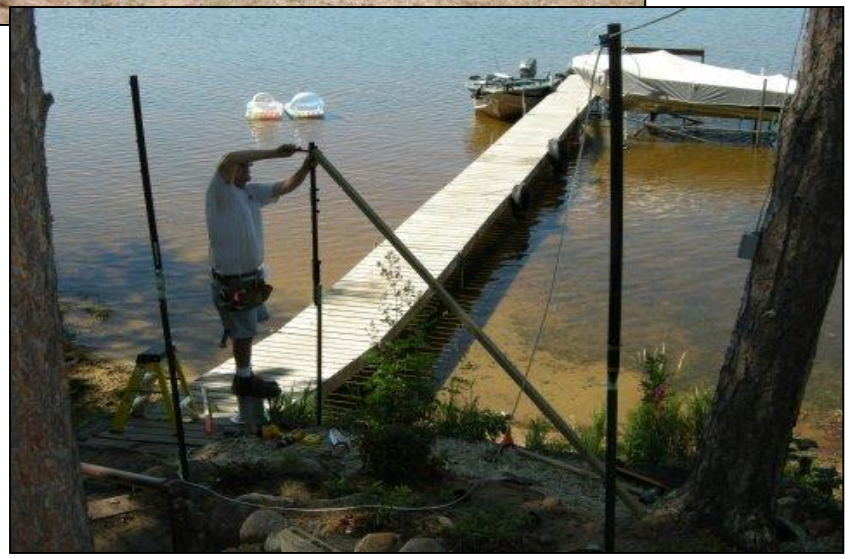
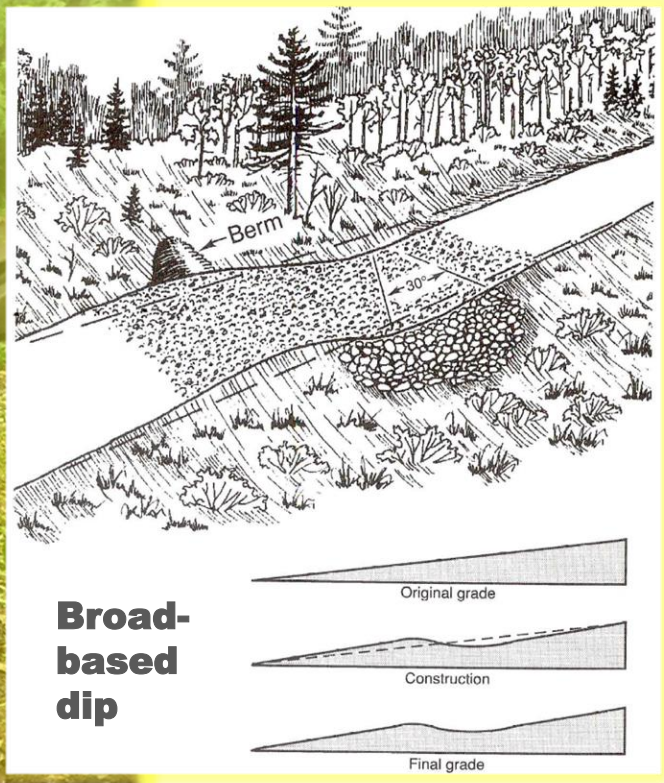
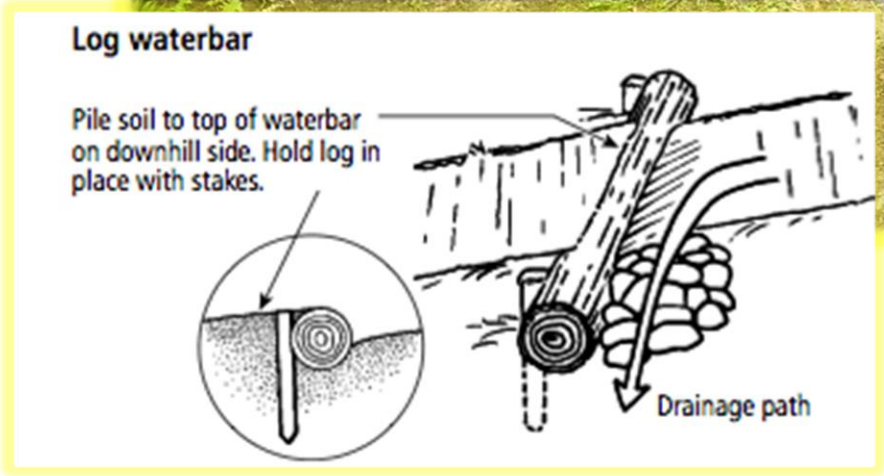
Maintenance – deer and rabbit protection

