



Shoreland restoration plans / plant choices / establishment tips / maintenance

Landscaping at the water's edge: ecological designs for water quality and habitat improvement workshop

– April 14, 2009 / On the edge: enhancing ecological integrity of shorelines

22nd Annual National Conference – Enhancing the States' Lake Management Programs – Chicago, IL



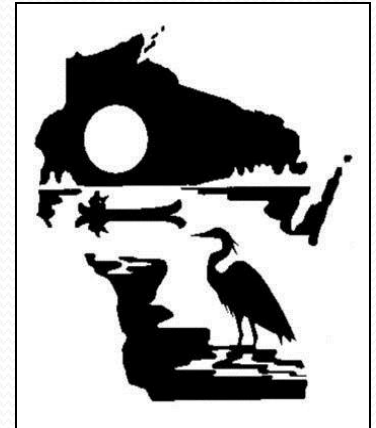
Patrick Goggin – *Lakes Specialist*
UW Extension Lakes /
Wisconsin Lakes Partnership



The Wisconsin Lakes Partnership



The Wisconsin Lakes Partnership



- Google UWEX lakes
- <http://www.uwsp.edu/cnr/uwexlakes/>
- <http://www.wisconsinlakes.org/>
- <http://www.dnr.state.wi.us/>
- Lake Tides... The Lake Connection
- Lake List
- CBCW
- CLMN





Talk outline: four themes

Shoreland restoration plans

Types of revegetation

Protection of intact buffers
No-mow / natural colonization & recovery
Accelerated recovery

Steps in a process

Goals and objectives for the site are discussed
Site characteristics / assessment
Imitate local communities / reference areas
Landowners concerns, uses, and view corridor
Developing a plan for the site

Components of a plan

Site inventory results
Sketch out a site drawing
ID existing vegetation
Map out site uses / features
Check on permits with local agencies
Talk with local professionals for help
ID & plan for any erosion control issues
Compile your landscape plan

Lessons learned

Create a network of helpers to assist you
Partnerships are needed
Be flexible+
Start permit requests early on for the project

Plant choices

Finding plant material

Why native plants?
Overview of example catalogs / resources
Know the source / local ecotypes
Layers of vegetation
Selecting plant stock
Donor material
High school classes / growing

Native plant sources

Working with your nursery
Container types
Native seed collection, cleaning, and propagation / seed banks
Plant rescues vs. digging from the wild
Contract growing

Work horse species

What are they?
Midwest examples

Lessons learned

Landscaper s, nursery staff, and consultants trainings and workshops
On-site seed collecting
Shoreland planting packets
County land & water conservation departments / districts native plant sales

Establishment tips

Developing a plant list

Notes from reference sites
Understand key growth characteristics
Assorted bloom times and colors
Creating new structure and habitat
Planting for wildlife-ex. birds; butterflies; etc.
Planting zones-aquatics, emergents, buffer strip, upland, woody vegetation
One-third rule: grasses, sedges, & rushes

Shoreline revegetation / restoration

Site preparation
Estimating the amount of plant material
Planting densities
Layout a planting scheme-three tiers of vegetation
Using the plan / pre-planting preparation
Installation
Volunteer labor / consider outside help

Lessons learned

Can complete projects in phases
No protection, why do it
Aquatic plantings-tricks of the trade
Sod cutter islands

Maintenance

Watering

Watering devices-delayed; remote; etc.
Quantity
Key to success / landowner commitment

Invasive species control

Recognizing invasives
Monitoring site over time

Protection of plantings

Deer sprays
Fencing options
Supplemental plantings / fill in any gaps
Signage
Be mindful of dock and boat storage
Prune trees to open views

Lessons learned

Watering can take a lot of time
Landowners agree on water source upfront
Drought plans
If you have invasives before you start, then be ready for invasives later on
Downed wood is good, on land and in the water
Assorted before / after photos

Defining shoreland buffer restoration

Practice that uses native trees, shrubs, and groundcover, along with natural and biodegradable materials (biologs, delta-lock bags, sediment logs, soil lifts, woody material, etc.), to reduce lakeshore erosion and improve aquatic and wildlife habitat quality.



Shoreland buffer restorations can be considered a successful management practice if they:

- Reduce surface water and nutrient run-off
- Reduce shoreline bank erosion
- Increase native plant abundance and diversity
- Improve wildlife habitat quality
- Increase wildlife abundance and diversity



Types of revegetation

1. Protection of intact buffers

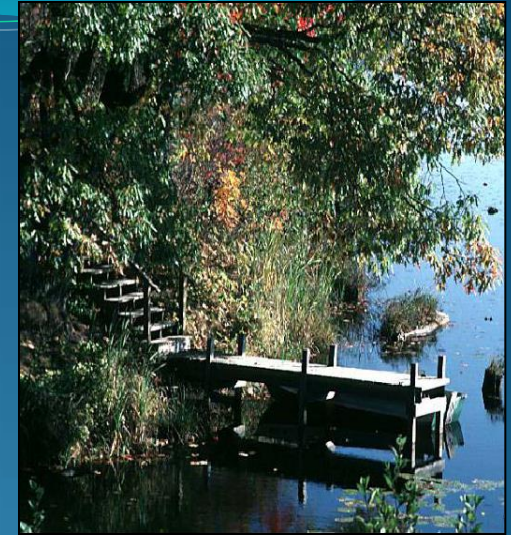
- No serious erosion problem
- Native vegetation present
- Diversity of structure
- Shoreland buffer requirement met

2. 'No mow' > natural colonization / recovery

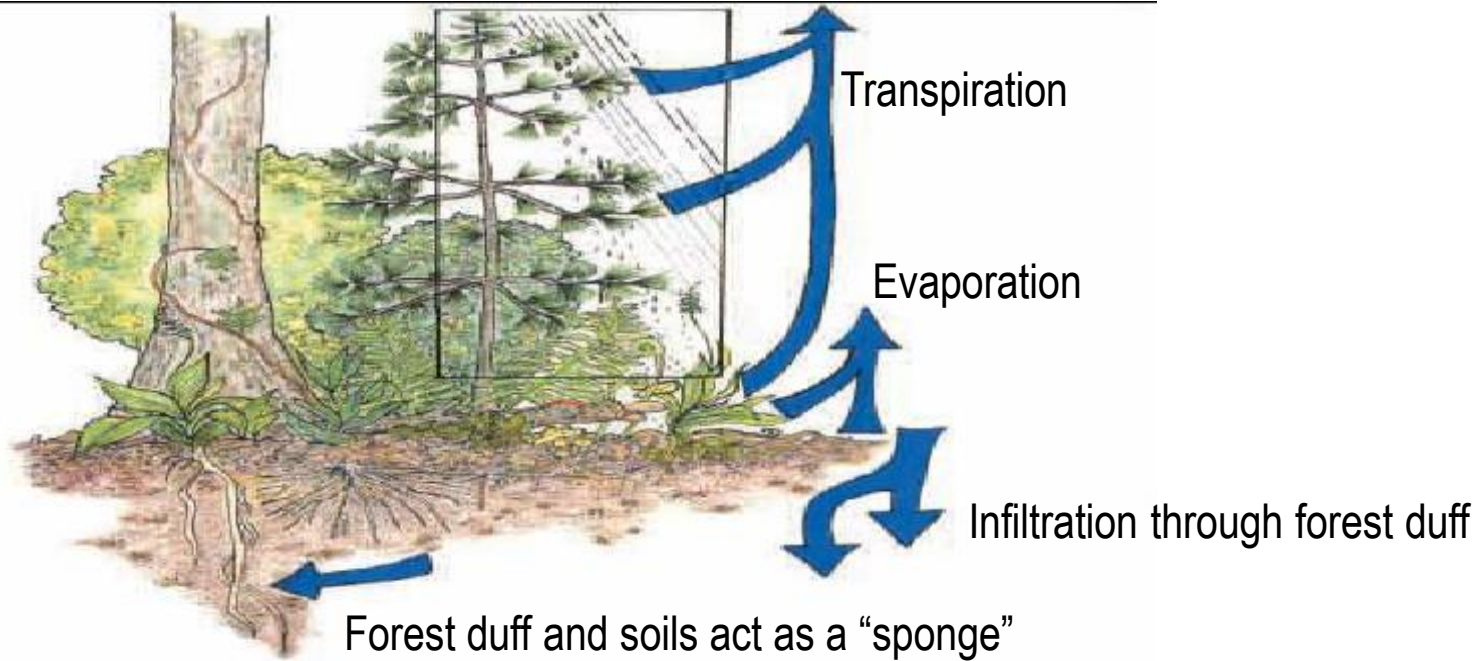
- Native elements present including seed bank
- Turf grasses not well established
- Areas screened from view
- Discourage trampling
- Look for opportunities to see results and promote

