

# WAUPACA COUNTY SHORELAND PROTECTION MANUAL

A Guide to Developing and Caring for Waterfront Property



Produced by University of Wisconsin Extension for Waupaca County

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(Revised 11/99)

## What Do You Know?

Take this self test now and later see how much you have learned (answers inside back cover). Circle **all** good answers.

- 1) The top two reasons people own waterfront property are:
  - a) boating
  - b) peace and quiet
  - c) swimming and water sports
  - d) enjoyment of natural beauty
- 2) Riparian buffer areas can provide these benefits:
  - a) sediment and nutrient trapping
  - b) water temperature attenuation
  - c) noise and debris control
  - d) visual screening and microclimate controls
- 3) Doubling the velocity of water enables it to move particles (6, 16, 64, 160) times larger.
- 4) What element is generally a key to managing surface water quality?
  - a) nitrogen
  - b) calcium carbonate
  - c) phosphorus
  - d) oxygen
- 5) Match lettered items (a-h) with the related numbered item (1-13) below.
  - a) \_\_\_ issues shore protection permits
  - b) \_\_\_ diverts water
  - c) \_\_\_ adapted to site
  - d) \_\_\_ administers shoreland regulations
  - e) \_\_\_ shore protection technique
  - f) \_\_\_ requires wide buffer area
  - g) \_\_\_ source of erosion control info.
  - h) \_\_\_ wildlife requirements
  - 1) native vegetation
  - 2) riprap
  - 3) local zoning
  - 4) berm or swale
  - 5) DNR
  - 6) bioengineering
  - 7) food, water & cover
  - 8) large watershed
  - 9) county LCD
  - 10) long slope
  - 11) impermeable surfaces
  - 12) sloping & revegetation
  - 13) compacted soils
- 6) Native vegetation is more "lake and stream friendly" than turf grass because:
  - a) stems bend with flows
  - b) adapted to site
  - c) better habitat values
  - d) may persist through winter
- 7) In attempting to provide all habitat needs for wildlife you favor on your property you may damage local ecosystems. T or F
- 8) "Hard" shoreline protection structures such as seawalls:
  - a) provide nursery habitat for young fishes
  - b) act as a bridge between land and water environments
  - c) reflect wave and ice energy
  - d) often require professional design and construction
- 9) Native water plants are adversely affected by:
  - a) abundant rough fish populations
  - b) new water level and flow regimes
  - c) algal blooms
  - d) sedimentation
- 10) Maximizing these factors are primary objectives of shoreland restoration:
  - a) vegetation diversity
  - b) infiltration
  - c) buffer width
  - d) detention

# WAUPACA COUNTY SHORELAND PROTECTION MANUAL

## A Guide to Developing and Caring For Waterfront Property

<b>WAUPACA COUNTY’S WATERS .....</b>	<b>1</b>
OBJECTIVES.....	1
<b>I.    SHORELAND ZONING REQUIREMENTS .....</b>	<b>3</b>
ORDINANCE JURISDICTION.....	3
PERMITS ARE REQUIRED .....	4
SUMMARY OF SHORELAND REGULATIONS .....	4
<i>WAUPACA COUNTY TROUT STREAMS</i> .....	9
MITIGATION REQUIREMENTS .....	10
SHORELINE VEGETATION PROTECTION AREA .....	10
ZONING ADMINISTRATION AND SOURCES OF INFORMATION .....	12
<b>II.   OTHER DEVELOPMENT REGULATIONS .....</b>	<b>15</b>
WATER WELLS.....	15
WASTE WATER DISPOSAL .....	16
WETLANDS .....	19
FLOODPLAIN ZONING.....	22
STATE WATER REGULATIONS.....	23
CONSTRUCTION SITE EROSION CONTROL, STORMWATER MANAGEMENT AND PRIORITY WATERSHEDS .....	29
<b>III.  SHORELANDSCAPE RESTORATION.....</b>	<b>32</b>
EFFECTS OF DEVELOPMENT ON WATERS.....	32
RESTORATION PLANNING FOR YOUR PROPERTY .....	39

# Waupaca County's Waters

## ***Objectives***

Wisconsin's glacial history has endowed Waupaca County with a bounty of lakes, rivers and streams:

- 240 lakes (7,240 acres);
- 79 river and stream (335 miles); and
- 35 trout streams (155 miles).

In the past they were important as highways of exploration and commerce and sources of power for lumber and grain mills. They continue to be vital to agriculture and industry. For many Waupacans waterways are defining features of the landscape valued primarily for recreation and their natural beauty.

Unfortunately our lakes, rivers and streams are threatened. Land disturbing activities expose soils and associated nutrients to runoff which transports them to nearby waters where they:

- obstruct navigation;
- cover critical aquatic habitat;
- make water turbid;
- encourage invading exotic plant species; and
- cause proliferation of algae and aquatic plants that damage the ecosystem.

In short, they cause "premature aging" of our waters making them far less useful and attractive.

In Wisconsin navigable waters are protected as public resources by the laws that created our state and its constitution. The state legislature and local governments have a duty to protect and steward public waters for the benefit of current and future generations. Because activities on lands near waters (shorelands) have such a significant effect on the quality and use of waters, shoreland development is subject to regulation by state and local governments. Waupaca County has adopted a Shoreland Protection Ordinance to comply with state requirements and to safeguard water resources critical to the quality of life that county residents have come to enjoy and expect.

The regulations are focused on five principal water protection strategies:

- development density controls (minimum lot sizes & clustered development);
- protection of sensitive lands (wetlands & slopes);
- shoreline buffer areas (setbacks and vegetation protection);
- minimizing nutrients and runoff (limits on land disturbing activities & construction of impervious surfaces); and
- matching waters with similar sensitivity to development with appropriate development guidelines (water classification).