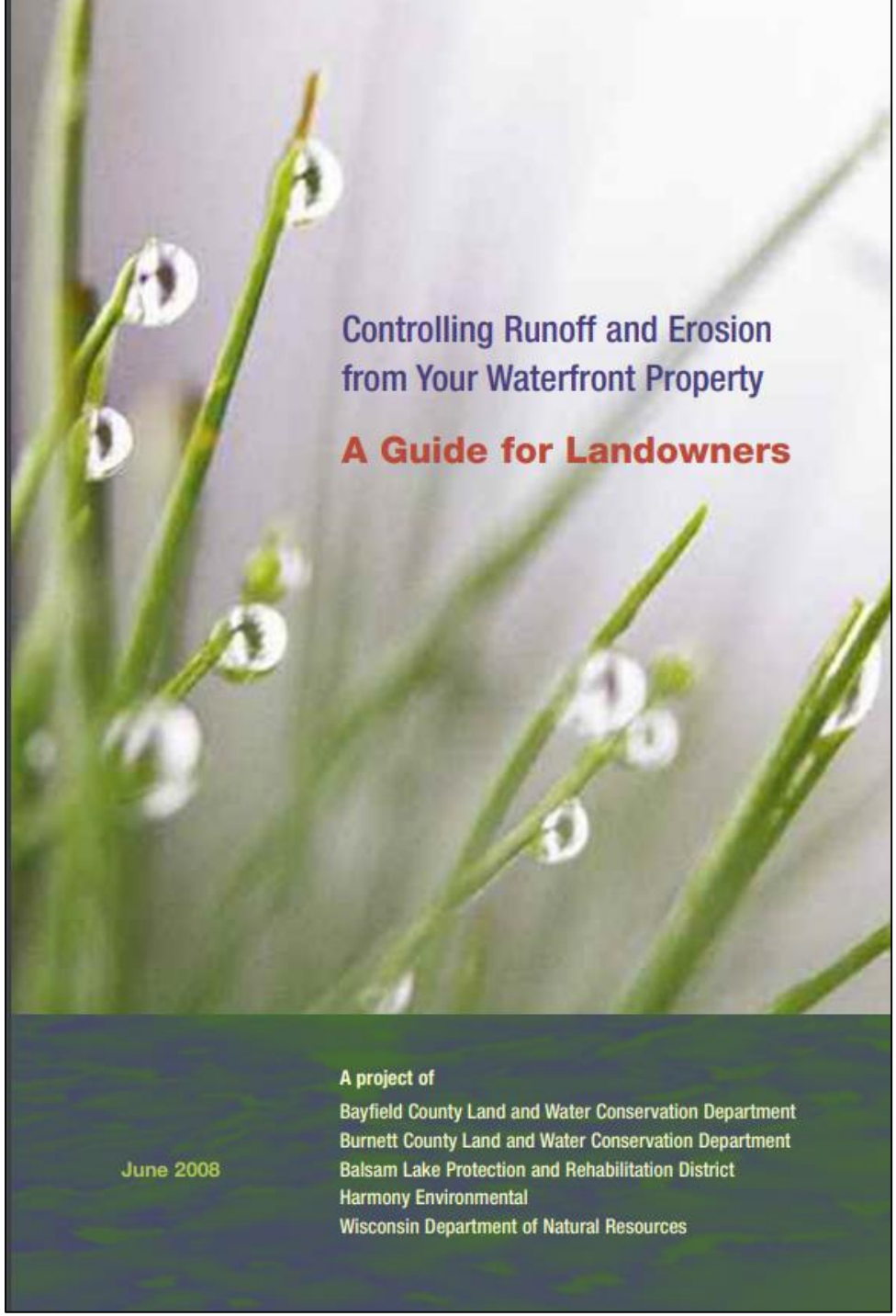


Practice #3: Diversion





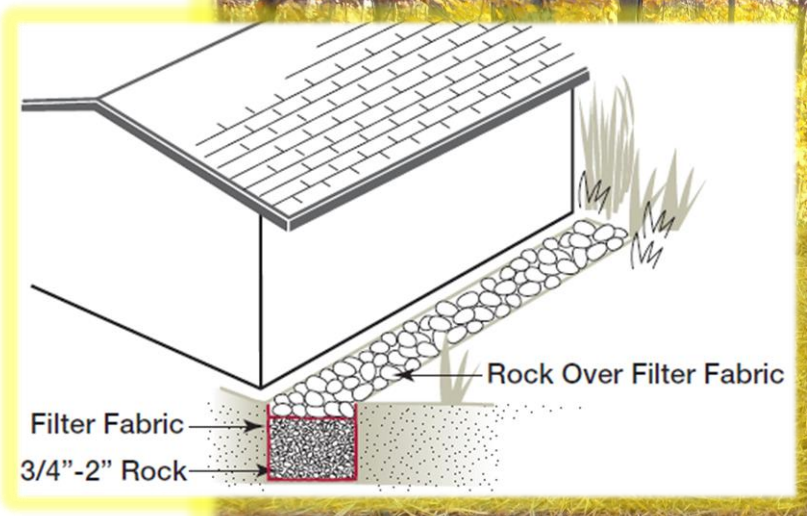
(http://awwatersheds.org/)



Companion document / guide

< https://healthylakeswi.com/wp-content/