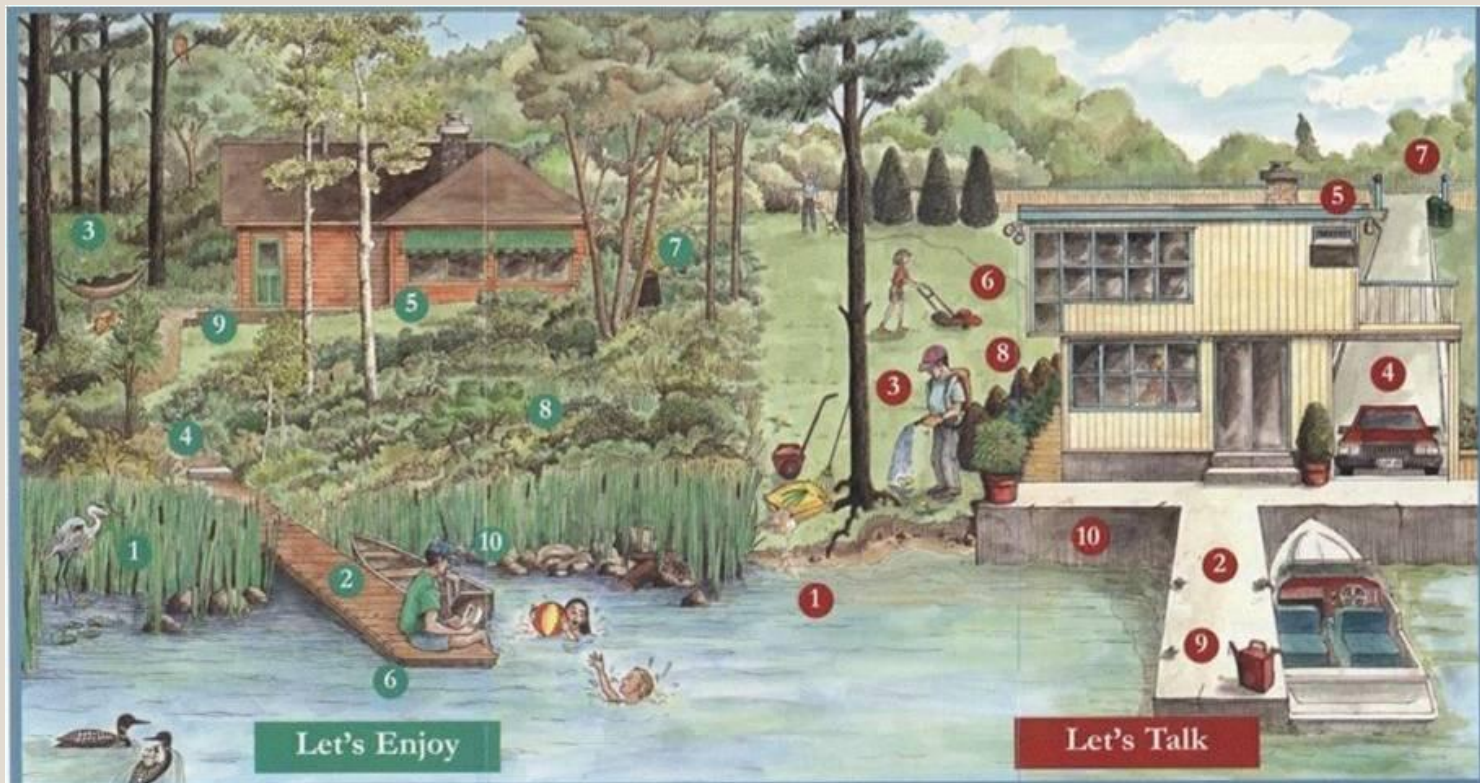


Moses Lake Shoreline Landscape Design

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What you do in your yard does make a difference



Our lake is a unique and fragile environment

- High light, warm temperatures, nutrient-rich
- Shallow, with silt deposits
- Large amount of shoreline relative to its size
- Increasing development
- Hot summer weather warms the lake water
- High phosphorus content occurs naturally in our soil



Our lake is a unique and fragile environment

- Water flow through the lake is not enough to flush contaminants, some parts of the lake get very little movement of water
- Multi-use, including part of the Columbia Basin Irrigation Project
- Managed by many governmental agencies including:
 - WA State Dept. of Ecology
 - Bureau of Reclamation
 - City of Moses Lake
 - Grant County
 - WA State Dept. of Wildlife
 - Army Corp of Engineers
 - Moses Lake Irrigation District
 - Noxious Weed District



Excessive Nutrient Loading

- Our lake is classified as *hyper-eutrophic* which indicates that it is receiving excessive nutrient loading (nitrogen and phosphorus)
- During an algae bloom oxygen depletion results
- As algae cells die and decompose, bacteria rob water of oxygen and fish begin to die
- Weeds and algae thrive because there is high light, warm temperatures, and lots of nutrients in our lake



Limiting phosphorous is the key



David Schindler, University of Ontario, experimented on Lake 227 in northern Ontario for 37 years by adding carbon, nitrogen and phosphorus to half the lake, and only carbon and nitrogen to the other half. He proved phosphorus was the main factor in blue-green algae growth in fresh water. The key to containing phosphorus levels is to protect wetlands and natural buffer zones that filter phosphorus-rich nutrients before they reach our lakes and streams.