This publication will help you to become familiar with shoreland development regulations and the reasons for them. It also provides information about managing waterfront property to help you become a better "land keeper" so that future generations of Waupacans can enjoy our waters undiminished in usefulness and beauty.

... Waupaca County Board of Supervisors  
Duane R. Brown, Chairman  
June, 1997

# I. SHORELAND ZONING REQUIREMENTS

This chapter describes ordinance jurisdiction, permit requirements and development standards administered by the Waupaca County Zoning office. It highlights two important features of the ordinance: 1) mitigation requirements for upgrading nonconforming buildings in the shoreline setback area and 2) the "no-cut" shoreline vegetation protection area. It also describes how zoning and related County policy decisions are made and who makes them.

## ***ORDINANCE JURISDICTION***

### **Development standards for shorelands of navigable waters**

The State of Wisconsin requires all counties in the state to adopt and administer shoreland regulations adjacent to navigable waters. Waupaca County recognizes the need for guidelines and has adapted the regulations to the requirements of Waupaca County citizens and water resources.

The regulations provide development standards for *shorelands* which are:

- within 1000 feet of the ordinary highwater mark (OHWM) of a navigable lake, pond or flowage, or
- within 300 feet of the ordinary highwater mark or the floodplain of a navigable river or stream (whichever is greatest).

The boundaries of floodplains adjacent to rivers and streams are determined by official maps and flood studies prepared by FEMA & DNR, and adopted by the County and available through the County zoning office.

In Wisconsin, waters are legally *navigable* if they have a bed and bank and levels or flow sufficient to support navigation by a recreational craft of the shallowest draft on a recurring basis. Generally, a stream or pond is navigable if it can be navigated by a small skiff or canoe during spring flood, even though it may be dry during some periods of the year. The presence of fallen trees, beaver dams, occasional sharp meanders or other obstructions requiring portage do not prevent a stream from being classified as navigable. Waters in Waupaca County are presumed to be navigable if they are listed in the Department of Natural Resources publication Surface Water Resources of Waupaca County or are shown as either continuous or intermittent waterways on current United States Geological Survey quadrangle maps. Contact the Waupaca County Zoning Administrator to determine whether shoreland regulations apply to your project.

## ***PERMITS ARE REQUIRED***

A zoning permit is required prior to any new development, change in use, internal improvement in excess of \$1,000 value or expansion of an existing building or structure. Under the terms of the ordinance "development" includes any man-made change to improved or unimproved real estate, including, but not limited to the construction of buildings, structures or accessory structures; the construction of additions or substantial alterations to buildings, structures or accessory structures; the placement of mobile homes; ditching, lagooning, dredging, filling, grading, paving, excavation or drilling operations, and the deposition or extraction of earthen materials.

## ***SUMMARY OF SHORELAND REGULATIONS***

The table on the following pages describes the most important features of the Waupaca County Shoreland Zoning Ordinance. It is only a summary and guide to the location of certain provisions in the ordinance. In all cases you should consult with the County Zoning office to determine the application of specific ordinance requirements to your project.

Development standards vary for each of 3 classes of lakes, ponds and flowages and for 2 classes of rivers and streams. Waters are classified generally according to their ability to support development using the criteria and methodology described in a report prepared for the County, Lake Shoreline Classification Study for Waupaca County (February 17, 1997). Waters in each class (group) are listed in the pages following the ordinance summary. Unlisted lakes are regulated as Group 3 lakes. Any classification change requires a public hearing and approval of an ordinance amendment by the County Board of Supervisors. The County Board decision will be based on the criteria described in the classification study.



# WAUPACA COUNTY SHORELAND ZONING REQUIREMENTS

## SUMMARY OF MAJOR PROVISIONS

(see attached list of lake, river & stream classes)

Standard	Location	Group 1 Lakes	Group 2 Lakes	Group 3 Lakes	Rivers & Streams	Trout Streams
<b>Min. lot size</b>	7.2-5 p. 24-26	5 acres	2 acres	20,000 sq. ft.	40,000 sq. ft.	40,000 sq. ft.
<b>Min. lot width &amp; water frontage</b>	7.2-5 p. 24-26	400 ft.	200 ft.	100 ft.	200 ft.	200 ft.
<b>Shore setback</b> <sup>1</sup>	7.2-5 p. 24-26	300 ft.	100 ft.	75 ft.	100 ft.	125 ft.
<b>Roadway setback Reduction</b>	5.41 p. 14	If a reasonable building site is not provided, the roadway setback may be reduced to no less than 20 feet from the road right-of-way where the garage faces the road; and no less than 10 feet where the garage does not face the road. All residences must have a 10 foot minimum setback.				
<b>Building Site Envelop</b>	5.42 p. 14	If the roadway setback and the shoreland setback - together - do not provide for a 30 foot deep building site envelop: first, the roadway setback can be reduced as indicated in 5.41 above (Roadway setback reduction); followed by a shoreland setback reduction of not less than 2/3 the required shoreland setback.				
<b>Wetland &amp; drainageway setback</b>	5.3 p. 14	<ul style="list-style-type: none"> <li>• 25 foot setback on all <u>non-navigable</u> wetlands and drainageways</li> <li>• Navigable wetland setbacks reflect that of group 3 lakes</li> <li>• Navigable drainageway setbacks reflect that of the adjacent river/stream classification</li> </ul>				
<b>Side &amp; rear yards</b>	4.2 p. 12	Lots > 100 ft. wide = min. 10 ft. & total of 30 ft. Lots < 100 ft. wide = min. 7.5 ft. & total of 20 ft.				
<b>Structures</b>	4.3&4 p. 13	No more than 1 dwelling may occupy a lot in single family residential district. A principal structure must be constructed prior to or concurrent with any accessory structure.				
<b>Vegetation protection area</b> <sup>2</sup>	7.2-5 p. 24-26	Within 275 ft. from shore (OHWM)	Within 75 ft. from shore	Within 50 ft. from shore	Within 75 ft. from shore	Within 100 ft. from shore
<b>Land disturbing activities</b>	6.15 p. 17	Limited to 50% of lot.				
<b>Impervious surfaces</b> <sup>3</sup>	6.16 p. 17	At least 75% of each shoreland lot must be maintained in Vegetative Cover- trees, shrubs, groundcovers, lawns, planting beds, etc.				
<b>Shore protection structures</b> (seawalls, riprap, sheet piling, etc.)	7.2-5 p. 24-26	All except bioengineered are prohibited.	All with state permit are allowed.			All except riprap & bioengineered are prohibited.



