

Designing and implementing sound lakeshore habitat restoration projects



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Talk outline: ten themes

1. Initial landowner meeting

Explore property and the site's existing conditions

- Protection vs. no mow areas vs. accelerated recovery techniques review
- Example site assessment sheet

Begin identifying landowners goals for their property

- Goals and objectives for the site are discussed
- Background materials shared
- Overview video provided

Discuss partner opportunities and roles / project resources

- Technical support partners: land and water; consultants; zoning shops; UW-Extension agents: WDNR lake coordinators and water resource specialists
- Create a network of helpers to assist you

Develop a draft project timeline and preliminary budget ceiling

- Timeline components
- Budget considerations

Discuss a communication strategy for your team going forward

- Determine appropriate communication plan for your team
- Talk routinely about project evolution

2. Create base plan (first laver) / site sketch of existing conditions

Sketch out

- Compile the information from your site assessment into a base map (first laver)
- Transfer the site sketches into a scaled base map

Map out existing vegetation

- Trees, shrubs, & groundlayer vegetation
- Identify suitable planting area(s) for the site

Identify biological features of vour site

- Native plant communities by ecological zone: upland; transitional; and aquatic
- Critical habitat areas like fringe wetlands. ephemeral ponds, or rare plants
- Identify nuisance plants and animals present on site

Create human use map and identify patterns of use on lakeshore and property

- House and outbuilding structures
- Septic system and utility lines
- Recreational use areas and view corridor
- Identify problem areas and elements of the site that need attention in the planning process

Inventory soil conditions

- Access soil type(s) around the property; identify soil types for all new planting areas
- Denote and map out wet versus dry zones on the property
- Complete soil borings if necessary and/or as state standards require for practices chosen

3. Lakeshore property owner's needs and desires

Describe desired conditions

- Describe wanted landowner patterns of usage and revegetation areas
- Talk the project through with family members that have an interest in the project and agree on the game plan together
- Inform the neighbors about your project; talk through their concerns

Identify appropriate state standards and permitting needs

- Check with county offices and WDNR on appropriate state standards and permitting
- Identify suitable planting area(s) for the site

Site preparation review

- Identify site preparation needs and to-do's
- Create a timeline for implementing the site preparation steps needed for your project

Utilize "bubble" shapes on a map to define functional spaces

- Identify lakeshore planting area and other native planting locations
- Designate activity areas around the property using bubble shapes
- Begin identifying areas of surface water runoff that need control
- Begin to identify areas suitable for accepting water runoff for infiltration
- Begin identifying areas of erosion concern and potential treatments

4. <u>Analyze your site – map out</u> <u>desired outcomes / planting</u> areas

Reference area process

Visit a reference site similar to your targeted plant community / an undeveloped location on your lake with similar site characteristics

Lavout initial planting scheme

- Finish mapping out native planting areas by ecological zone
- Consider any invasive species problems with your site

Plant lists

- Work with your team to develop a native plant list(s) by ecological zone / soil types
- Make sure you have all three layers of vegetation in your plan: trees / canopy; shrubs / mid-layer; and groundlayer of wildflowers, grasses, ferns, sedges, rushes
- Remember the 1/3 rule for grasses, sedges, and rushes, especially at the water's edge
- Arrange for and / or contract your native plant material order

Develop storage plans and access area specifics

- Access dock, boat hoist, and equipment storage needs for your site
- Finalize access area logistics for your project

Incorporate ecological design elements suitable for the site

Consider assorted ecological design elements for your project

Design a maintenance and monitoring strategy for your proiect

- Consider how you will maintain and monitor your site as a team
- Create a timeline for implementation
- Devise a watering plan



5. <u>Develop water</u> conservation strategies review and planning

Perform an assessment of surface water flow and movement

- Complete the New Hampshire *"Follow the flow"* site assessment process
- Map out the findings from your site review

Map out drainage features of your lakeshore property

- Create a detailed map of drainage patterns, and slopes
- Identify erosion prone areas of your site

Identify "broken" connections and opportunities for reestablishing water infiltration

- Identify hydrological disconnections
- Explore ways of minimizing human use and disturbance in these sensitive areas

Identify water conservation strategies that can enhance your site and that fit your budget