Journal of Science photo

What are the problems with water quality in Moses Lake?

The problem is people.

Lots of people contaminating the lake,
resulting in:

- Weeds and algae
- Loss of fish and wildlife habitat
because of shoreline disturbance
(bulkheads, fill, etc.)

Everyone lives in a watershed



Storm water runoff contains heavy metals, oil, and nutrients from landscape fertilizers.

Failing septic systems on shoreline property as well as upland properties



Birds, livestock, pets

Pet and bird droppings are rich in nutrients, which can easily leach into our lakes and streams. Geese in particular are attracted to mowed lawns around homes, parks and similar areas next to open water.

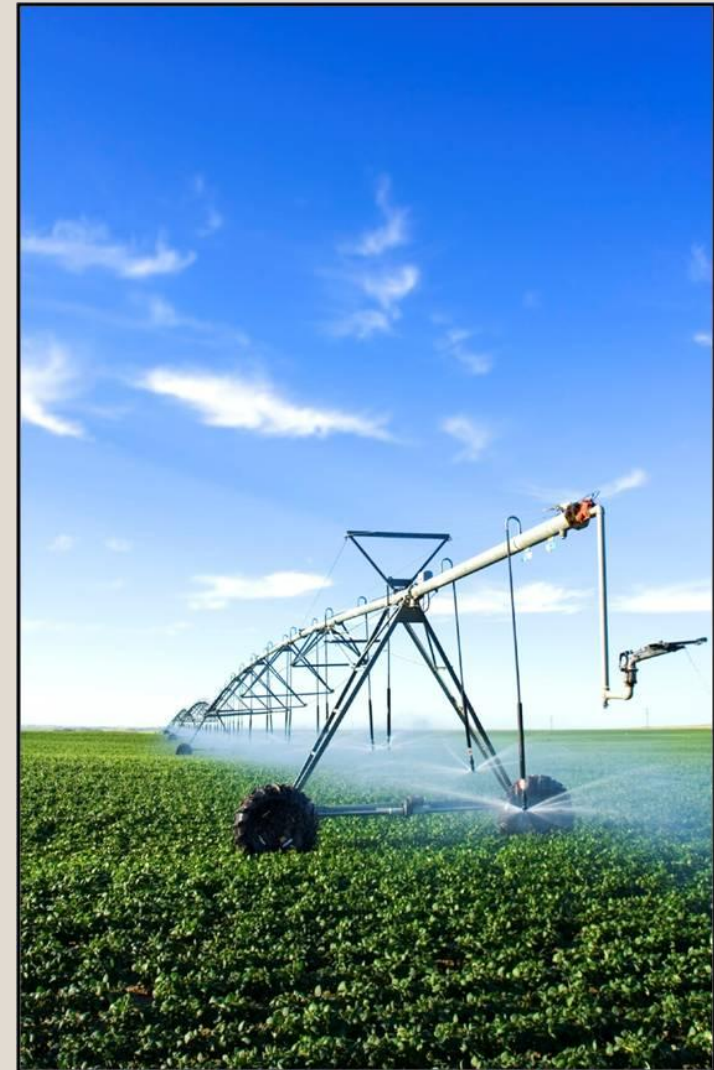
- Pet dropping should be placed in your sanitary sewer or bagged and put into your garbage
- Stop feeding the geese.
- Reduce the size of your lawn to a point where geese no longer feel safe grazing on it. An open sight-line of less than 30 feet will cause geese to move to a more comfortable area.



Everyone lives in a watershed

We all contribute to nutrient loading of the lake:

- Homeowners and their pets and landscaping
- Agriculture, especially in the Crab Creek drainage
- Fish hatcheries
- Broken sewer pipes



Poor landscape management by everyone in the watershed

These entities have shown awareness and have started taking steps to address the problem:

- Farmers
 - Government (city, county, and state)
-

Less aware are:

- Industry
- Churches and schools
- Private homeowners

Let's talk

Conventional landscape practices and seemingly normal day-to-day activities provide an opportunity to inadvertently cause harm to the quality of the water in our lake.