blogs.dir/16/files/2016/03/Healthy-Lakes-Diversion-Rock-Infiltration-Technical-Guidance.pdf >

Practice #4: Rock Infiltration

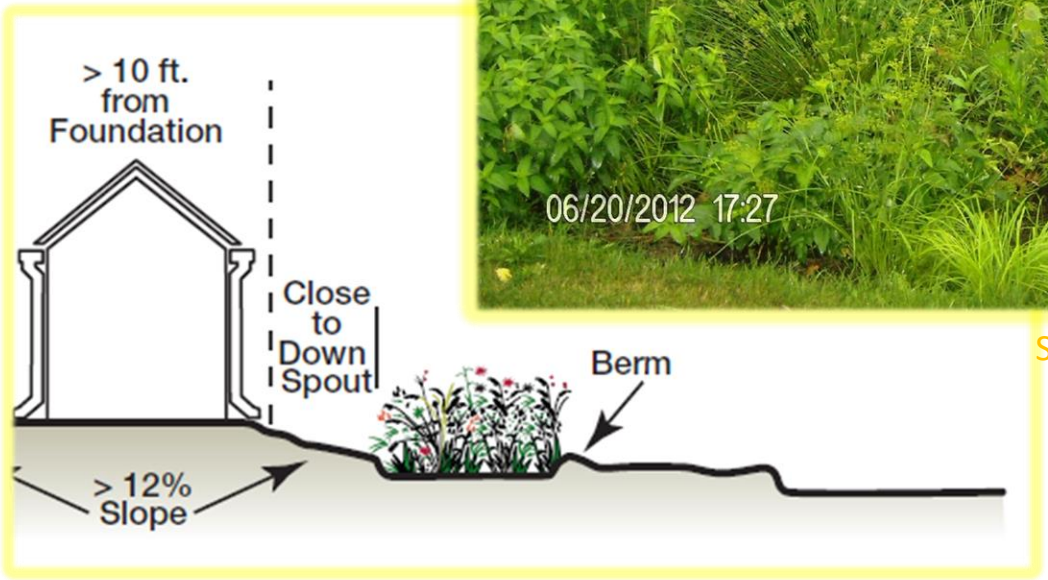


Deer Lake, Polk County (Cheryl Clemens)