 Sketch out locations for improving water runoff infiltration and other areas suitable for recharge into a water conservation layer

Talk outline: ten themes [continued]

6. <u>Develop erosion control</u> plans and solutions

Have a professional engineer oversee a site assessment

- Complete a topographic survey of the site
- Review signs of erosion; delineate the causes of erosion on site; assess the types of erosion found on the property
- Complete an NR328 assessment including the erosion intensity (EI) score worksheet for the property

Begin to identify erosion control treatments

- Review the types of erosion present and the treatment options available
- Explain the findings of your erosion control assessment to the landowners and planning team
- Talk through bioengineering options and treatments as a team; agree on an erosion control plan for your site
- Work through the budget considerations of your erosion control plan as a team; establish a cost estimate for the work
- Discuss cost-share options available (if applicable)

Map out final erosion control treatment areas

- Identify the needed permits and materials; pinpoint the state standards in play with your erosion control plan and what the specifications are that you need to meet
- Complete erosion control treatment crosssections and plan requirements according to state standards and permit needs
- Have a landowner and WDNR meeting to review final erosion control plan logistics
- Order erosion control products and materials; submit and obtain final permits needed
- Add the erosion control map as a layer to your final plan

7. <u>Consider long-term</u> <u>maintenance and monitoring</u> <u>strategies</u>

<u>Watering</u>

- Watering devices-delayed / remote timers; in ground systems discussion; etc.
- Identify your water source
- Formalize landowner commitment to watering in plan

Invasive species control

- Conduct an invasive species assessment
- Perform needed pre-installation treatments for invasive species present on site
- Review tips for recognizing future invasive species on your site with landowners / maintenance
- Develop a monitoring plan for invasives on your site

Develop protection strategies you want to utilize for your native plantings

- Review sprays and deterrents available
- Talk through the fencing options
- Discuss the need for future supplemental plantings / fill in any gaps and the warranty of plant material from nursery partner
- Have a signage discussion
- Talk about rules for pruning trees to open views and consulting your local zoning office

Finalize your maintenance and monitoring plans

Combine your maintenance and monitoring strategies into a final plan

8. <u>Compile final</u> conservation plan / identify installation process and timeline

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Combine all steps (layers) into a final draft conservation plan

- Base layer initial site assessment findings
- Human use, view corridor, critical habitat locations, and storage information according to landowner preferences / wants
- Planting areas denoted by ecological zone
- Water conservation areas and strategies
- Erosion control plan treatment areas
- Include the maintenance and monitoring strategies of your site into the final plan

Final plan review with your team

- Confirm native plant order
- Review project specifications / state standards and permits together
- Identify final installation timeline and "todo's"
- Compile and review together final cost estimate
- Complete a project bidding process (if desired)
- Schedule a pre-installation meeting with project installers, landowners and planners
- Discuss cost-share reimbursement process
 (if applicable)

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Talk outline: ten themes [continued]

9. Project installation

Site preparations

- Invasive species control completed
- Turf grass treatment is completed

Partner communication

- Goals and objectives for the site are discussed
- Make sure all partners and the installers understand the installation process and your conservation plan components

Digger's hotline / permits in place

- Call digger's hotline a week or two before your installation time
- Make sure the final permit needs are met and that the needed permits are in hand

Schedule project installation

- Remember to include your lake community in the installation (if appropriate / feasible)
- Schedule your project installation with your team
- Recognize that a phased approach to installation may be needed: start with erosion control and water conservation treatments getting installed first; then your native trees and shrubs; followed by the groundlayer native plantings

Install water conservation & erosion control strategies

Create a network of helpers to assist you

10. Implement the long-term maintenance and monitoring strategies

Follow through on maintenance needs

- Complete watering, weeding / invasive species control, and supplemental plantings according to plan
- Conduct regular check ups of fencing, erosion control treatments, and water diversion systems as needed

Implement the monitoring protocol

- Conduct the site monitoring protocol you developed for your site
- Tweak future plans according to your findings
- Share the project with your lake community, local media, and others interested in lakeshore conservation work