3. Accelerated Recovery

- Turf grass well established
- No native plants present
- Exposed soil
- Lots of traffic
- Sand beach maintained
- Quick results wanted



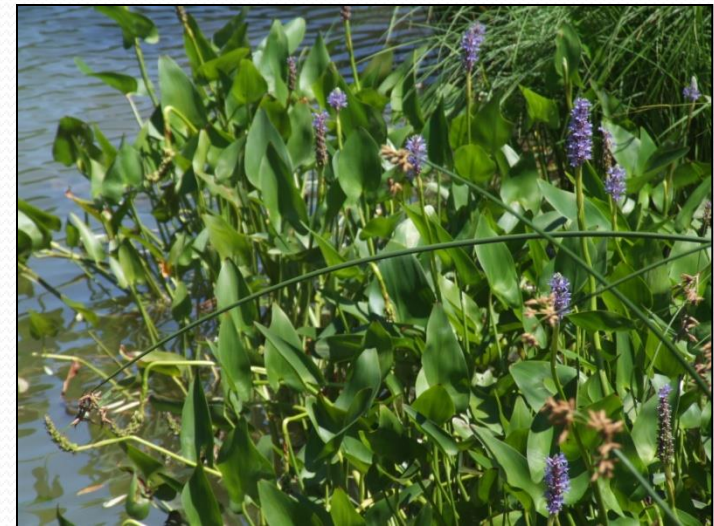
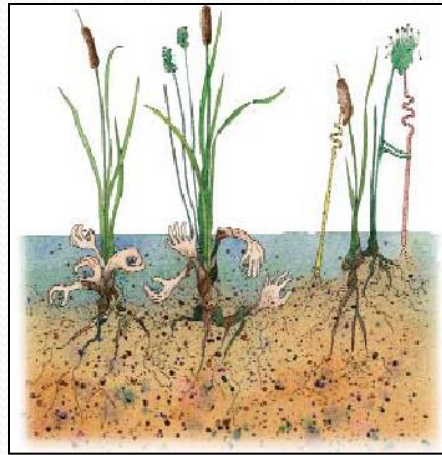
Importance of layered vegetation

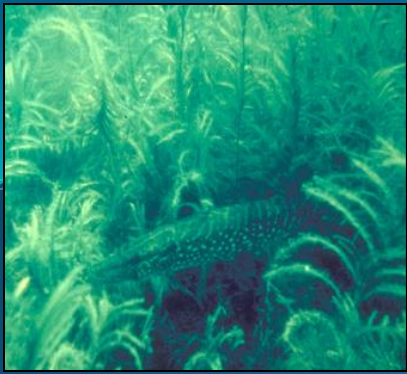


Roots stabilize soils preventing erosion and allow plants to pump up water back into the atmosphere (transpiration)

Vegetation-the roots to the solution

The riparian areas of shorelines are glued together by a diversity of plants with strong, deep root systems, especially those of woody plants.





Steps in the process > identify and discuss the goals and objectives for the site

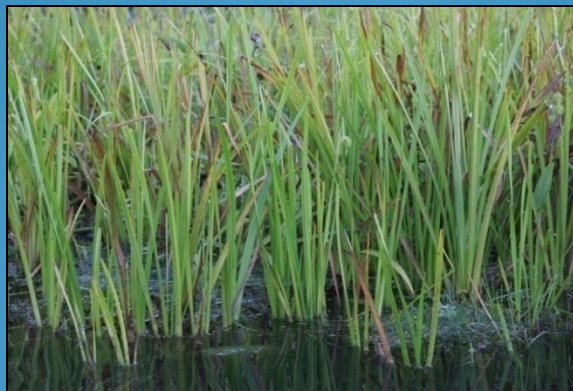
- View corridor (30 ft. viewshed), recreational uses, wildlife support
- Access points along shoreline including docks, walkways, beach area, storage, etc.
- Wildlife impacts (muskrats; deer; etc.)
- Enhance existing native plants at the site / no mow areas vs. accelerated recovery
- Aesthetics: natural, wild (“untidy”) look versus a more landscaped feel (“tidy”)
- What the neighbors will think? Talk w/ them @ the project
- Exotic species control
- Attaining proper WDNR / county zoning permits



Steps in the process > site characteristics

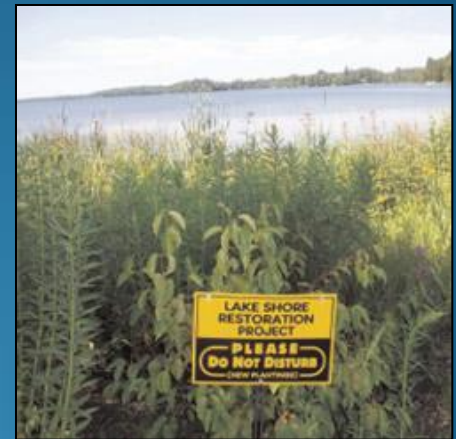
All factors at the site must be taken into consideration including:

- Moisture conditions (bank zones)
- Wave action
- Overland runoff
- Soil type
- Sunlight availability
- High traffic areas
- Goose and deer protection



Steps in the process > shoreland site assessment might include:

1. Determine if causes of instability are local (e.g., lake or overland actions, ice, seepage, sediment accumulation, littoral drift, etc.) or watershed related (e.g., water level control structure, recreation, etc.).
2. Waterway designation (area of special natural resource interest, ORW, ERW) and size and type of water body (seepage lake, groundwater drainage lake, drainage lake, impoundment).
3. Water level fluctuation, *ordinary high water mark (OHWM)*, water depth at 20 feet and 100 feet from shore.
4. Shore orientation and geometry.
5. Bank recession rate.
6. Average fetch – Measured by the average of a central radial line, perpendicular to the shoreline, and two radials measured at 45 degree angles from the central radial.
7. Drainage paths, flow patterns, runoff controls, roof gutters, impervious areas.
8. Bank and bed composition and stability – Soil type, composition, Unified Soil Classification System (USCS) profile log, bank height, bank angle, percent of bank protected by vegetation, rooting depth and density, presence of existing erosion control practices.
9. Tiers of vegetation – Aquatic, littoral, bank and upland; presence of invasive species.
10. Identification of the size and location of areas or habitats requiring avoidance (e.g., wetlands, riparian and upland areas, near shore habitat).
11. Aquatic/terrestrial habitat and movement corridors for wildlife in a watershed context.
12. Length of treatment area and accessibility for equipment.
13. Location and size of access corridor.
14. Number and orientation of existing or proposed decks, steps, piers, access points to water body, utilities, etc.
15. Documentation of cultural and historical resources.
16. Site sketch illustrating items 1-15...



Steps in the process > imitate local plant communities using reference sites

Similar site conditions:

- Light (areas of light and shade)
- Soil type / water holding capacity
- Moisture levels

Find an undisturbed area of your lake similar to your site conditions and investigate it:

- What kinds of native trees, shrubs, wildflowers are there?
- What densities are these plants found in at the site?
- Look to mimic what you see there in your revegetation efforts...



Steps in the process >

landowners concerns, uses, and view corridor



Typical questions to ask:

- What end product does each family member envision for the shoreline?
- What is the property's drainage pattern?
- Where are the areas of heaviest use?
- Recreational uses? (types; # of people) etc.
- Pet and children areas?
- Where is the viewing corridor?
- Structures near the water?