<b>Boathouses</b>	8.34 p. 31	New boathouses are prohibited. Existing boathouses (as of 6/5/97) are limited to ordinary maintenance & repair.
<b>Wetland protection</b>	7.1 p. 19-24	In mapped shoreland and contiguous wetlands of 2 acres or more the following uses are permitted: open space uses, forestry, ag. drainage maintenance, fencing, piers & walkways, public highway maintenance, limited private road construction, limited development of natural & recreation areas, habitat improvement projects & limited utility & railroad construction. Other development requires a demonstration that listed significant public interest values do not exist in the wetland & that an alternative project site is not available. Map amendment process is required.
<b>Planned residential unit development</b>	3.2 p. 8-12	Custom tailored residential development guidelines provide an alternative to class standards for lot size & width. 50% density bonus. 40 acre min. parcel size. 50% dedicated open space required with multiple ownership options. Flexible design standards for roads, building envelopes & infrastructure. Authorized as a conditional use.
<b>Nonconforming uses<sup>4</sup></b>	8.2 p. 27-28	No expansion is permitted. If discontinued for 12 mos., future use must conform. Nuisances not permitted to continue.
<b>Nonconforming structures<sup>4</sup></b>	8.3 p. 28-31	Accessory structures are limited to ordinary maintenance & repair. Principal structures: a) 0=50 ft. from shore = internal improvements only b) 50 ft to the required setback = may expand if 750 sq. ft. footprint or greater 1) Maximum expansion is 1500 sq. ft. footprint; or 15% of lot within 200 feet of OHWM - which ever is greater 2) Additional stories no larger than footprint of original structure 3) Maximum height of 28 feet c) Mitigation required on all structural expansions Mandatory Measures • Evaluate and upgrade septic • Implement erosion and runoff control measures Owner Determined Measures - <b>(must obtain 4 points)</b> • Restore and/or maintain native vegetation 1-4 points • Remove nonconforming accessory structures 1-3 points • Earthtone building colors 0.5 points • Other approved measures (?) d) Limited conversion of seasonal residents permitted e) Structures damaged in excess of 50% of fair market value must comply if rebuilt.
<b>Nonconforming lots<sup>4</sup></b>	8.4 p. 31-32	Lots served by sanitary sewer - Single family dwelling permitted if: a) at least 7,500 sq. ft. in area & 50 ft. width & water frontage b) residential use permitted c) lot recorded prior to ordinance d) ownership separate from abutting lands e) compliance with all other requirements Lots not served by sanitary sewer - Single family dwelling permitted if: a) at least 10,000 sq. ft. in area & 65 ft. width & water frontage & b-e above, or b) at least 20,000 sq. ft. in area & 100 ft. water frontage & b,c & e above.

<sup>1</sup> Measured from the ordinary highwater mark (OHWM) to the nearest point of a building or structure.

<sup>2</sup> No vegetation removal or land disturbance except for pier or wharf construction, a walkway to access the shore, approved shoreline protection activities, removal of dead, diseased or dying trees which are a hazard & establishment of a 30 ft. wide view corridor by selective pruning and removal. Forest, cultivation and grazing practices require special regulations - refer to 5.57 & 5.58.

<sup>3</sup> Footprints of structures or land areas where precipitation is essentially unable to infiltrate into the soil.

<sup>4</sup> Nonconforming uses, structures or lots are those which predate current regulations, were legal when constructed but do not comply with current requirements.

# Waupaca County Lake, River & Stream Classes

## Group 1 Lakes

Chapin Lake	Mud Lake (T22NR11E S. 21)
Flynn Lake	Mud Lake (T22NR12E S. 10)
Foster Lake	Mud Lake (T22NR12E S. 17)
Fox Lake	Mud Lake (T25NR12E S. 18)
Holman Lake	Myklebust Lake
Jacklin Lake	Mynyard Lake
Jenson Lake	Newsome Pond
Johnson Lake	Norby Lake
Jones Lake	Preuss Lake
Knutson (Eickner) Lake	Sand Bar Lake, East
Krause (Lutz) Lake	Sand Bar Lake, West
Little Lake	Skunk Lake
Long Lake (T25NR13E S. 21, 22)	Spring Lake
Marl Lake (T23NR11E S. 32,33)	Spring Pond
Meed Lake	Twin Lake, North (Big)
Michael Lake	Twin Lake, South (Little)
Mountain Lake	Vesey lake
Mud Lake (T21NR11E S. 21)	Woodnorth Lake