Rock infiltration pit
captures and cleans
driveway and roof runoff

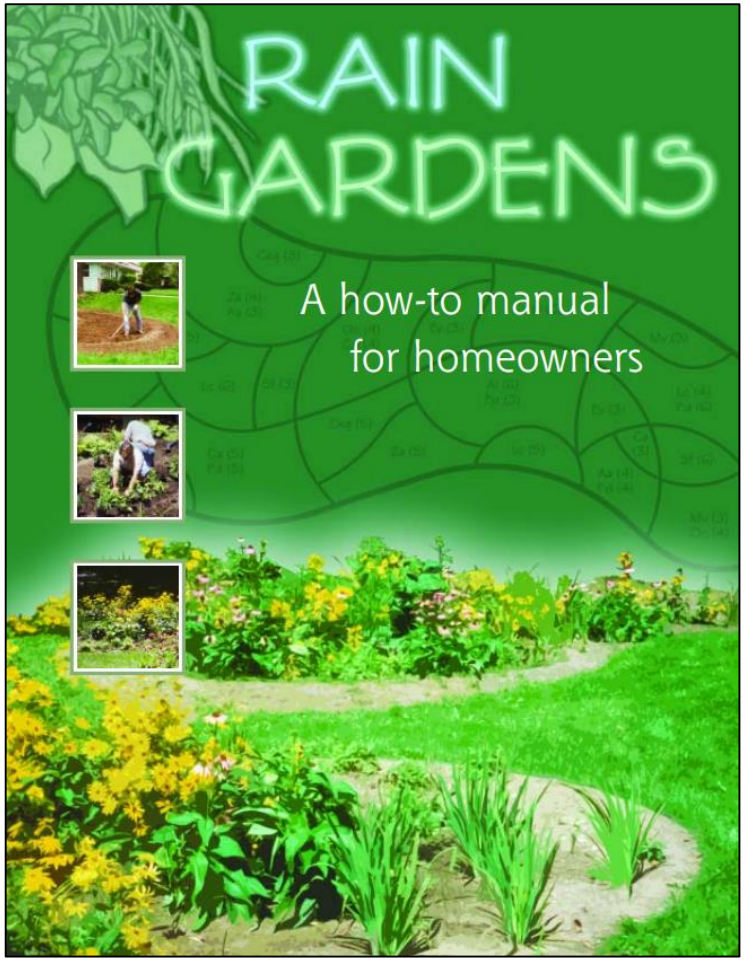
Practice #5: Rain Garden

Shell Lake, Washburn County (Brent Edlin)