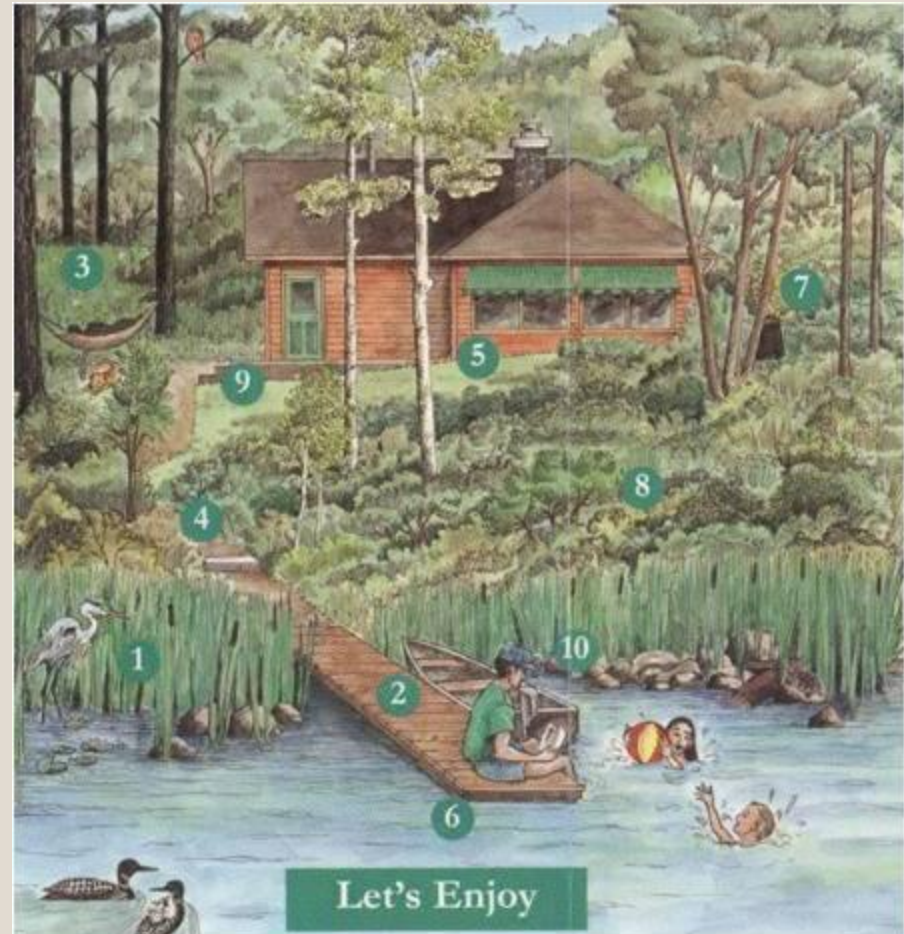


Let's enjoy

What you do in your own yard does make a difference.

Plant a buffer zone of vegetation between the water and any area prone to runoff such as lawns, driveways, and bare soil.

Vegetation is one of our greatest allies in the fight against surface water pollution. Vegetation has the ability to filter and treat many of the contaminants found in runoff before it enters the lake.



Ten easy things you can do to protect our lake

Although changing behavior is never easy, there are ten easy things everyone can do to protect the water quality of our lake:

1. Read and follow the labels on fertilizers and pesticides. More is not better.
2. Decide you don't need the greenest lawn in the neighborhood, less fertilizer means less runoff, less cost, less mowing.



Ten easy things...

3. Avoid using fertilizer and pesticides near the water, even organic fertilizer. Purchase a P-free fertilizer. Use fertilizer containing phosphorus only if a soil test shows that your soil needs this nutrient.

4. Water (irrigate) to avoid runoff. This is important anywhere in Moses Lake, not just near shorelines. Storm water runoff is the leading contributor to water quality pollution of urban waterways in Washington. (Source: WA DOE)



Ten easy things...

5. Do not wash your car in your driveway. Many soaps still contain phosphorus. Avoid street runoff.

6. Pick up pet droppings and make sure horses and cattle are in a pasture with a proper vegetation buffer. Pet “poop” is really raw sewage.

7. Never feed the geese!



Ten easy things...

8. Do not remove native aquatic emergent plants from the shoreline.

9. Keep as much of your land permeable as possible. Do you really need a storage shed or new concrete patio?



Ten easy things . . .

10. Pools and hot tubs (chlorine) should be drained into the sanitary sewer, never the storm sewer, which drains into the lake



Designing for an eco-friendly shoreline

Eco-friendly shorelines do not all look alike, but they all will include such features as gravelly beaches, overhanging vegetation, set-back bulkheads or retaining walls, vegetated buffer zones, and bioengineered slope stabilization



What is a beautiful shoreline?

We need to rethink what we consider a beautiful shoreline. Shift away from a manicured lawn to natural landscapes.



Natural landscapes offer a softer, more natural aesthetic that can enhance views by adding variety and seasonal interest while maintaining shoreline stability.

Disadvantages of a traditional lawn

- Increased runoff with pollutant load.
- Uninteresting, sterile landscape with loss of species diversity and habitat
- High maintenance (mowing, edging, irrigation)
- Will require chemical treatments
- It's a goose magnet.



The problem with bulkheads

A continuous hardening of the shoreline

Bulkheads reflect and increase wave energy. This causes the wave energy to move up and down, rather than horizontally. This agitation scours sediment away, causing the substrate to get coarser, deeper, and steeper. It can erode the base of a bulkhead, causing it to fail.