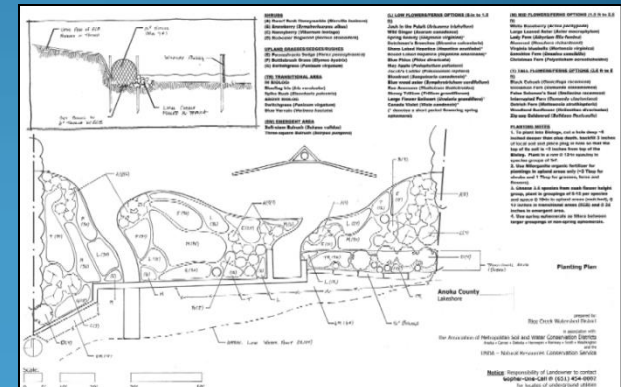
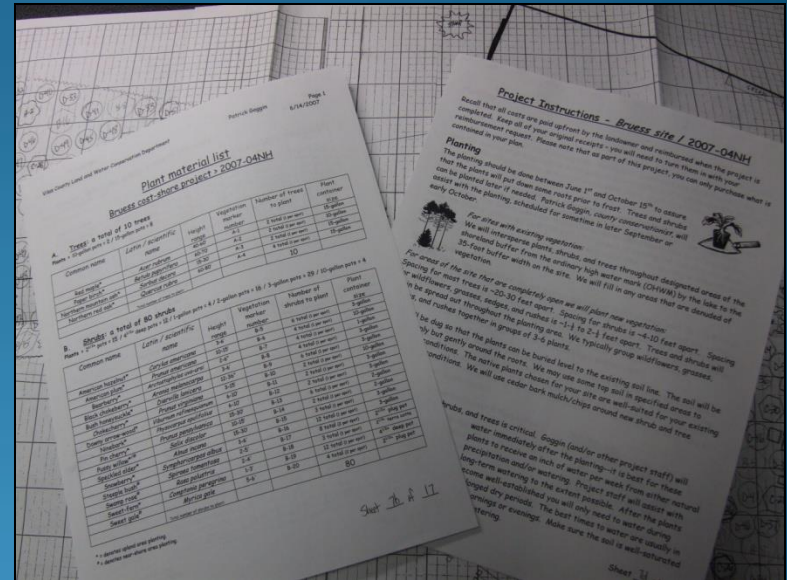


Steps in the process >

developing a plan for the site

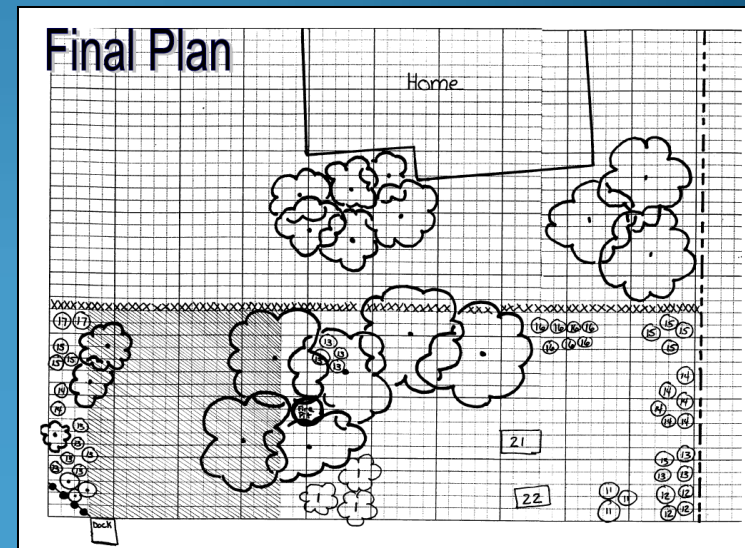
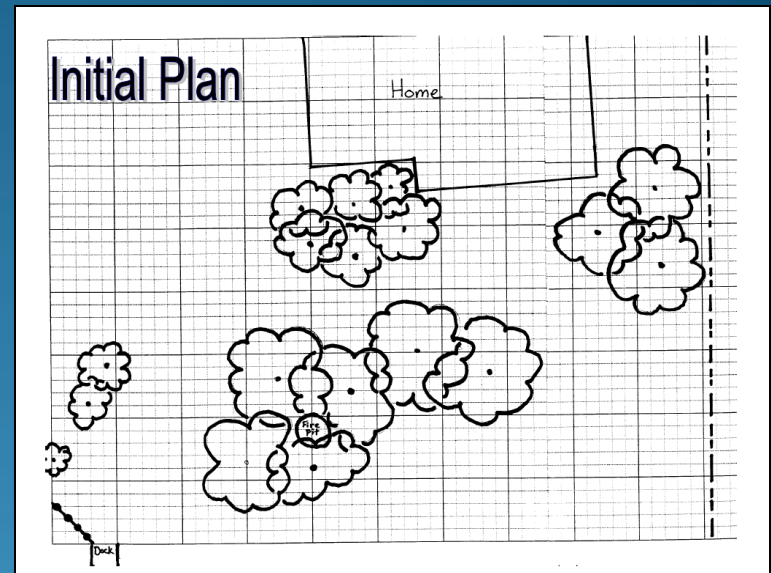
See example plan

- Cover sheet/map & landowner info
- Estimated quantities/materials list
- Construction notes
- Plan view – bird's eye view of the site
- Cross sections for any engineering work
- **Planting plan**
- Permit paperwork/pertinent state standards
- Specifications
- Support documents/pictures/resource lists



Components of a plan > things you should have thought about as you developed your plan

- Site inventory results
- Sketch of site
- Existing vegetation is identified
- Map out site uses /features: fire pit; beach area; boat storage; fire ring; sunset bench; pathways; docks; dog zone; children area; swimming; etc.
- Check out permits with local agencies
- Consult local professionals for help
- Identify and create solutions for erosion control problems
- Compile your landscape plan: upland; buffer; and near-shore areas





Components of a plan > permits/talking w/ local agencies



Permits are required for most activities and specific requirements are set forth, including:

- **Setbacks:** Certain setbacks must be met from roads, waterways, lot lines, floodplains, wells and septic systems in order to protect health, safety and water quality. All structures have required setbacks. Structures include any human-made object with form, shape and utility.
- **Subdivisions:** Minimum lot sizes are required for newly created parcels, in order to provide for safe and orderly building placement and access.
- **Sanitary Regulations:** Rules for proper wastewater disposal (septic systems) address proper siting, design, installation, inspection and maintenance of all septic systems in order to protect public and environmental health.
- **Land Disturbing Activities:** Grading, filling, dredging, ditching and excavating are limited in order to prevent erosion and destruction of fish and wildlife habitat. The regulations also protect neighboring properties.
- **Vegetation Removal:** Removal of existing trees and vegetation should always be kept to a minimum. No excavation or vegetation removal shall be done in the area within 35' from the shoreline. This area, known as the Vegetative Buffer area, offers an area for reducing and filtering runoff before it gets to the water and also offers habitat for fish and wildlife. Only a 30' wide area may be cleared for access to the water.
- **Nonconforming Structures:** Nonconforming structures are those structures that do not meet certain setbacks but were built prior to the ordinance being in effect. There are more restrictive limitations on the expansion and improvements of nonconforming structures in order to reduce the impact that these structures have on water quality or public health and safety factors.
- **Impervious Surfaces:** These are areas where precipitation is essentially unable to infiltrate into the soil. Impervious surfaces are limited because of the negative impacts that unfiltered stormwater has on our lakes and rivers and neighboring properties.
- **Stairways and Walkways:** Stairways and walkways may be permitted in areas less than 75' from the shoreline in order to provide safe access and to protect the shoreline because of steep slopes or wet, unstable soils.
- **Development in Wetlands:** Development in wetlands is strictly limited in order to protect water quality, flood storage areas, stormwater filtering areas and fish and wildlife areas.
- **Uses:** Conditional Use Permits may be required for certain "uses" of a property which may not be in conjunction with surrounding uses, such as commercial uses, motels and multi-family dwellings.