## Group 2 Lakes

Big Lake	Kating Lake
Black (Knudsen) Lake	Kinney Lake
Buck Lake	Lembke (Little Long) Lake
Campbell Lake	Long Lake (T24NR11E S. 11, 12)
Casey Lake	McAllister Lake
Cedar Lake	McLean Lake
Crystal Lake	Moon (Goodhal) Lake
Driscoll Lake	Mud Lake (T24NR13E S. 1)
Duck Lake	North Lake
Emmons Lake, North	Pfeiffer (Brady) Lake
Emmons Lake, South	Price Lake
Gooseneck Lake	Rasmussen's Lake
Graham lake	Rich Lake
Grass Lake	Rolands (Bestul) Lake
Gregerson Lake	Round Lake (T21NR11E S. 29)
Grenlie Lake	Round Lake (T24NR11E S. 12, 13)
Gurholt Lake	Sand (Jensen) Lake
Herman Lake	School Section Lake
Jackson Lake	Shambeau Lake
Jaquith Lake	Selmer (Siemer) Lake
Junction Lake	Silver Lake (T23NR11E S. 14, 15)
	Sturm (Storm) Lake

### Group 3 Lakes

All other unlisted or unnamed lakes

#### Lakes - Unsewered

Bailey (Bayley) Lake	Lake Solitude
Bass Lake (T21N R11E S. 13, 24)	Old Taylor Lake
Bear Lake	Rollofson Lake
Bestul (Brekke) Lake	Silver (Anderson) Lake
Blue Mountain (Goerke) Lake	Spencer Lake
Hatch Lake	Stratton (Storm) Lake

#### Lakes - Sewered

Bass Lake (Chain-O-Lakes)	Mirror Lake
Beasley Lake (Chain-O-Lakes)	Nessling Lake (Chain-O-Lakes)
Columbian Lake (Chain-O-Lakes)	Orlando Lake (Chain-O-Lakes)
Dake Lake(Chain-O-Lakes)	Otter Lake (Chain-O-Lakes)
George Lake (Chain-O-Lakes)	Ottman Lake (Chain-O-Lakes)
Knight Lake (Chain-O-Lakes)	Pope Lake (Chain-O-Lakes)
Limekiln Lake (Chain-O-Lakes)	Rainbow Lake (Chain-O-Lakes)
Long Lake (Chain-O-Lakes)	Round Lake (Chain-O-Lakes)
Manomin Lake (Chain-O-Lakes)	Shadow Lake
Marl Lake (Chain-O-Lakes)	Sunset Lake (Chain-O-Lakes)
McCrossen Lake (Chain-O-Lakes)	Taylor Lake (Chain-O-Lakes)
Miner Lake (Chain-O-Lakes)	Young's Lake (Chain-O-Lakes)

#### Impoundments - Unsewered

Allen (Hartman) Lake	Ogdensburg Millpond
Big Falls Pond	Peterson Creek Millpond
Iola Millpond (unsewered portion)	Pigeon (Clintonville) Lake (unsewered portion)
Keller Lake	Weyauwega Lake (unsewered portion)
Little Hope Millpond	White Lake
Manawa Millpond (unsewered portion)	
Marion Lake (unsewered portion)	

#### Impoundments - Sewered

Cary Pond	Pigeon (Clintonville) Lake (sewered portion)
Iola Millpond (sewered portion)	Scandinavia Millpond
Manawa Millpond (sewered portion)	Waupaca Mill pond
Marion Lake (sewered portion)	Weyauwega Lake (sewered portion)

#### Bayous - Unsewered

Cincoe Lake	Partridge Lake (unsewered portion)
Colic Bayou	Partridge Crop Lake
Fremont Pond	Pea Soup (Mill Cut) Bayou
Horseshoe Bayou	Shaw Landing
Horseshoe Bayou, Little	Templeton Bayou
Jenny Slough	Tom Bayou
Millers Bayou	Traders Bayou

#### Bayous - Sewered

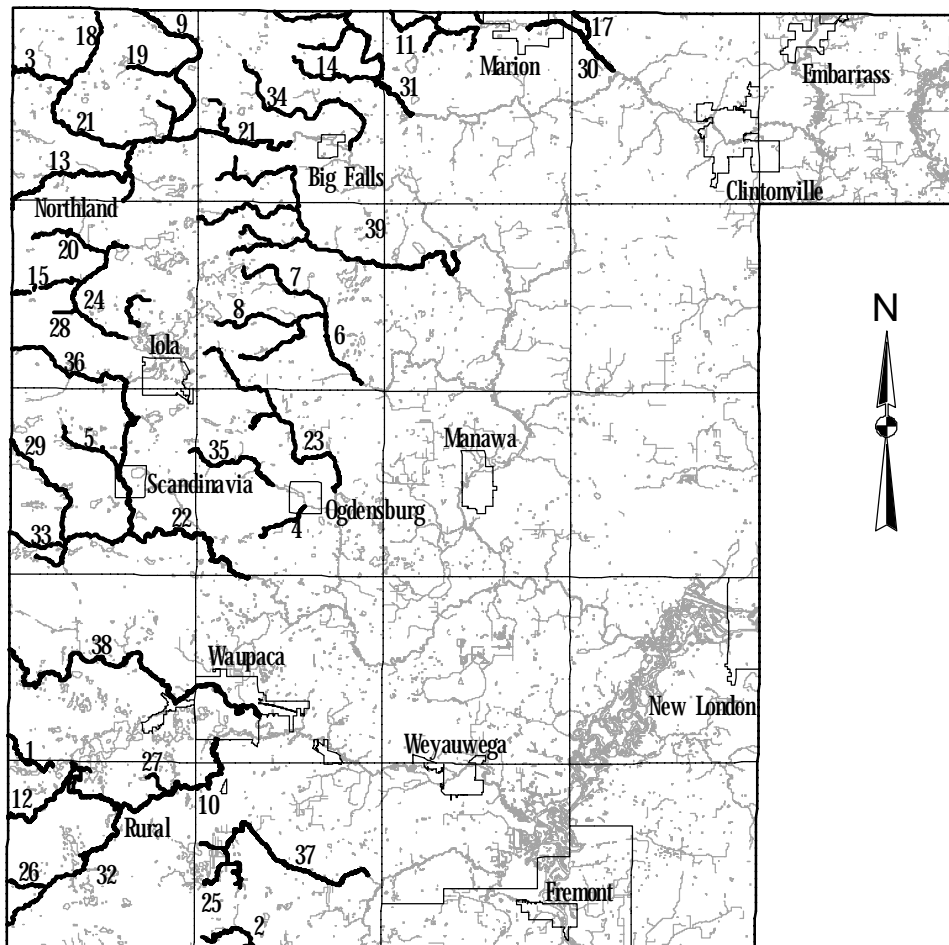
Partridge Lake (sewered portion)