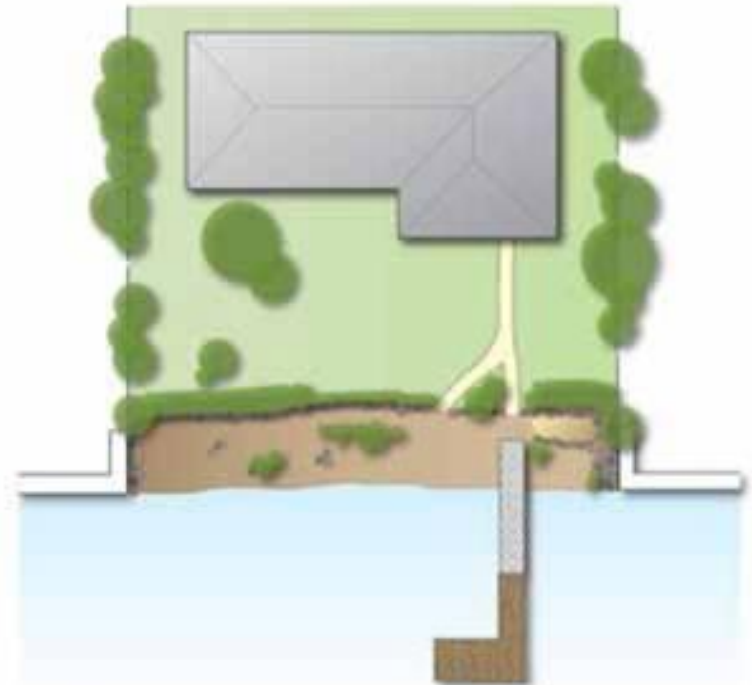
Alternatives to bulkheads

Bulkhead permits are unlikely to be issued.
Alternative “engineered solutions” to soften and stabilize the shoreline include:

- Gravel beach installations
- Terracing
- Large, flat rocks, logs, other woody debris
- Vegetated buffers
- Shallow pools
- Bioengineered slope stabilization

Beach installation

- Appropriate for new construction, or when older bulkheads fail
- Gravel is hauled in to form a sloped beach
- Any sand play areas are small and kept above high water mark as sand erodes easily
- Add appropriate plantings above the beach, creating habitat and framing views
- Extra rock and gravel adjoins neighboring bulkheads to help prevent erosion

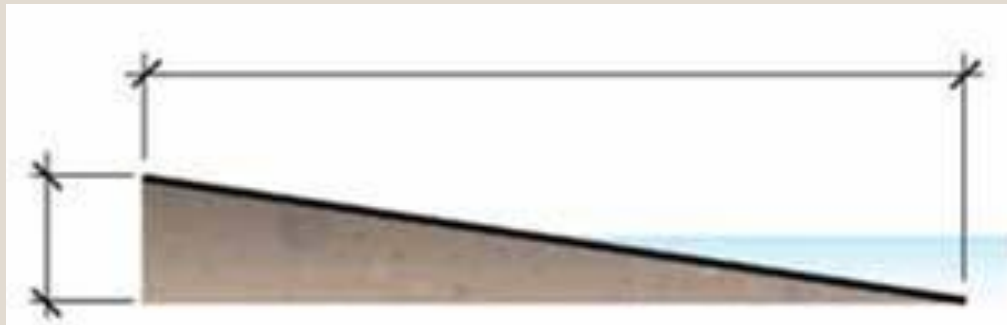


Slope ratio

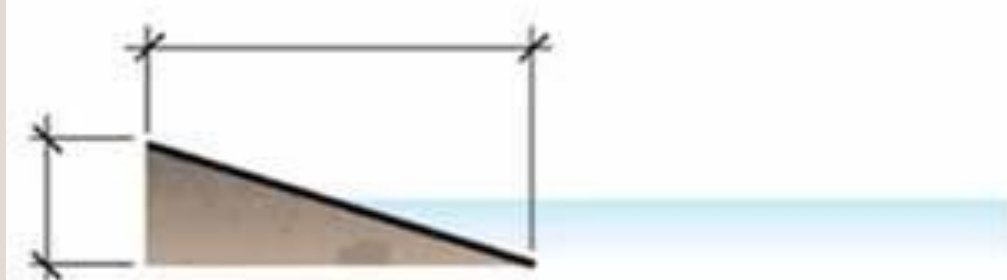
In considering a beach installation, slope is an important component. Slope provides resistance to erosion.

A 7:1 slope is ideal, but slopes up to 4:1 can be stable

7:1 slope



4:1 slope



A successful beach installation

This beach installation displays many of the components of an eco-friendly shoreline:

- Aquatic and emersed plants are left intact
- Distinct vegetated buffer zones leading up to the house
- Beach access
- A small lawn kept well back from the shoreline



Set-back bulkheads (retaining walls)

- Bulkhead remains, but is set back several feet from the shoreline. It often does not touch the water at all.
- Steps provides access to the beach, either an existing or engineered beach.
- Set-back forms a sloping “pocket” beach
- Move likely to get permit approval