Shoreland restoration plans > lessons learned

- Create a network of helpers to assist you (landscapers; nursery people; agency folks; conservation groups; lake community members; etc.)
- Partnerships are often needed, especially for bigger projects
- Be flexible and plan a few years out if possible as these projects take time
- Start permit applications early on in the project



Plant choices

Plant choices > finding plant material

- Why native plants?
- Overview of example catalogs / resources
- Know the source / local ecotypes
- Layers of vegetation vs/ hydrologic zones
- Selecting plant stock
- Donor material
- Team up with high school / clubs for growing native plant material



Why native plants?

Plant choices > finding plant material

- Conservation of local genetic diversity
- Ability to provide food and shelter for native wildlife
- Improved health and vigor—climatically at home
- Increased survival rates for your plantings—save \$
- Reduced maintenance costs





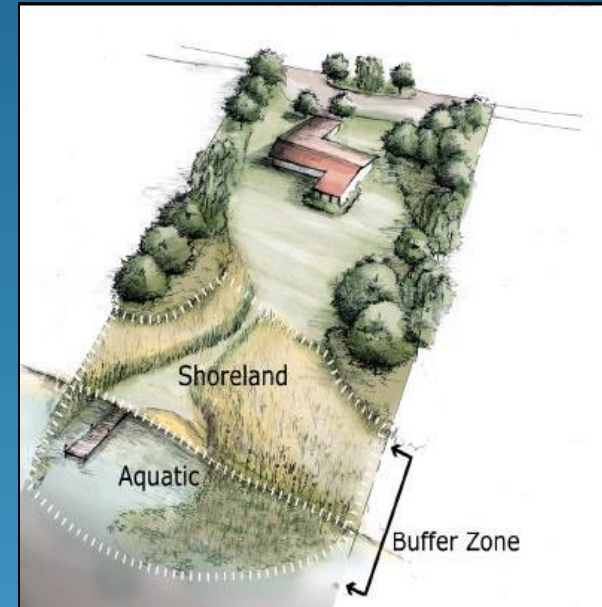
Layers of vegetation

Emergent: a rooted plant growing up through the water surface; the majority of plant is above water.

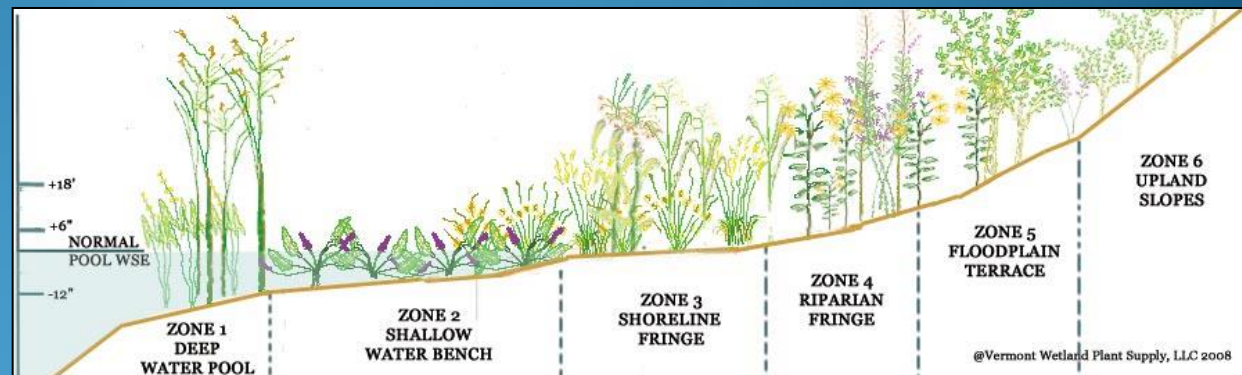
Floating-leaved: a plant rooted in the substrate with its leaves floating on the water surface.

Free-floating: a plant growing while freely floating on water.

Submergent: a plant growing completely underwater; can be rooted or floating.



Source: MNDNR



@Vermont Wetland Plant Supply, LLC 2008

Source: < http://www.vermontwetlandplants.com/plants_stormwater.html >

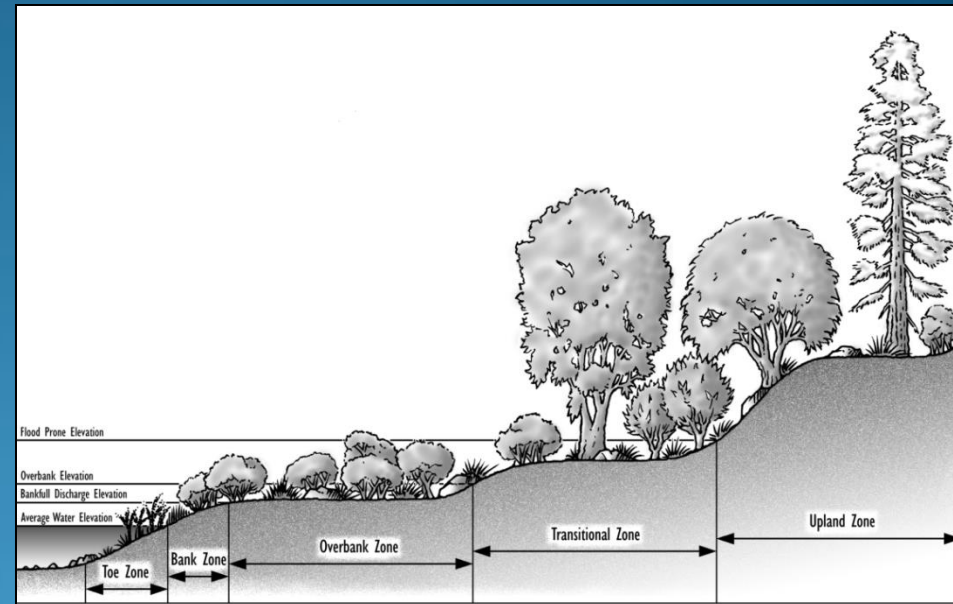


Plant choices > finding plant material

Layers of vegetation vs. hydrologic zones



Vermont Lake Protection Series #3



Hydrologic zones - STREAMBANK AND SHORELINE PROTECTION (Feet) Code 580



Plant choices > native plant sources



- Working with your nursery
- Container types
- Native seed collection, cleaning, and propagation / seed banks
- Plant rescues vs. digging from the wild
- Contract growing



Plant choices > native plant sources

working with a nursery



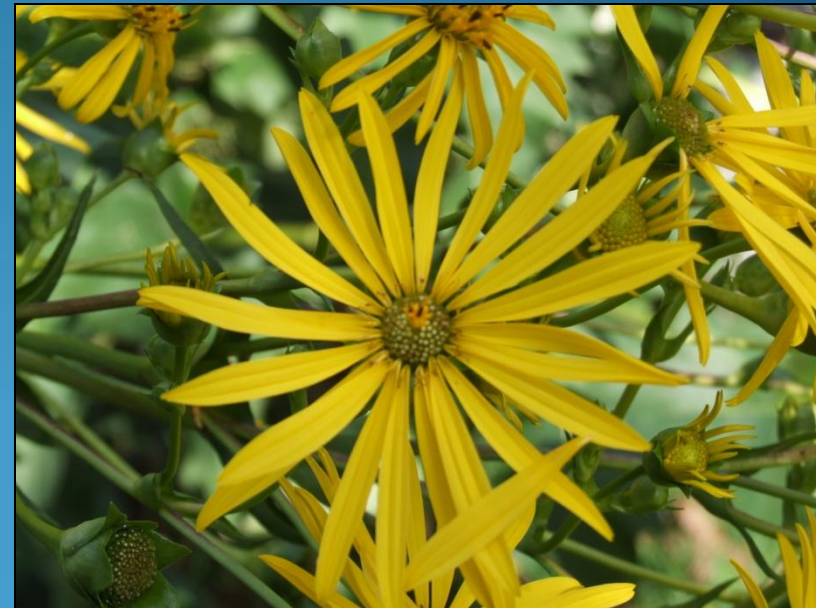
- Special orders – plan well in advance
- Determine origin / propagation method
- DO NOT use imported plants
- Contract growing



Plant choices > work horse species

What are they? Typically these plants have traits we admire for shoreland habitats:

- Penetrating, deep roots.
- Prolific seeders that pioneer into disturbed ground before weeds and invasive species arrive.
- Many also have rhizomatous, fibrous, and/or clump forming root systems that minimize erosion.
- Most have wildlife habitat benefits of one sort or another too, such as providing nesting material, food, and cover.
- They are tolerant of variability in site conditions for moisture, water depth, soil type, and light.
- They can also be propagated efficiently and in a cost effective manner by nurseries specializing in native plant material production.