#### **Trout Streams**

Listed in the Wisconsin Department of Natural Resources publication Wisconsin Trout Streams

## WAUPACA COUNTY TROUT STREAMS

MAP	STREAM NAME	TROUT WATER	MAP	STREAM NAME	TROUT WATER
1	ALLEN CR.	ALL	21	LITTLE WOLF R. (N BR.)	TO NE ¼ S28, T25N, R12E
2	AUSTIN CR.	ALL	22	LITTLE WOLF R. (S BR.)	TO NE ¼ S5, T22N, R12E
3	BAILEY (BRADLEY) CR.	ALL	23	LITTLE WOLF R. (N FK S BR.)	TO TOWN RD BISECTING S14 & S23, T23N, R12E
4	BASTEEN CR.	TO OUTLET OGDENSBURG POND	24	MACK (BROWN) CR.	ALL
5	BESTUL CR.	ALL	25	MCLEANS CR.	ALL
6	BLAKE BR. (MAIN CR.)	TO HWY 161	26	MURRAY CR.	ALL
7	BLAKE BR. (N BR.)	ALL	27	NAYLOR CR.	ALL
8	BLAKE BR. (S BR.)	ALL	28	OLSON CR.	ALL
9	COMET CR.	ALL	29	PETERSON CR.	ALL
10	CRYSTAL R.	TO CTH E	30	PIGEON R. N BR.	TO JCT WITH PIGEON R. S. BR.
11	DOTY CR.	ALL	31	PIGEON R. S BR	TO NW ¼ S20, T25N, R13E
12	EMMONS CR.	ALL	32	RADLEY CR.	TO JCT WITH CRYSTAL R.
13	FLUME CR.	ALL	33	SANNES CR.	ALL
14	GESKE CR.	ALL	34	SPAULDING CR.	ALL
15	GRIFFIN CR.	ALL	35	STENSON (ENGBRETSON) CR.	ALL
16	HARTMAN CR.	ALL	36	TROUT (NACE) CR.	TO HWY 161
17	HYDE CR.	ALL	37	WALLA WALLA CR.	TO CTH X
18	JACKSON CR.	ALL	38	WAUPACA R.	TO HWY 54
19	JONES CR.	ALL	39	WHITCOMB CR.	ALL
20	LEERS CR.	ALL			



## **MITIGATION REQUIREMENTS**

A nonconforming structure (usually a building) is one which was legally constructed before adoption of land use regulations but which does not comply with the current regulations. Such structures are often said to be "grandfathered." The Waupaca County Shoreland Zoning Ordinance allows nonconforming structures to be maintained but imposes specific limitations on their improvement or expansion (consult section 8.3).

Where the ordinance permits improvement or expansion of grandfathered structures which do not comply with shoreline setback regulations, mitigation is required. Mitigation requirements include:

- upgrading the sanitary system;
- abandoning nonconforming accessory structures of less than \$2,000 valuation;
- restoring a buffer of native vegetation;
- control of erosion and runoff; and
- use of visually inconspicuous building materials.
- Establishment of a 400 sq. ft. shoreline recreation area.

These measures are intended to compensate for the impacts of construction in the setback area and to reestablish to the extent practicable the water protection functions of a shore buffer area. Chapter III, "Shorelandscape Restoration," describes buffer area restoration and erosion and runoff control measures designed to comply with these requirements.