Set-back bulkhead

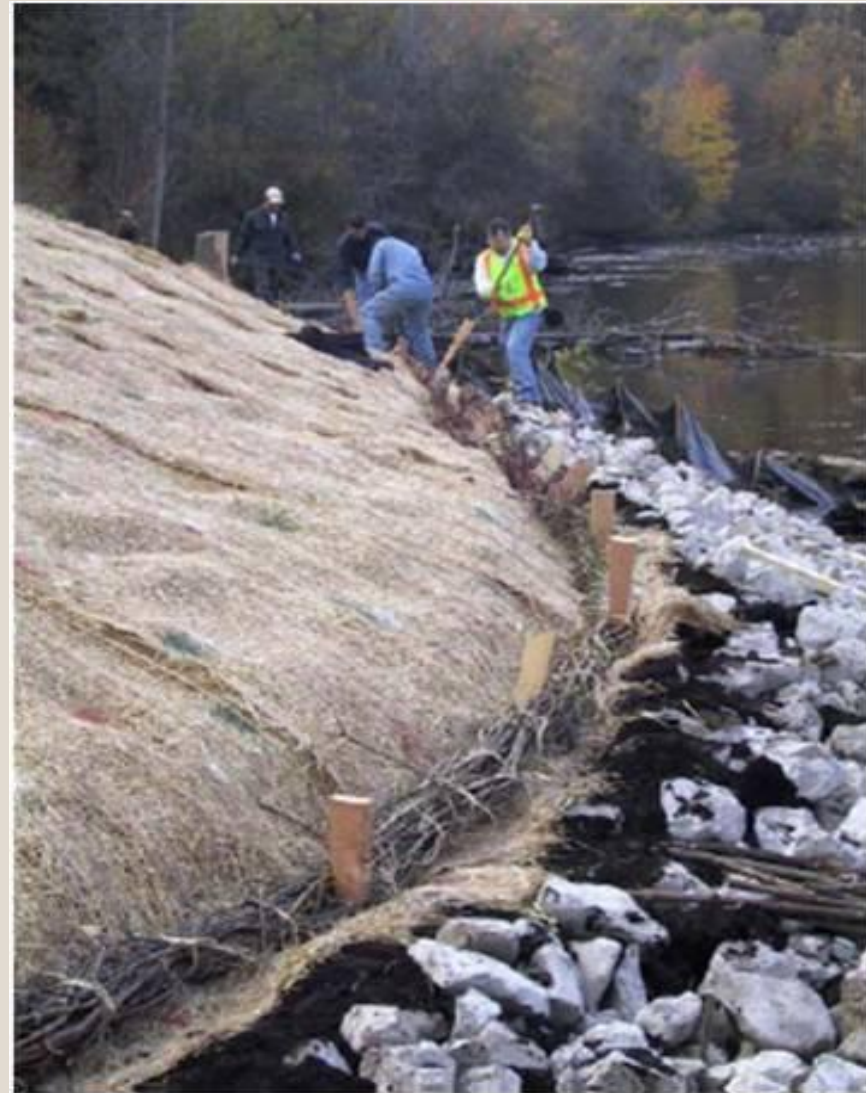
Although the beach formed by this set-back bulkhead has a shallow slope, the house may be terraced high above this retaining wall/bulkhead.



Slope bioengineering

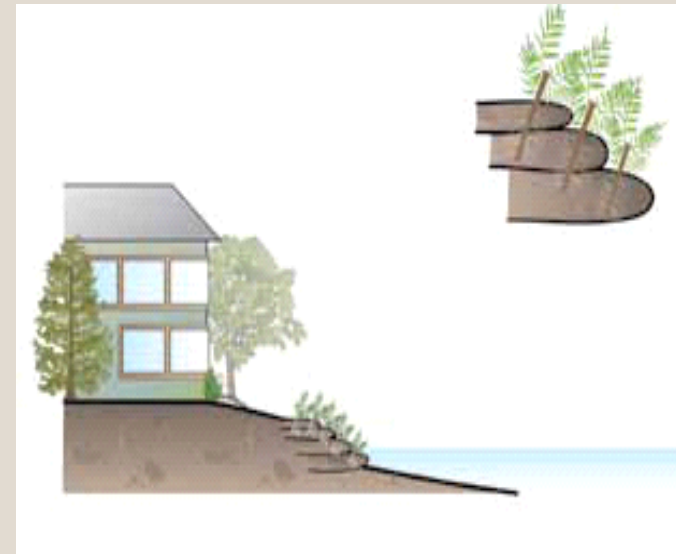
Slope Bioengineering:
an array of different
techniques that use
plant material to hold
soil and gravel in place.

Here they are installing
coir, a fiber obtained
from the husks of
coconut

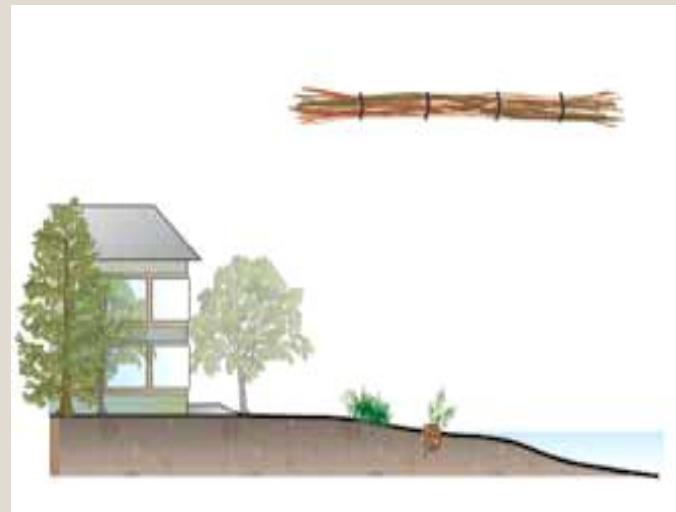


Slope bioengineering

Live revetment uses stakes and geotextile fabric to rebuild slopes



Fascines are bundles of live plant cuttings set into a bank horizontally; they provide short term erosion control; then they take root and provide long-term stabilization