Plant choices > lessons learned

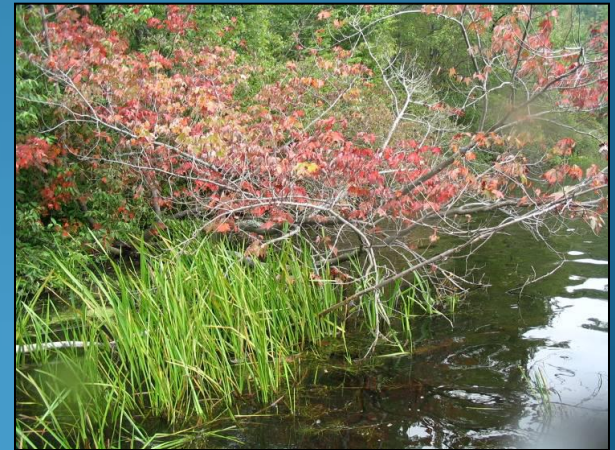
- **Workshops** (for landscapers; nursery people; agency folks; conservation groups; lake community members; and consultants on shoreland restoration)
- On-site seed collecting
- Shoreland planting packets
- County land & water conservation departments / districts native plant sales



Establishment tips

Establishment tips > developing a plant list

- Notes from reference site visits
- Understand key growth characteristics of plants
- Assorted bloom times and colors
- Creating new structure and habitat-3 tiers
- Planting for wildlife: ex. birds; butterflies; amphibians; etc.
- Planting zones: aquatics; emergents; buffer strip; upland; woody vegetation
- One-third rule: grasses; sedges; & rushes





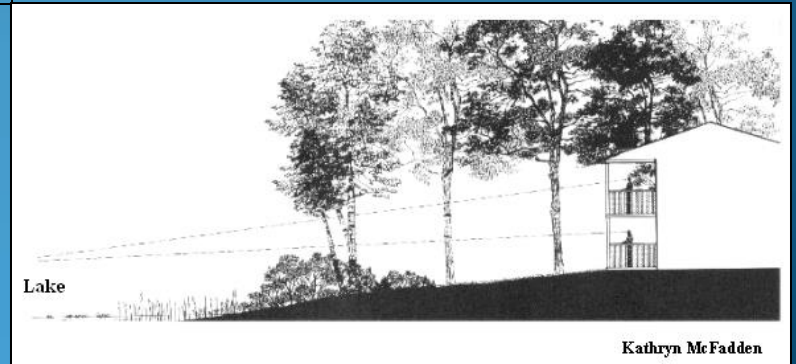
Establishment tips > growth characteristics

1. Life expectancy
2. Rate of plant establishment
3. Ability to reach suitable size in a reasonable time period
4. Resistance to herbivores
5. Ability to find/propagate
6. Competition with other plantings and naturally occurring species



Establishment tips > shoreline revegetation / restoration

- Site preparation
- Estimating the amount of plant material/square footage
- Planting densities
- Layout a planting scheme: three tiers of vegetation
- Using the plan and pre-planting preparations
- Installation
- Volunteer labor / consider outside help

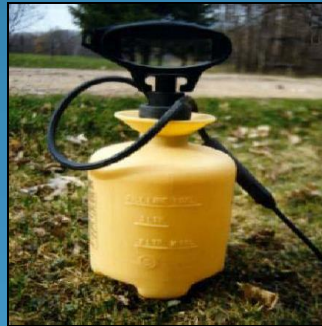


Establishment tips > shoreline revegetation / restoration

Site preparation



- Black plastic
- Soil tilling
- Herbicides





Plantings

- Estimating the plant material needed / square footage
- Planting densities



Planting densities



Shoreland habitat planting densities.

LAYER	Woodland density	Wetland or barrens / Dry prairie / Wet prairie density
Tree	0.5 – 5 per 100 sq. ft.	0 - 0.2 per 100 sq. ft.
Shrub	1 - 4 per 100 sq. ft.	0.2 - 0.5 per 100 sq. ft.
Herbaceous cover/ground layer	25 – 75 plants per 100 sq. ft.	50 – 100 plants per 100 sq. ft.

Source: Wisconsin Biology Technical Note 1: Shoreland Habitat, p. 4.

• Calculate your square footage

[I.e., 100 linear shoreline feet
X 35 foot buffer = 3500 sq. ft.]

- ~18-35 trees
- ~35 shrubs
- 584 forbs
- 292 grasses, sedges, and rushes



Plant material types



Planting stock								
Plant Stock	Description	Collection Time	Planting Time	Relative Cost	Relative Survival Success	Negative Collection Effect	Advantages	Disadvantages
Seed	A propagule with a protective outer coat. Available from some plant nurseries.	• early summer to late autumn	spring or autumn	lowest	low	low	<ul style="list-style-type: none"> • minimal planting effort; can be broadcast or incorporated into soil mixtures • low labor and costs • suitable for large sites • can be stored for several years • increases genetic diversity 	<ul style="list-style-type: none"> • wide range of viability, reliability and success • restricted harvest and planting time • special storage requirements (i.e., no pests, cold, wet) • long stratification period for some species • predation of seed • low germination rates for some species • seed can easily wash away from planting site
Tuber	Large, swollen underground stems that provide food storage for the plant. Available from some plant nurseries.	• spring or autumn	early spring or late autumn	moderate	high	high	<ul style="list-style-type: none"> • minimal planting effort 	<ul style="list-style-type: none"> • large tubers difficult to extract from soil • susceptible to washout • some species susceptible to predation • reduced genetic diversity, may be clonal • difficult to obtain a large number of plants without causing excess damage
Rhizome or rootstock	Underground stems that usually grow horizontal to the surface, providing food storage for the plant. Available from some plant nurseries.	• spring or autumn	early spring or late autumn	moderate	high	high	<ul style="list-style-type: none"> • minimal planting effort • maximizes use of plant materials 	<ul style="list-style-type: none"> • susceptible to washout • generally requires cultivation • reduced genetic diversity, may be clonal • difficult to obtain a large number of plants without causing excess damage
Container (propagated seedling)	Young plants that have their roots surrounded by soil in a peat, fiber or plastic pot. Available from many plant nurseries.	• not applicable	spring or summer	high	high	low	<ul style="list-style-type: none"> • easy to plant, ideal for volunteers • can store in greenhouse or nursery • allows flexibility in coordinating project design and planting • high level of genetic diversity if seeds are collected properly • bare root material is easier to handle and transport 	<ul style="list-style-type: none"> • requires planning and preparing in advance • susceptible to trampling and predation by wildlife
Bare root	Young plants with very little or no soil surrounding roots. Available from nurseries.	• spring to mid-summer	spring or summer	intermediate	moderate	low	<ul style="list-style-type: none"> • easy to plant, ideal for volunteers • can store in greenhouse or nursery • allows flexibility in coordinating project design and planting • high level of genetic diversity if seeds are collected properly • bare root material is easier to handle and transport 	<ul style="list-style-type: none"> • requires planning and preparing in advance • susceptible to trampling and predation by wildlife
Transplants	A single or group of plants (including soil and root systems) dug from one area on your site or another area and planted in another; not taken from the wild.	• no restriction	spring, summer or autumn	low if done by volunteers; higher if paid labor	high	high	<ul style="list-style-type: none"> • rapid establishment • increases probability of success • stabilizes soil rapidly 	<ul style="list-style-type: none"> • very labor intensive • may be difficult to dig, transport and plant • causes damage to the donor site • difficult to obtain a large number of plants without causing excess damage