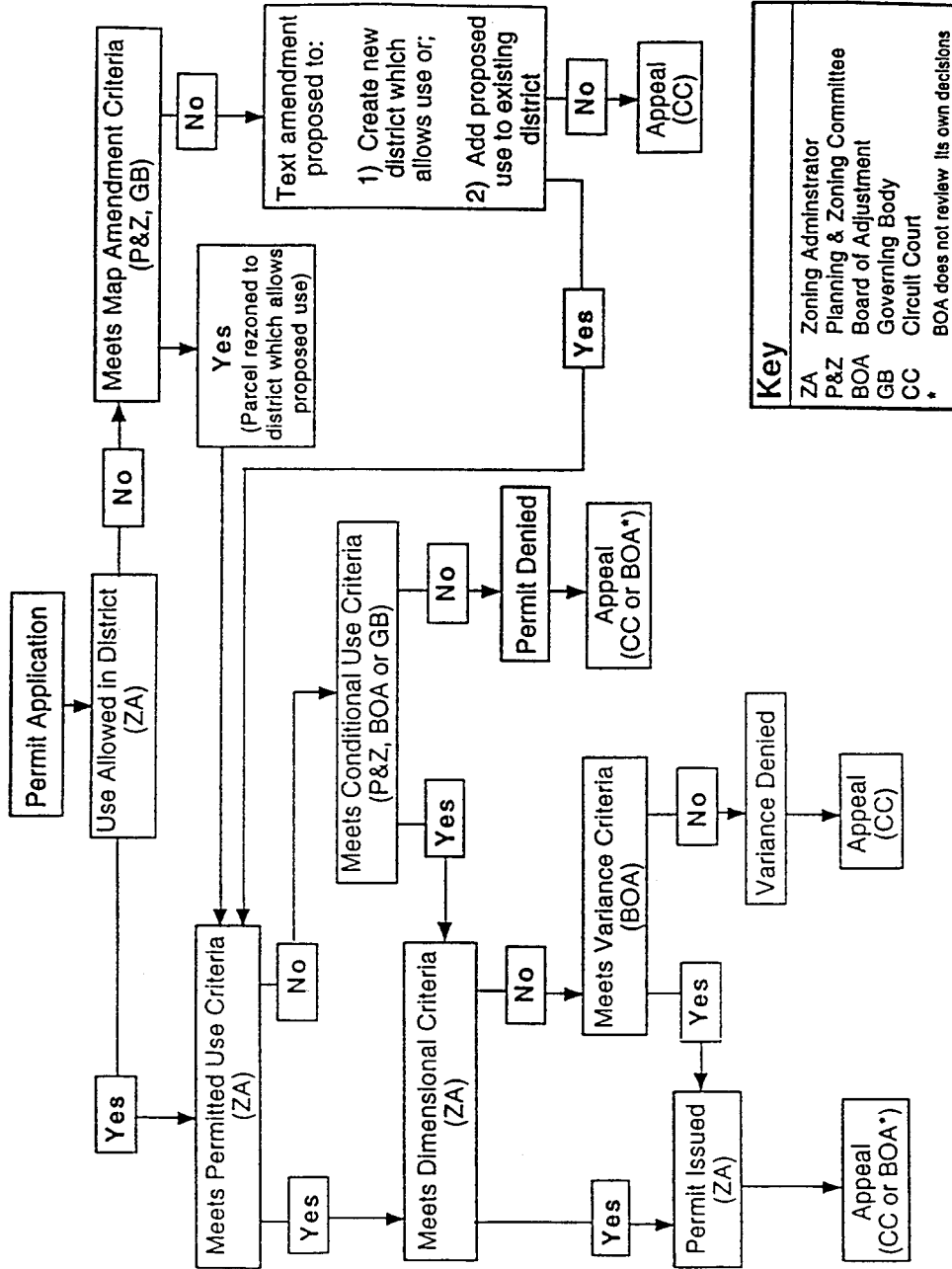
## **SHORELINE VEGETATION PROTECTION AREA**

The Waupaca County ordinance establishes a "no-cut" shoreline vegetation protection zone on each waterfront property (section 5.5). A few specifically limited exceptions to the "no-cut" requirements are provided. They include:

- piers and docks;
- pedestrian access paths and walkways;
- shore protection structures authorized by state permit;
- removal of dead and diseased trees; and
- establishment of a 30-foot wide view corridor by selective cutting.

The zone extends from the ordinary highwater mark of a waterway to a line which is 25 feet less than the required shoreline setback for structures (varies for each class of waterway). However, the cutting restrictions apply to all parcels whether they are used for residential development or for open space or recreation. Special requirements have been defined for forestry, grazing and cultivation practices within the "no-cut" shoreline protection zone. (Sections 5.57 - 5.6)

# Zoning Permit Decision Process



Key	
ZA	Zoning Administrator
P&Z	Planning & Zoning Committee
BOA	Board of Adjusting
GB	Governing Body
CC	Circuit Court
*	BOA does not review its own decisions

# **ZONING ADMINISTRATION AND SOURCES OF INFORMATION**

## **Who's Who and What They Do...**

State laws prescribe membership and procedural requirements and duties for county planning and zoning agencies and boards. County ordinances provide some additional requirements and outline the responsibilities of the zoning administrator and other agency staff. Local government committees and boards must comply with the state's open meeting law (s. 19.81-19.98, Stats.).

## **Planning and Zoning Committee**

A 5 member committee of the Waupaca County Board of Supervisors, the Planning and Zoning Committee, oversees development of county land use plans and administration of implementing ordinances including the Shoreland Zoning Ordinance. The committee is appointed by the Board Chair with Board approval. The Committee may direct county staff to initiate planning or it may contract with the East Central Wisconsin Regional Planning Commission or other professional consultant. Following public notice and hearings, it recommends adoption or modification of proposed plans or ordinances to the County Board which may adopt, reject or modify a plan, map or ordinance.

The Planning and Zoning Committee also decides conditional use permits. Conditional uses are listed in the ordinance for most zoning districts. These are uses of land which may be permitted provided they comply with specific conditions described in the ordinance and that they can be adapted to the limitations of a particular site and can be made compatible with uses of adjacent lands. Public notice and a hearing on proposed conditional uses are required. The Committee supervises activities of the zoning administrator and related staff. It may appeal decisions of the County Board of Adjustment to circuit court.

## **Zoning Administrator**

The zoning administrator is the key to an effective land use regulation program. The administrator and assistants act as staff to the planning and zoning committee. Duties include processing permit applications, receiving appeals and applications for conditional uses and variances and providing information for the public and permit applicants. The administrator advertises and schedules public hearings and may provide testimony and recommendations at hearings before the Planning and Zoning Committee or Board of Adjustment. The administrator is custodian of official ordinances, maps and zoning records. He/she makes inspections to determine compliance with the ordinance and initiates any required enforcement procedures. This office is the single best source of information about proposed and current development projects. Decisions of the zoning administrator are appealable to the County Board of Adjustment.