Vegetated buffers

Vegetated Buffers are recommended to be used in conjunction with any eco-friendly shoreline design. It is something the homeowner can do himself

- Any original bulkhead remains untouched
- Plantings frame views
- Plantings overhang the water and shelter fish and cool the lake
- Always retain native emergent plants



You don't lose your view, you enhance your view

A vegetated buffer
adds interest to the
shoreline . . .



and it frames the views
both to and from the
house

The buffer zones

A buffer zone is a vegetated area that protects the lake. It is often divided into three zones:

- Upper bank
- Lower bank
- Riparian zone

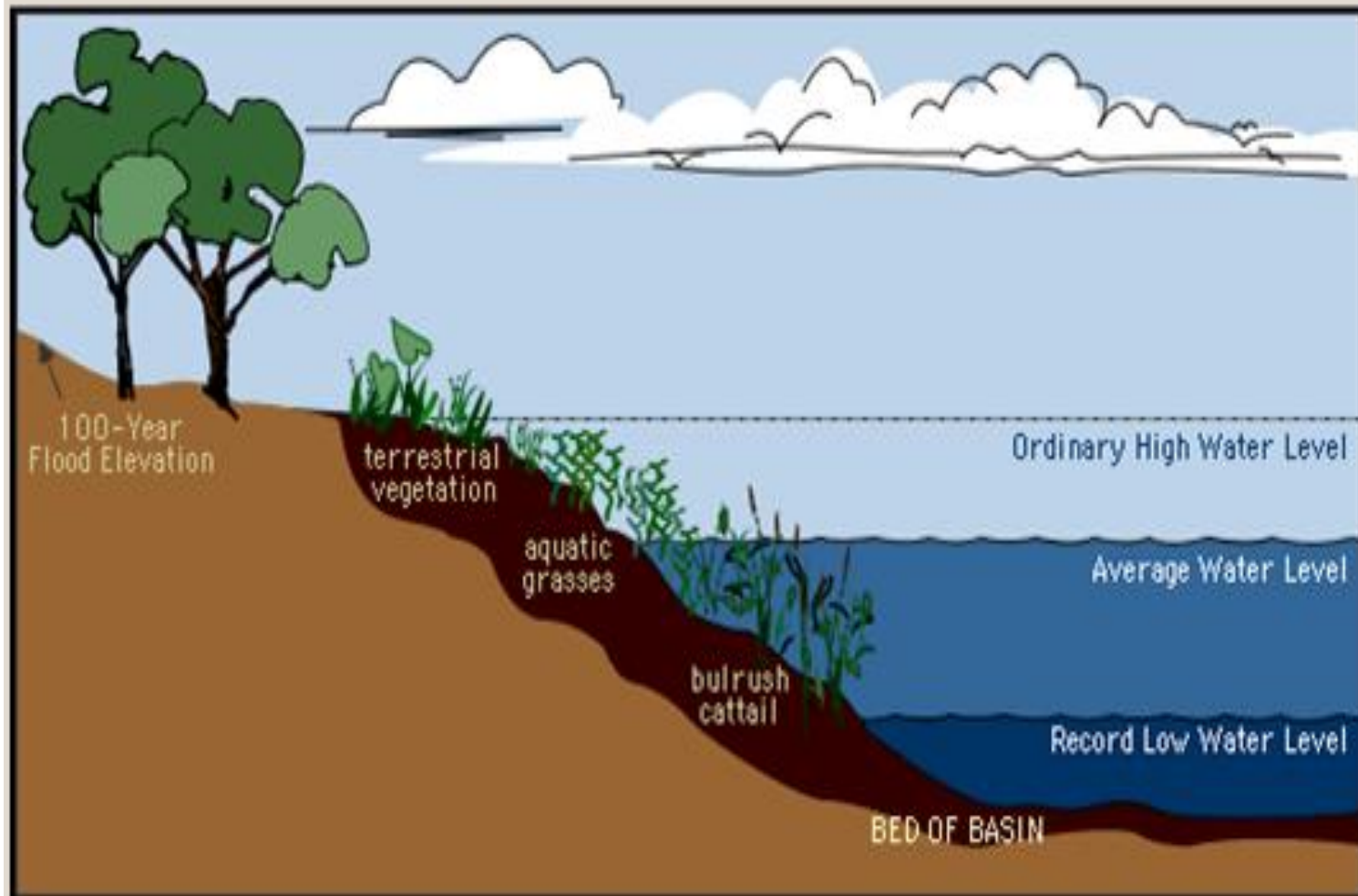


Riparian Zone

- Extends into the water and includes aquatic (submersed) plants such as pondweed and milfoil, as well as emergent plants such as reeds, sedges and cattails
- May extend two feet or more up the shoreline, depending on slope
- Has wet to damp soil, depending on slope
- Plants must tolerate wet soils



Profile of the riparian zone



Conserve the natural vegetation in the Riparian Zone

- Keep what you have or reestablish it
- Provides good habitat
- It is attractive
- Protects lake from erosive forces
- Reduces runoff
- Filters pollutants