6. <u>Develop erosion control plans</u> and solutions

Have a professional engineer oversee a site assessment

Complete a topographic survey of the site Review signs of erosion; delineate the causes of erosion on site; assess the types of erosion found on the property Complete an NR328 assessment including the erosion intensity (EI) score worksheet for the property





Lake shore erosion

- Slumped banks
- Root wads exposed
- Rilling
- Receding shoreline



Pictures provided by: Bill Bartodziej et al 2007 and Rob Bursik





Altered Watershed Effects

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Soil loss from mowing to water's edge

Coon Lake

6. Develop erosion control plans and solutions

Begin to identify erosion control treatments Review the types of erosion present and the treatment options available

Explain the findings of your erosion control assessment to the landowners an planning team

Talk through bioengineering options and treatments as a team; agree on an erosion control plan for your site

Work through the budget considerations of your erosion control plan as a team; establish a cost estimate for the work

Discuss cost-share options available (if applicable)





Biological Erosion Control Methods

- 1. Use vegetative and natural materials for stabilization and protection.
- 2. Rely on plant materials as the main structural elements in a shoreline protection system.
- 3. Comprised of living and/or organic materials.
- 4. Biodegradable.

Fiber Rolls



Live Stakes



Brush Mattress

Brush Layering



Map out final erosion control treatment areas

Identify the needed permits and materials; pinpoint the state standards in play with your erosion control plan and what the specifications are that you need to meet

Complete erosion control treatment cross-sections and plan requirements according to state standards and permit needs

Have a landowner and WDNR meeting to review final erosion control plan logistics

Order erosion control products and materials; submit and obtain final permits needed

Add the erosion control map as a layer to your final plan





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7. <u>Consider long-term maintenance</u> and monitoring strategies

<u>Watering</u>

Watering devices-delayed / remote timers; in ground systems discussion; etc.

Identify your water source

Formalize landowner commitment to watering in plan





7. <u>Consider long-term maintenance</u> and monitoring strategies

Invasive species control

and monitoring strategies Conduct an invasive species assessment Perform needed pre-installation treatments for invasive species present on site Review tips for recognizing future invasive species on your site with landowners / maintenance Develop a monitoring plan for invasives on your site



7. <u>Consider long-term maintenance</u> and monitoring strategies

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7. <u>Consider long-term maintenance</u> and monitoring strategies

Finalize your maintenance and monitoring plans Combine your maintenance and monitoring strategies into a final plan





Combine all steps (layers) into a final draft conservation plan Base layer – initial site assessment findings

Human use, view corridor, critical habitat locations, and storage information according to landowner preferences / wants

Planting areas denoted by ecological zone

Water conservation areas and strategies

Erosion control plan treatment areas

Include the maintenance and monitoring strategies of your site into the final plan

In addition to improving water quality, riparian buffers that contain native, woody vegetation can provide many benefits to the waterfront property owner. These benefits include... √Increased property values - Buffers can increase property values by as much as 20% from improved √Decreased heating and cooling costs - Trees can provide summer shade and evergreens can act as winter √Reduced erosion - Plants and their roots reduce runoff and stabilize soil. √Noise reduction -Trees and shrubs can muffle urban noises. √Increased shoreline stability - Shrubs and groundcover can hold the soil on banks in place. √Wildlife habitat and viewing - Bay wildlife depends upon mixed woodlands for food, habitat and travel corridors. √Air quality improvement - Trees and shrubs absorb airborne pollutants and return oxygen to the atmosphere for our use.

 $\sqrt{\text{Groundwater recharge -Buffers absorb excess water increasing groundwater recharge and reducing flood volume.}$





Final plan review with your team

Confirm native plant order Review project specifications / state standards and permits together Identify final installation timeline and "to-do's" Compile and review together final cost estimate Complete a project bidding process (if desired) Schedule a pre-installation meeting with project installers, landowners and planners

Discuss cost-share reimbursement process (if applicable)





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9. Project installation







Site preparations Invasive species control completed Turf grass treatment is completed





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Remember to include your lake community in the installation (if appropriate / feasible)

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9. Project installation





Install water conservation & erosion control strategies Create a network of helpers to assist you



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10. Implement the long-term maintenance and monitoring strategies

Follow through on maintenance needs Complete watering, weeding / invasive species control, and supplemental plantings according to plan Conduct regular check ups of fencing, erosion control treatments, and water diversion systems as needed



10. <u>Implement the long-term maintenance</u> and monitoring strategies

Implement the monitoring protocol

Conduct the site monitoring protocol you developed for your site Tweak future plans according to your findings Share the project with your lake community, local media, and others interested in lakeshore conservation work



Plant choices

Importance of layered vegetation



Forest duff and soils act as a "sponge"

Roots stabilize soils preventing erosion and allow plants to pump up water back into the atmosphere (transpiration) Use a variety of root structures: fibrous, taproot, runners/rhizomes.