For information about ordinance requirements and to report violations contact:

Waupaca County Zoning Office  
County Courthouse, 811 Harding St.  
Waupaca, WI 54981  
715 258-6255  
FAX 258-6212  
8:00 AM - 4:00 PM, M-F



## **County Land and Water Conservation Department**

Some portions of the Shoreland Ordinance require consultation with or approval of project design by the County Land and Water Conservation Department:

erosion control structures and activities within the shoreline setback area [section 5.2(d)] and vegetation protection area (section 5.5);

shoreline protection structures on Group 1 Lakes (section 7.28) and trout streams (section 7.58); and

mitigation plans for internal improvement or expansion of nonconforming structures which do not meet shoreline setback requirements [section 8.32(4)].

Department staff can also provide information and advice about erosion control, stormwater management and priority watershed projects.

Waupaca County Land and Water Conservation Department  
County Courthouse, 811 Harding St.  
Waupaca, WI 54981  
715 258-6245  
FAX 258-6212  
7:30 AM - 4:00 PM, M-F

## **Board of Adjustment**

The 5-member County Board of Adjustment is appointed by the chair of the County Board to hear appeals (disagreements about ordinance requirements) and variances (requests for relaxation of dimensional standards in an ordinance). State law describes membership requirements and duties of the board of adjustment (s. 59.694, Stats.). The Board is a quasi-judicial body (almost like a court) because its decisions are bound by strict criteria outlined in the statute and the ordinance. It must apply the ordinance as written. It is not a policy making body as is the Planning and Zoning Committee. Board decisions may be appealed to circuit court by a procedure know as certiorari.

## **Corporation Counsel**

The corporation counsel is the attorney for the county and is employed to represent municipal interests. He/she provides legal opinions to the county board and its committees regarding their planning and zoning powers and duties (s. 59.69, Stats.). The corporation counsel also serves as prosecuting attorney for ordinance violations in circuit court.

## **County Board**

The Waupaca County Board is comprised of elected supervisors representing 27 districts. It approves or rejects land use plans, zoning ordinances and related amendments on recommendation from the Planning and Zoning Committee. The County Board approves contracts with planning or legal consultants and authorizes budgets for the zoning office, corporation counsel and other county agencies that affect planning and land use law administration.

Because it holds the policy and fiscal reins of local government, the County Board is ultimately responsible for local land use policy and related law administration.



## II. OTHER DEVELOPMENT REGULATIONS

Besides County Shoreland Zoning requirements, a number of other federal, state and local regulations affect shoreland development. This chapter summarizes the regulations. However, you should contact appropriate agencies to determine which specific requirements apply to your project. In particular, many towns administer land use and building codes with design standards and permit requirements.

### ***WATER WELLS***

#### **Wells and Groundwater**

Virtually everyone in Waupaca County gets their water from groundwater wells. Our abundant supply of groundwater comes from **aquifers**, underground soil and rock formations that store and move water. Rain and snow-melt seep through soil and bedrock to replenish these aquifers. The water from most wells enters its aquifer within hundreds of yards to a few miles of the well. Activities on the land surface effect groundwater. Waste water from homes, fertilizers, pesticides and spilled petroleum can seep through the soil and underlying geology to contaminate groundwater with nitrates, pesticides or other contaminants making it unfit for many uses.

Many private wells on waterfront property are shallow because groundwater often lies close to the surface near lakes, rivers and streams. These shallow wells are generally more susceptible to local sources of contamination. Wells on waterfront properties are also more likely to be contaminated by flooding. Most lenders will not finance the purchase of rural property without a safe well water report. In short, sound well water protection practices safeguard public health as well as the value of property.

#### **Well Permits, Siting and Construction**

In Wisconsin, the Department of Natural Resources sets well construction standards (NR 112). In Waupaca County a well driller is responsible to DNR for permits and compliance with the standards. Here are some general guidelines:

- Wells should be drilled on high ground away from flooding, surface water runoff and possible sources of contamination (at least 25 feet from a septic tank and 50 feet from a sewage system drain field).
- The top of the well casing must extend at least 12 inches above the surrounding ground level.
- The bottom of the well must be at least 25 feet deep or 10 feet below the groundwater level, whichever is deeper, to minimize risk of contamination from local sources and comply with state well construction standards.

- Deep wells draw water from farther away. If potential contamination sources are close to a well, a deep well may reduce risks. However, wells deep into bedrock may also create health risk depending on type of bedrock. Wells should be sited upslope from nearby sewage disposal systems.
- Abandoned wells that have not been properly sealed can contaminate groundwater. Locate them and contact DNR water supply specialists for proper abandonment instructions.
- Wells should be tested annually for bacteria and nitrates. Water sample bottles and mailers can be obtained from the University Extension office at the courthouse in Waupaca. The "homeowner's package" is recommended for new well tests.

## **WASTE WATER DISPOSAL**

Municipal sewage systems are designed and monitored continuously by trained professionals. However most rural property owners must treat household wastewater using an on-site disposal system usually called a **septic system**.

A properly functioning sewage system removes most disease causing organisms (**pathogens**) and some nutrients and chemicals from wastewater to protect public health, surface waters and groundwater. However, it will not remove or treat many water soluble pollutants such as nitrates. Therefore, extra care in location and maintenance of systems is critical near surface waters and where groundwater is near the surface. Proper system design and maintenance will extend its life and delay the expense and inconvenience of replacement (around 25 year life). Development plans must include designation of a suitable location for a replacement sewage system.

### **Types of Systems**

Private sewage systems are regulated under the state uniform plumbing code (COMM 83) which is administered by the county sanitary inspector in the zoning office. A permit is required to install, modify or replace a system. The state code provides location and design standards for sewage treatment systems and holding tanks. Topography (slope), depth to groundwater and bedrock, soil types and separation from distances from wells and surface waters on a building site will determine which of three types of private sewage systems will be allowed.