Implementing a plan

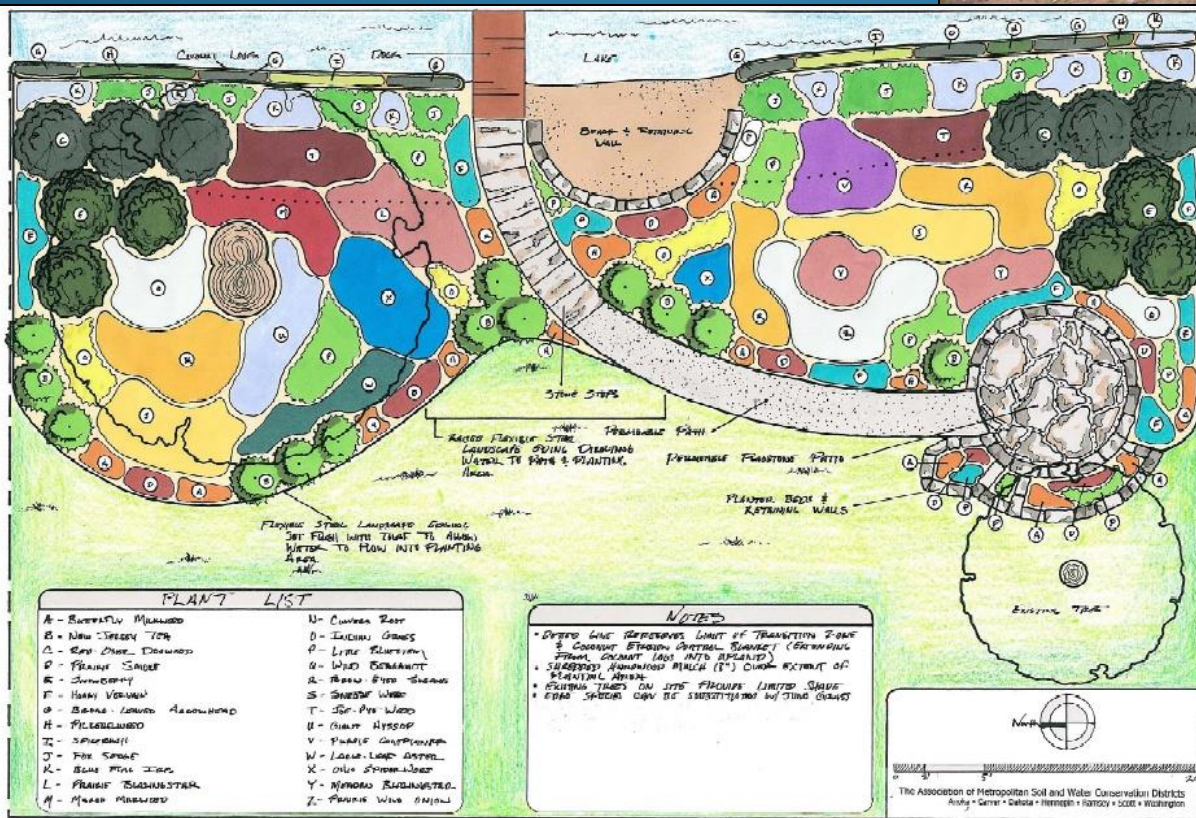
Revegetation:

Three tiers of vegetation: trees, shrubs, and groundlayer—
wildflowers, sedges, grasses, ferns

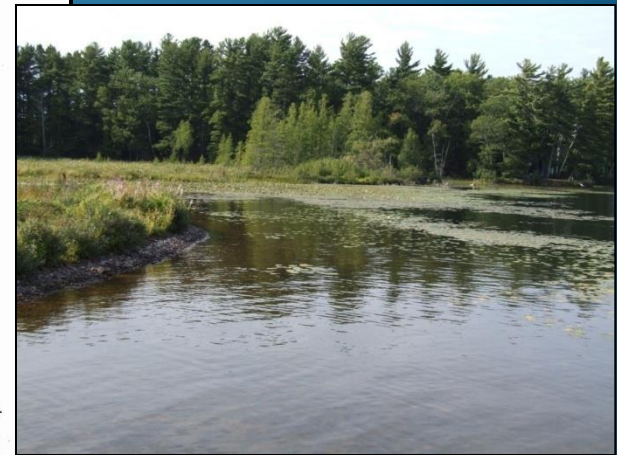
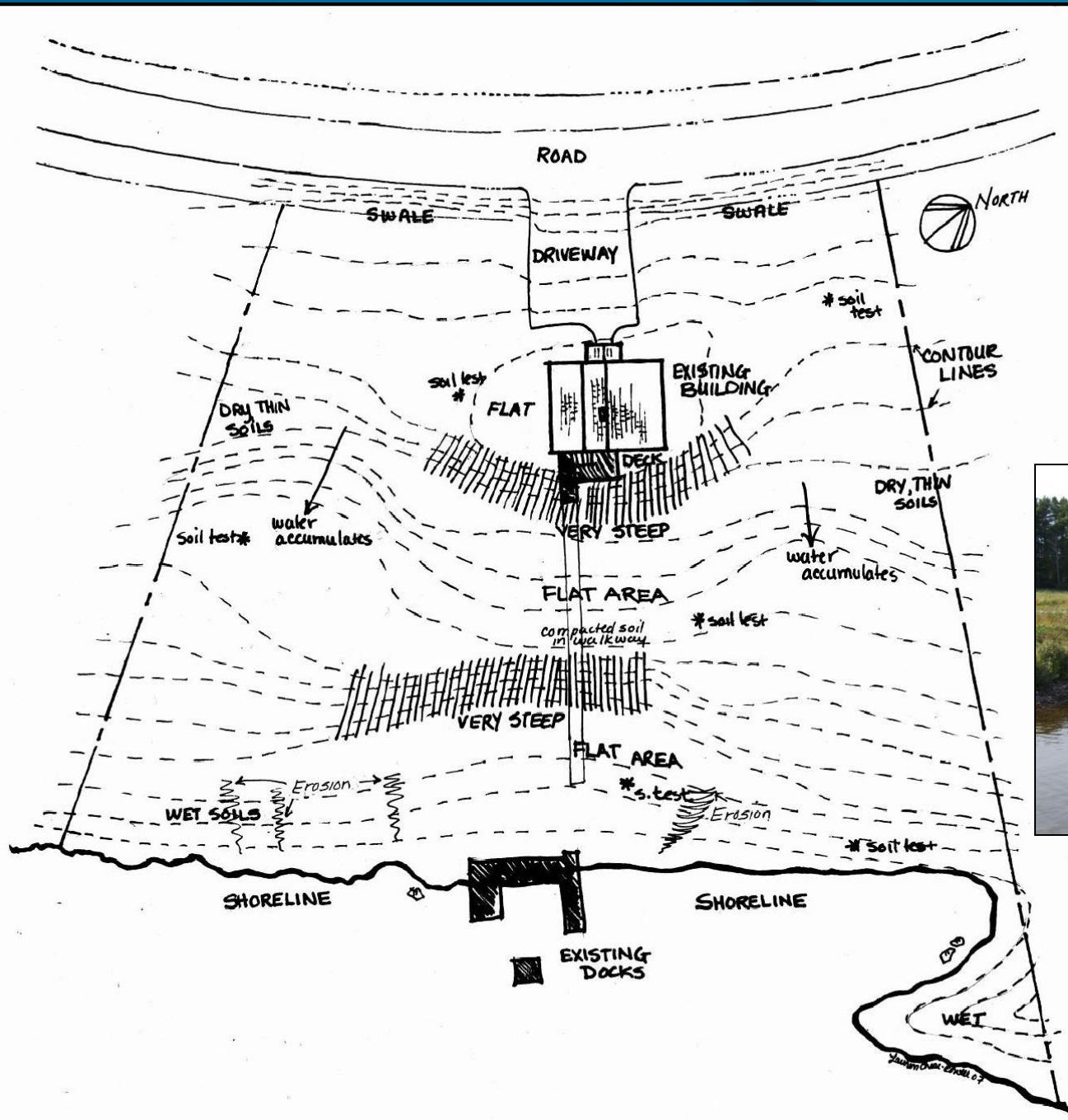