The Lower Bank

- Depending on slope, a 5 to 20 ft wide zone between the Riparian Zone and Upper Bank
- Natives are valuable in this zone because they don't need fertilizer or much maintenance
- Suitable for trees, shrubs, groundcovers
- Use mulch in this zone
- Add architectural interest, benches, rocks
- Soil moisture varies between damp to dry, depending on slope



The value of native plants



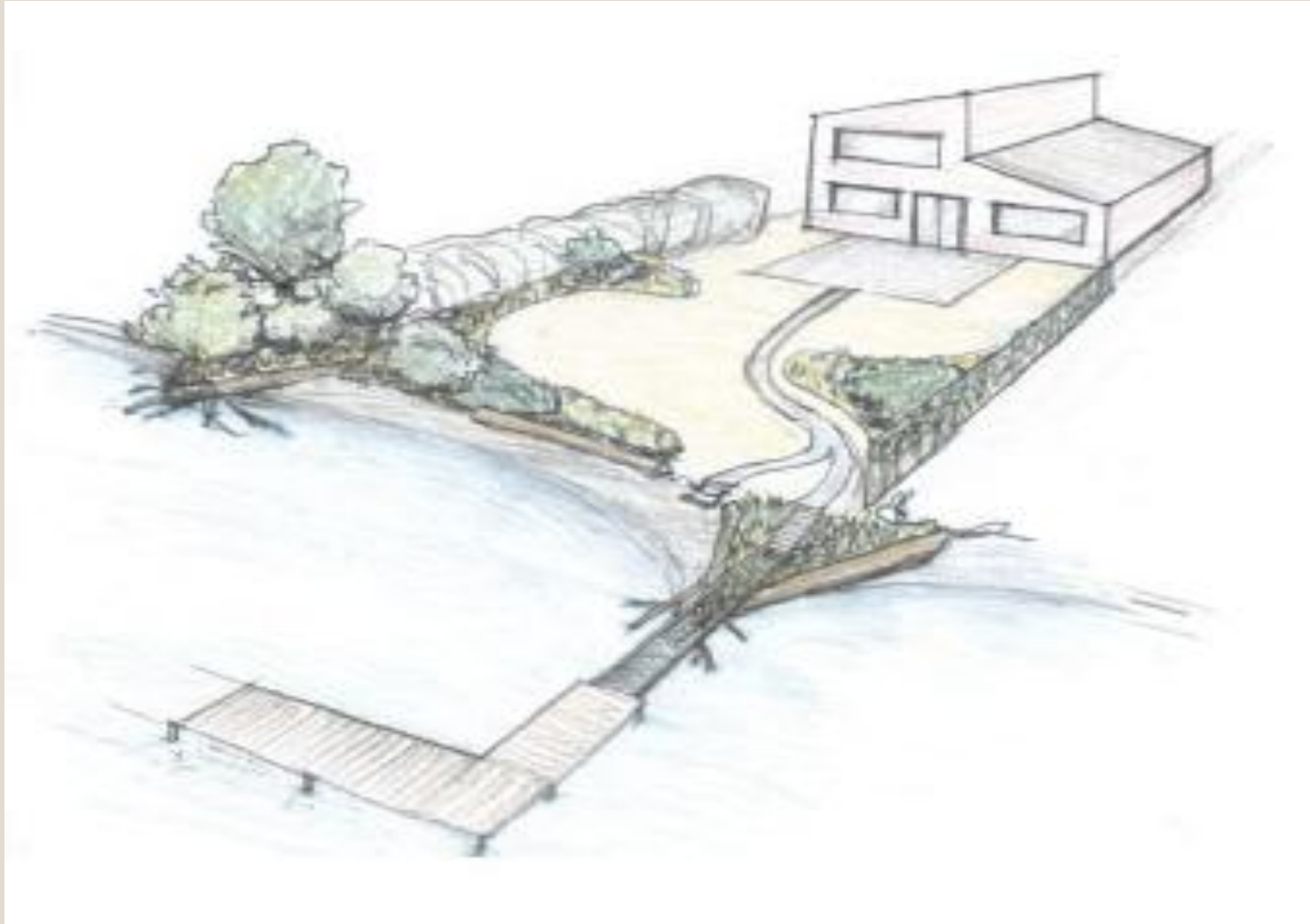
- Deep root system valuable in stabilizing banks
- Needs no fertilizer or pesticides
- Minimum maintenance
- Natives attract natives: birds and beneficial insects
- Filters and removes toxins and pollutants before they reach the water

Upper Bank



The Upper Bank is the land closest to the house. Keep this zone as far from the shoreline as possible to minimize accidental runoff. This is where you will place the plantings that demand more fertilizer and pesticides: the vegetable garden, ornamental flower beds, and lawn. The soil will be driest here, and will require irrigation.