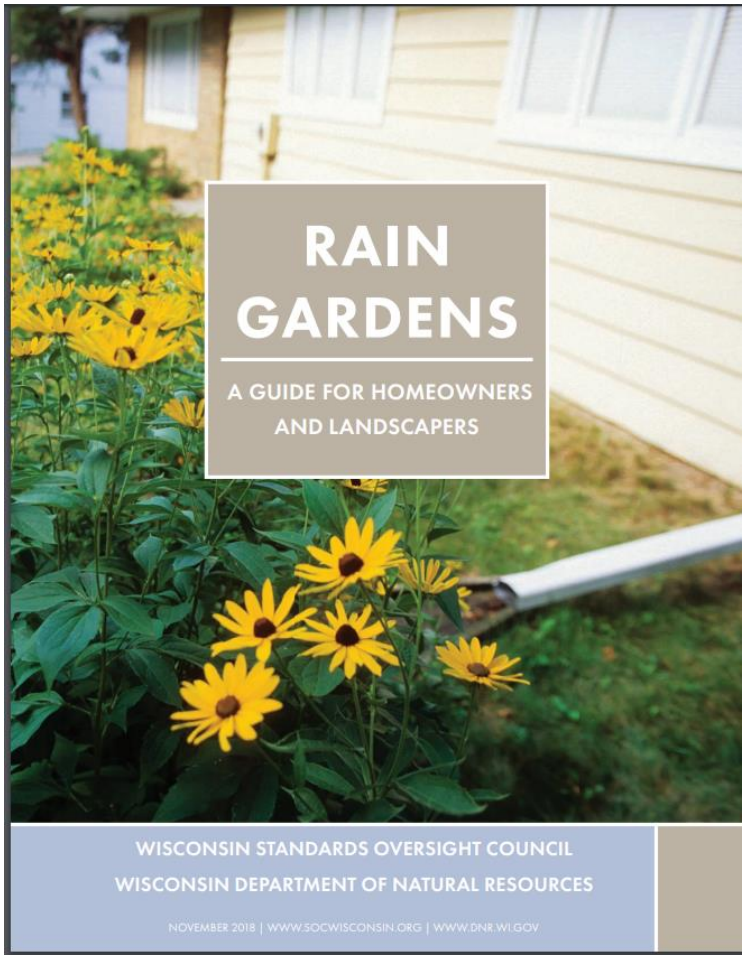


Rain garden webinar: < https://www.youtube.com/watch?v=RvEncgtfUzA >

Rain garden guides



http://clean-water.uwex.edu/pubs/pdf/rgmanual.pdf



https://healthylakeswi.com/wp-content/blogs.dir/16/files/2016/03/Healthy-Lakes-Rain-Garden-Technical-Guidance.pdf

Webinars

Healthy Lakes & Rivers overview webinar - WLWCA

https://www.youtube.com/watch?v=07oMtcMrnL4&feature=emb_imp_woyt

CLMN webinar

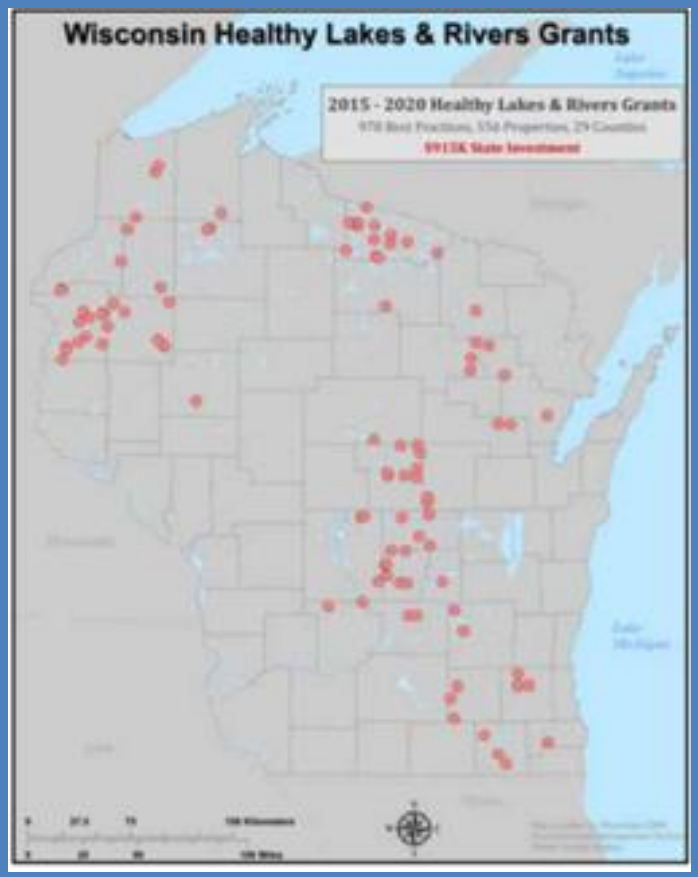
https://www.youtube.com/watch?v=RvEncgtfUzA

Healthy Lakes champions

Participants in program help us market it locally and statewide

Healthy Lakes Grants

- Annual deadline November 1st
  - 75/25% state/sponsor match – reimbursement grant
  - Eligible sponsors, including qualified lake associations, lake districts, counties and other local government units, may apply on behalf of multiple landowners
  - Standard **2-year** grant agreement
  - First time participants need to meet w/ DNR lake or river biologist prior to first grant (Sept. 1st goal)
- Each best practice capped at $1000 state share
- 10-year contract with standard operation & maintenance details described in grant agreement
  - Grant sponsor develops and administers contract that landowner signs
- Self-reporting or site visits on 5-10% of projects annually by Healthy Lakes team members
- FAQ fact sheet on web site