Establishment tips > shoreline revegetation / restoration

Using the plan

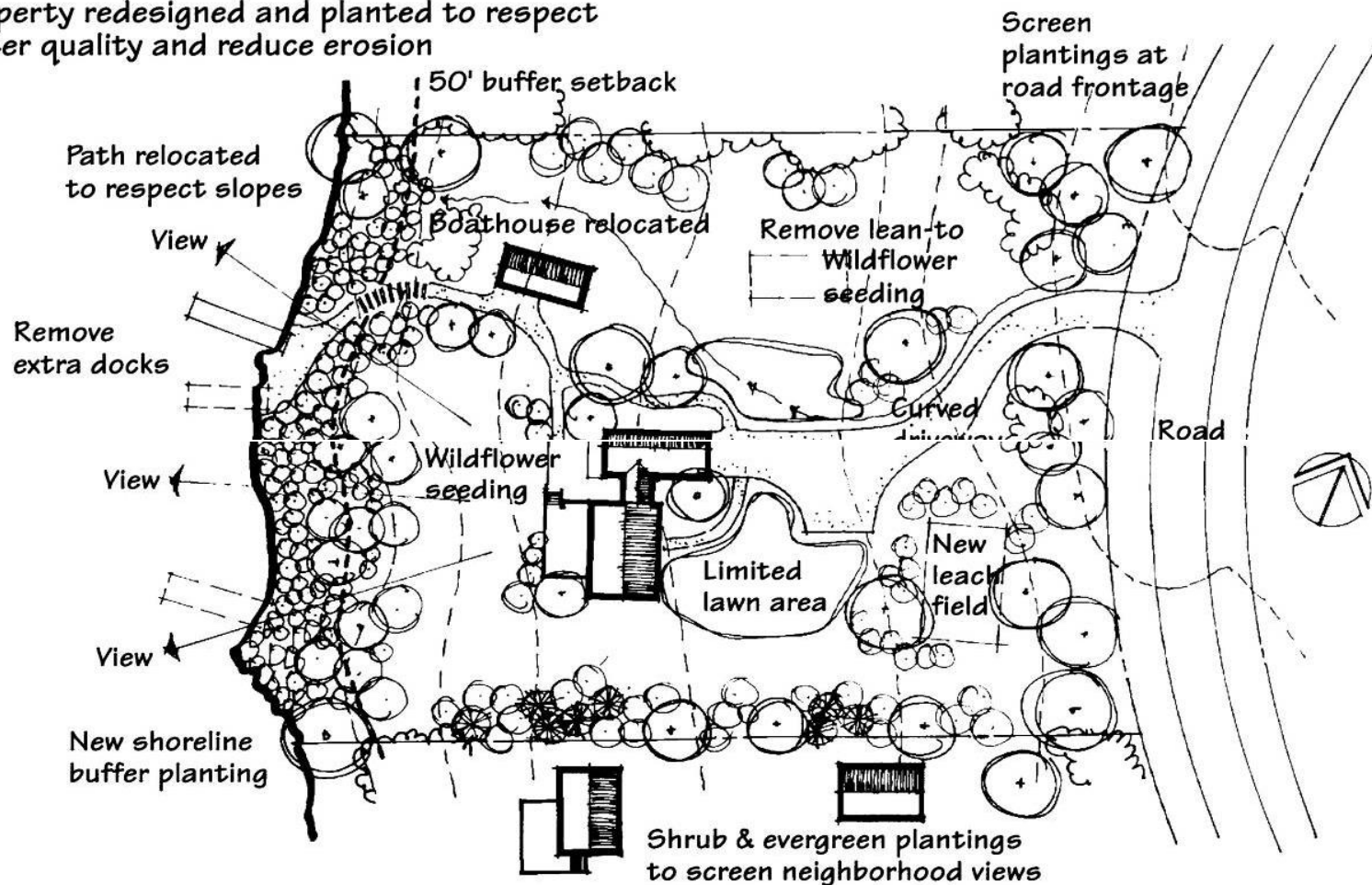


Site drawing



Site drawing

Property redesigned and planted to respect water quality and reduce erosion





Establishment tips > lessons learned

- Can complete the project in phases
- No protection, why do it?
- Aquatic plantings-tricks of the trade
- Sod cutter islands

SOD CUTTER:

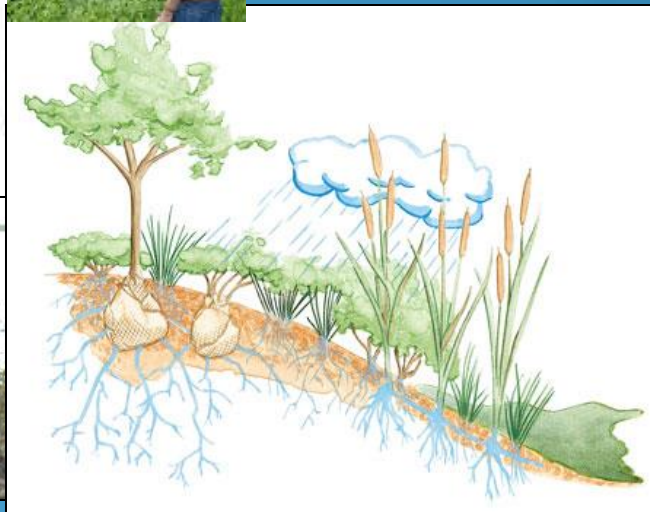
- Techniques when budget is limited
- Deters competition from grasses
- Mulch laid down before planting
- Reuse sod elsewhere in yard or compost



Maintenance

Watering-dah

- Need to water
- plantings initially > 4-6 weeks; 1-2 " per week



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Maintenance > come up with a monitoring plan and commitment

Who will maintain?

- Professionals
- Landowners
- Volunteers

Level of management

- Let nature control
 - Weed only noxious plants and undesirables
 - Mow to control weeds at end of season
- Burn area to control weeds

Level of management

- Recognizing invasives
- Monitoring the site over time



Maintenance > protection of plantings

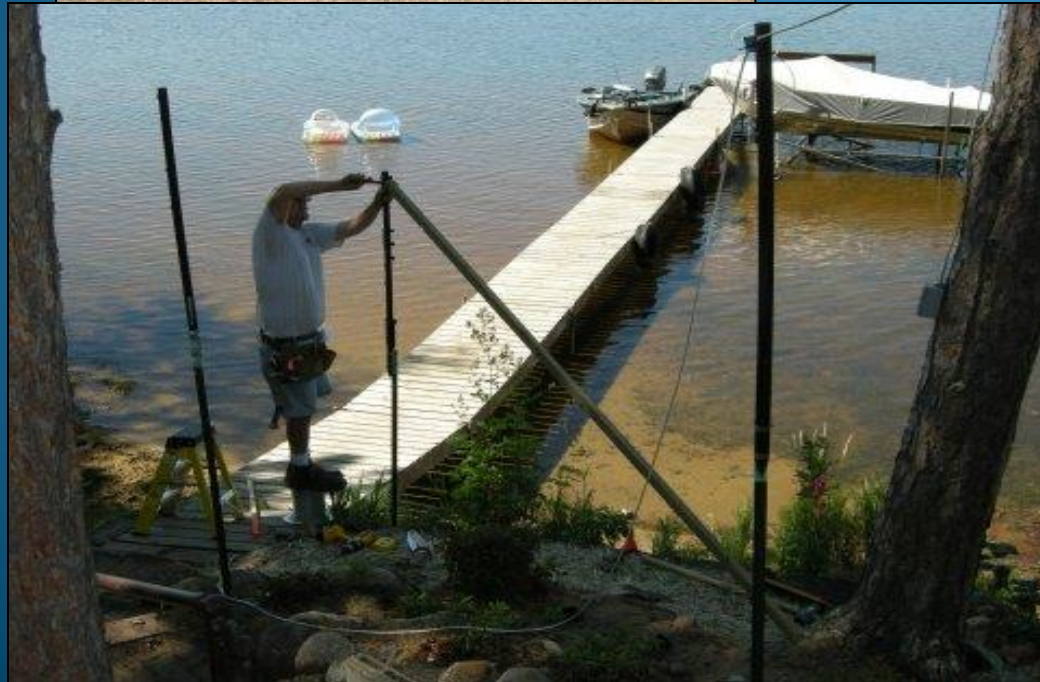
Maintenance

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Deer/rabbit protection / other maintenance issues