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



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Shoreland restoration plans

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. <u>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.).</u>

2. <u>Waterway designation</u> (area of special natural resource interest, ORW, ERW) and size and type of water body (seepage lake, groundwater drainage lake, drainage lake, impoundment).

3. <u>Water level fluctuation</u>, *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. <u>Average fetch</u> – 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. <u>Bank and bed composition and stability</u> – 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. <u>Tiers of vegetation</u> – Aquatic, littoral, bank and upland; presence of invasive species.

10. <u>Identification of the size and location of areas or habitats requiring avoidance</u> (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. <u>Number and orientation of existing or proposed decks, steps, piers, access points to water</u> body, utilities, etc.

- 15. Documentation of cultural and historical resources.
- 16. <u>Site sketch illustrating items</u> 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...







Shoreland restoration plans

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





Planting plan – it may be all you need





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

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 > 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





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Plant choices > finding plant material

Why native plants?

- 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





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

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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

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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 > developing a plant list

- Notes from reference site visits
- Understand key growth characteristics of plants
- Assorted bloom times and colors
- Creating new structure and habitiat-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

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• Volunteer labor / consider outside help

Establishment tips > shoreline revegetation / restoration

Site preparation

Black plastic 0 Soil tilling • Herbicides

Site Preparation

-Chemical

Rodeo (use within 10 feet of water's edge) – aquatic formulation of Roundup Roundup (use away from shoreline) – breaks down upon contact with soil

Options for control

- Chemical (glyphosate)
- Smothering (black plastic)
- Mechanical (remove sod)

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• Estimating the plant material needed/square footage

Planting densities

Plantings

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Establishment tips

Establishment tips > shoreline revegetation / restoration

Plant material types

Revegetation:

Establishment tips > shoreline revegetation / restoration

wildlfowers, sedges, grasses, ferns

Implementing a plan

Three tiers of vegetation: trees, shrubs, and groundlayer-

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Establishment tips > shoreline revegetation / restoration

Using the plan

2.2

Establishment tips

Site drawing

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Establishment tips

Shoreland Access

Shoreland Buffer

Edging

Gustafson Residence

Lake Johanna – Ramsey County photo by RCWD

Establishment tips – ecological design principles (Cheryl Clemens)

Divert Runoff
Minimize hard surfaces
Encourage infiltration
Rock pits, water bars, French drains & trenches

Diversion practices redirect water away from the lake towards infiltration practices

Gutters and downspouts

- Drain tile
- Berms
- Driveway or path diversions
- Rain barrels

Minimize Hard Surfaces

Alternatives:

- Clean ¾ inch rock or pea gravel
- Stepping stones
- Porous paving materials

*Note: Avoid compacting soil with heavy equipment or frequent foot traffic

Encourage Infiltration Infiltration practices allow water to soak into the soil

- Rain Gardens
- Shoreline Buffers
- Native Plants
- Rock Pits or Trenches

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 > 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

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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

- 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.
- 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.
- Well-maintained motor electric, or modern 4-stroke outboard, operated with low wake near shore.

- Bare shoreline subject to erosion.
- Solid dock destroys wildlife habitat, alters currents, causes erosion elsewhere.
- 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.

NR 115 - Vegetation

Before

No clear-cut in first 35-feet

Vegetation removal prohibited in first 35 feet, except

Now

- Access and viewing corridors
- Shoreline restoration
- Invasives control
- Dead, dying, diseasedSound forestry

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!

Patrick Goggin / < pgoggin@uwsp.edu >

Thank you

The following people, groups, etc. contributed slides or other information into this presentation:

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