Wisconsin Healthy Lakes & Rivers Grants
2015 - 2020 Healthy Lakes & Rivers Grants
978 Best Practices, 556 Properties, 29 Counties
$915K State Investment

We're Making
Healthy Lakes & Rivers Together!
$915K STATE investment
The Wisconsin Department of Natural Resources has invested $915K toward Healthy Lakes & Rivers projects since 2015.
556
Properties
Help us reach our goal of 724 properties in 2021!
29
Counties
Nearly half of Wisconsin's counties have projects.
423
Native Plantings
212
Fish sticks
165
Rain Gardens
96
Diversions
82
Rock Infiltrations
Healthy Lakes & Rivers

Healthy Lakes Program of
Patrick
healthylakeswi.com
Apps Suggested Sites Imported From IE Accept friend request grosbeaksgalore New Tab A-Hole 2015 Lakes Partnersh Google Docs Other bookmarks

FISH STICKS

Create fish and wildlife habitat.

Fish Sticks are feeding, breeding, and nesting areas for all sorts of critters – from fish to song birds. They can also prevent bank erosion – protecting lakeshore properties and your lake.

LEARN MORE

I own lakeshore property.

You can make a difference. Learn about Healthy Lakes best practices for your property and how to find help.

Get Started

I'm an eligible grant applicant.

Qualified lake associations, lake districts, municipalities, and tribal governments can apply for Healthy Lakes grant funding on behalf of multiple lakeshore property owners.

Get Started

Let's make Healthy Lakes & Rivers together!

THE HEALTHY SHORE LIST

HOW DOES *YOUR* WATERFRONT CHECK OUT?

✔

___ **PLANT A BUFFER ZONE OF NATIVE VEGETATION CLOSE TO SHORE**
The tangle of roots filters impure runoff from your cottage and slows erosion of the soil

___ **SWEAR OFF PESTICIDES AND HERBICIDES**
They end up in the water and are bad news for aquatic life

___ **OPT FOR A FLOATING OR PIPE DOCK**
It causes the least disturbance to the shoreline lakebed

___ **MOOR THE SWIM RAFT FARTHER OUT TO SAVE SHORE PLANTS**
Birds nest and fish spawn in those things you call "weeds." Don't tear them out

___ **"SOFTEN" HARD WALKWAYS AND DRIVES**
Unlike asphalt, pea gravel or wood chips soak up runoff

___ **PRESERVE YOUR PROPERTY'S MATURE TREES**
Their deep roots stabilize the slope down to the water

___ **FORGO FERTILIZERS/UPGRADE YOUR LEAKY SEPTIC SYSTEM**
Both send phosphorus into the lake, fuelling algae growth and depleting oxygen

___ **LEAVE FALLEN TREES AND BRANCHES IN THE SHALLOWS**
Wood nourishes all sorts of underwater critters and provides cover for fish

___ **KEEP OIL AND GAS WELL AWAY FROM THE WATER'S EDGE**
Even a minor spill has big consequences for vulnerable lake dwellers

___ **USE UNTREATED WOOD FOR SHORELINE STRUCTURES LIKE DOCKS**
Preservative-free materials, such as cedar, are pricier but much safer for aquatic inhabitants

___ **KICK THE COTTAGE LAWN HABIT**
Turf lets up to 55 per cent of rainfall wash away

___ **REPLACE THAT CRUMBLING CONCRETE BREAKWALL**
A gently regraded slope withstands waves and looks a lot nicer

___ **SHARE YOUR WATERFRONT WISDOM WITH NEIGHBOURS**
Healthy-shore practices benefit everybody, from cottagers to fish

FOR MORE INFORMATION, TURN OVER >

Questions / Discussion

Thanks for all you do to protect and make better lakes and rivers around Three Lakes!

The Wisconsin Lakes Partnership