Planning a lakeside landscape



1. Assess your site. Things you need to know:

- Ordinary High Water (OHW) history
- Soil type
- Soil moisture
- Sun exposure
- Slopes, both in the near-water, and the slope to the house; drainage patterns; and eroding areas
- Existing vegetation – can you keep it or is it inappropriate?
- Prevailing winds



2. Determine what do you want in your landscape

What you *have* in your landscape may not be what you *want* in your landscape. Some things you may already have, some you will want to add:

- Path to the lake
- Winter storage for canoe or boat
- View of the lake from the house
- Beach, dock, swimming area
- Privacy
- Place to entertain
- Other?



3. Determine your preferred style

There are many landscape styles from which to choose, what is your personal preference? Formal, cottage, English garden, low maintenance, natural, Xeriscape. There are many resources to help you, both in print and on the web.



4. Develop a plan

Reworking your whole landscape is intimidating. It helps to develop a plan that divides the task into several phases. Start with the area closest to the lake and work your way upland over the course of several years.

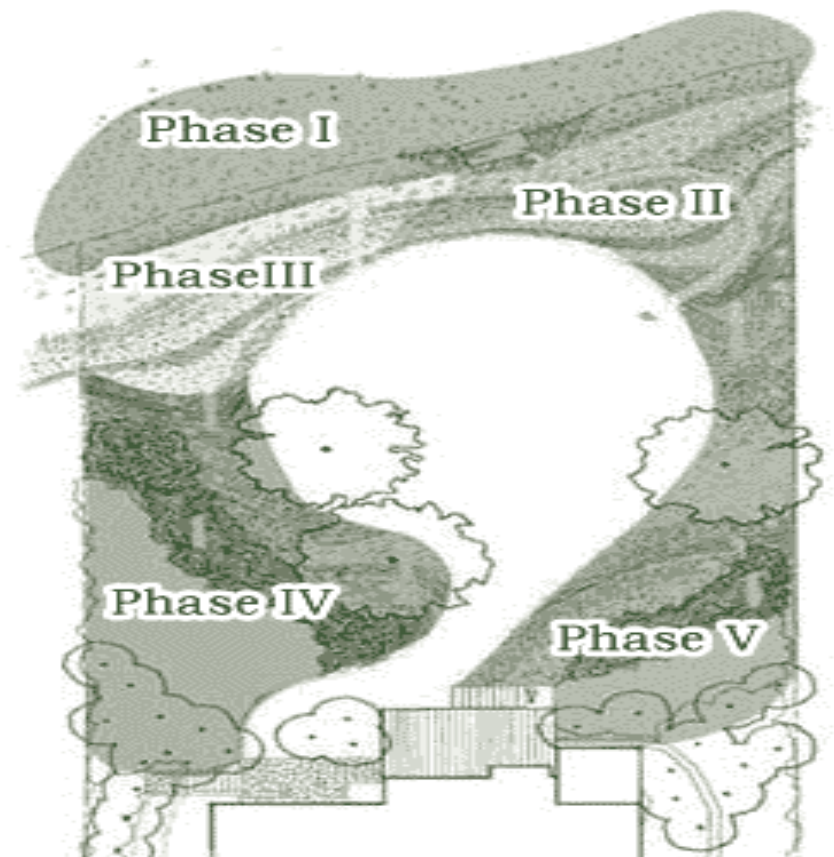


Figure 1: Reworking your whole lakescape might seem a little intimidating, so develop a plan that divides tasks into several phases. Start with the area closest to the lake or stream, and work your way upland over several years.

5. How do I manage the project?

Every project is different. How you manage it will depend on the scope of your project.

- Identify your goals
- Can it be done in stages or all at once?
- Hire professionals or will you do it yourself?
- Prioritize areas to plant
 - Do the big things first. Establish the bones - trees and structures - and work around them
 - Make your plant selections for each zone
 - Establish the beds, even if you don't plant them right away
- Always protect the water during construction

Wow. I'm feeling overwhelmed

If you can do only one thing to make your landscape more lake-friendly, **pull your lawn back from the water's edge**. Remove a 10 ft strip of turf along the bulkhead or water's edge. Plant some shrubs, trees, and native plants in your new Lower Zone. Cover the soil with mulch. Repeat next year.

A lawn is a big factor in the nutrient loading of the lake. It must be pampered with fertilizer, pesticides, herbicides, mowed and trimmed; and it rewards you by attracting nuisance geese.



Shoreline permitting

Local: City or County Planning & Development departments should be your first stop. They will be able to tell you what other agencies you may need to contact.

State: In general, for any construction below the Ordinary High Water mark, bulkheads, piers, pile-driving, dredging. Department of Fish and Wildlife, Dept. of Ecology, Dept. of Agriculture for herbicide permits for aquatic weed control or for replanting riparian zone.

------(Time line to this point may take up to one year)-----

Federal: U.S. Army Corp of Engineers for over-water structures such as moorage pilings, and gravel installation for beaches

Permitting can be a long and complicated process, but might not be necessary at all if you limit yourself to planting only in the lower and upper zones.

Special thanks to...

- WSU Extension
- City of Moses Lake
- City of Seattle
- Department of Ecology
- U.S. EPA
- University of Alberta/David Schindler



Local Master Gardener office

WSU Grant/Adams Area Extension
Master Gardener Program
Courthouse, P.O. Box 37
Ephrata, WA 98823

Tel: 509-754-2011 ext. 413

<http://grant-adams.wsu.edu/gardener>