- Deer sprays
- Fencing options
- Supplemental plantings / fill in any gaps
- Signage
- Be mindful of dock and boat storage
- Prune trees to open views

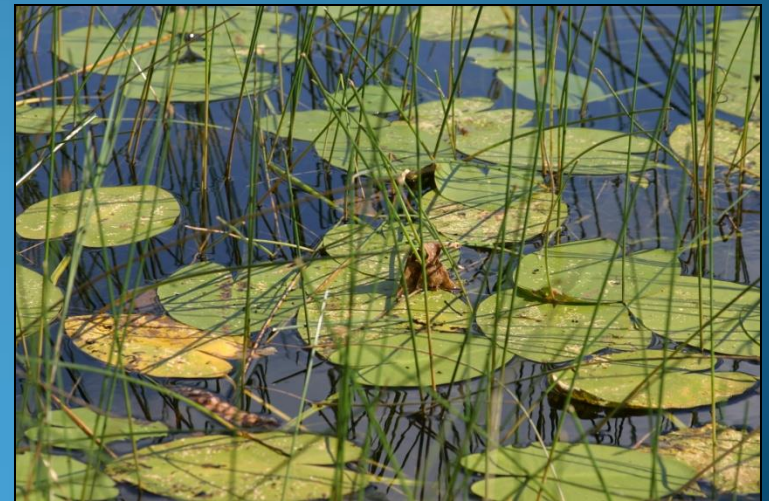


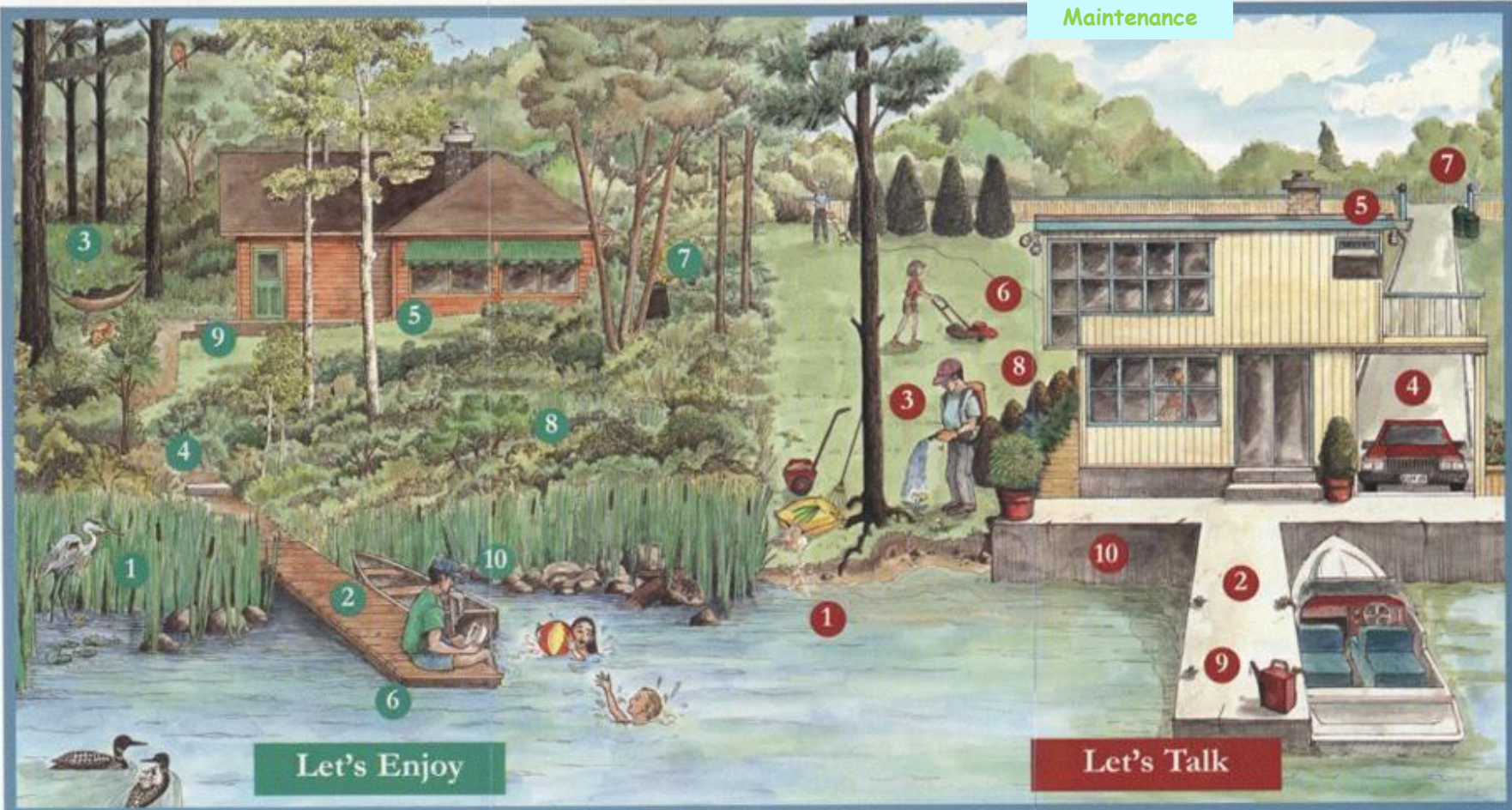
Maintenance > lessons learned

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- Watering can take a lot of time logistically to set up
- Landowners agree on water source upfront
- Drought contingency plans
- Watch for invasives
- Downed wood is good, on the land and in the water





Let's Enjoy

Let's Talk

1. Natural shoreline — great wildlife habitat.
2. Small floating dock — low impact on "ribbon of life."
3. Septic system far from the shore — reduces water pollution.
4. Narrow, gravelled footpath — less chance of erosion.
5. Trimmed trees and adjustable awnings — natural air conditioning with view maintained.
6. You work less — relax more!
7. Kitchen compost — improves your soil's quality.
8. Low-maintenance native plants — provide shoreline buffer.
9. Building — set back from shore and in character with setting.
10. Well-maintained motor — electric, or modern 4-stroke outboard, operated with low wake near shore.

1. Bare shoreline — subject to erosion.
2. Solid dock — destroys wildlife habitat, alters currents, causes erosion elsewhere.
3. Fertilizer spills and chemical run-off from lawn — damage water quality.
4. Paved lane — pollution-laden runoff flows to water.
5. No shade trees — overworked air conditioner adds to electric bill.
6. Removal of natural vegetation — more work for you and more runoff.
7. Collecting lawn clippings — deprives soil of nutrients.
8. Ornamental shrubs — require chemicals and extra work.
9. Poor fuel management — spills are deadly.
10. Hardened shoreline — eliminates "natural filter," degrades water quality, and blocks wildlife access.

Before / after > Found Lake, Vilas Co., WI



Before / after > Found Lake, Vilas County, WI



Before / after >

Found Lake, Vilas Co., WI



Before / after > Found Lake, Vilas Co., WI



Before / after > Found Lake, Vilas Co., WI



Before / after > Statehouse Lake, Vilas Co., WI



Before / after



Shoreland numbers in Wisconsin

- 47,162,014 meters of shoreline on our inland lakes

(data from WDNR Hydro IV database on 1:24,000 sources)

or over 29,304 miles

- Shoreland restoration needs to be an available option for any Wisconsin landowner willing to give it a try





LEAVING A LEGACY

Thanks for all you do toward
leaving a legacy of healthy lakes!



Questions?

Thanks for all you do toward leaving
a legacy of healthy lakes!



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The Wisconsin Lakes Partnership



Thank you

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