A **conventional sewage system** collects household waste in a tank buried outside the house. This tank may be constructed of concrete, steel or fiberglass. Steel tanks have a short life. A holding tank may rise to the surface if soils become saturated. Heavy materials settle out and are decomposed to form sludge in the tank. Floating materials such as grease are retained in the tank by baffles so that they do not flow to and obstruct the drainfield. Sludge and floating materials must be periodically removed from the tank by pumping. The remaining liquid portion is moved by gravity or a pump to a buried drain field usually constructed of perforated plastic pipe or drain tiles bedded in gravel. Organisms in the soil below filter out and break down waste products. Some water moves to the root zone of plants or to the surface where it evaporates. The remaining partially treated water eventually percolates to groundwater.

**At-grade and mound sewage systems** function similarly to conventional systems except that the liquid wastes flow or are pumped to a drain field which is constructed at or above the natural ground surface. Such systems are required where bedrock, groundwater near the surface or unsuitable soils prevent construction of a buried drain field. Because these systems require construction of an elevated drainfield they are generally more expensive than conventional systems.

A **holding tank** is a watertight tank which stores waste water. Waste water pumped from the holding tank is trucked by a licensed pumper to a nearby municipal wastewater plant for treatment or to an approved site for land spreading. Holding tanks are permitted in some areas where site conditions prevent construction of waste treatment systems. Frequent pumping makes this the most expensive method of waste disposal for a year-round residence. A holding tank may be required as a replacement for a failed sewage treatment system if site conditions do not allow construction of a mound system. It must be pumped when the alarm indicates that it is full in order to protect public health and nearby waters and to avoid back up of sewage into homes or cottages.

### **Detecting a Failed System**

Sales of rural property are generally contingent on a satisfactory inspection report for the sewage system. The inspection should include more than simply turning on all the faucets to make sure that water drains. Evidence that the tank has been pumped in the last two years should be supplied. State law requires above ground access manholes to septic tanks to have a warning label and be locked because dangerous gases accumulate in the tank. The manhole cover should be located and removed to confirm that baffles are in place and that the level of wastewater in the tank is correct (too high... water is not flowing to the drain field and it may be clogged; too low... there may be a hole in the tank). The vent pipe at the end of the drain field should be in place and should not have standing water in it (indicates saturated drain field and poor or incomplete treatment of wastes). Woody vegetation should not be allowed to grow over the drain field because roots may obstruct or damage drain pipe or tiles.

A private sewage system can be as effective as a municipal system at removing most disease-causing organisms. However, some nutrients and harmful chemicals are not removed and can damage surface waters or groundwater even if the system is designed and located according to codes. A malfunctioning system may result in contaminated well water or nuisance weed and algae growth which damage habitat and impede recreational use of nearby lakes and streams. Potential health risks are the most serious concerns. Dysentery, hepatitis and other diseases spread by bacteria, viruses and parasites may be present in waste water and spread to nearby waters making them unsafe for recreational use.

### **If a System Fails**

Contact the county zoning office about programs which may provide financial assistance for replacement of failed sewage systems for permanent residences.

- ✓ Have the tank pumped mixing the sludge and wastewater well to remove as much sludge as possible. This may provide temporary relief unless household plumbing or the drain field are clogged or the drain field is flooded by high water.

- ✓ Fence off the drain field to protect humans, pets and wildlife if wastewater is being forced to the surface.
- ✓ Do not use system additives. They provide no benefit and may cause further damage.

In the long term, a replacement sewage system may be required. If neighbors experience similar problems, investigate a community sewage system or formation of a sanitary district and construction of a more extensive sewage collection and treatment works.

### **Evidence of a Malfunctioning Sewage System:**

- Sewage backed up in the basement or drains.
- Ponded water or wet areas over drain field.
- Bright green grass over drain field may indicate that a system is forcing effluent to the surface.
- A dense stand of aquatic plants along only the adjacent shoreline.
- Slow draining drains or toilets and sewage odors.
- Bacteria or nitrates in nearby well water test.
- Biodegradable dye flushed through the system is detectable in the lake.

### **For more information...**

Contact your county zoning staff or sanitarian and review the following publications:

- Maintaining Your Septic System – WDNR PUBL-WR-165 90 REV
- Upstream-Downstream, The Failing Septic System – WDNR May 1978
- Care and Maintenance of Residential Septic System – UWEX B3583
- Inspecting and Troubleshooting Wisconsin Mounds – UWEX G3406
- Care and Maintenance of Residential Septic Systems – UWEX B3583
- Locating and Landscaping the Mound System of On-Site Waste-Water Disposal – UWEX G2940

# **WETLANDS**

Federal, state and local regulations affect wetlands. Wetlands provide critical protection for lakes, rivers, streams and groundwater. Their valuable environmental functions also support our state's tourism and agricultural industries. They provide:

- storm and flood water storage basins (flood protection);
- surface water protection (by trapping pollutants and sediments);
- critical fish and wildlife habitats;
- groundwater recharge (your drinking water) or additions to stream flows;
- shoreline protection against erosion;
- educational and scientific values; and
- natural scenic beauty.

## **Wetland Definition and Mapping**

Wetlands are areas where water is near the ground surface long enough during the growing season to determine the distinctive vegetation and soils that form in wetlands (s. 23.32(1), Stats.). A U.S. Army Corps of Engineers Wetland Delineation Manual (1987 and 1989 revisions) provides a consistent, scientific basis for wetland identification and boundary determinations based on soil types, vegetation and hydrology (wetness).

Wisconsin Wetland Inventory maps describe wetland boundaries and vegetation types. Most maps cover a 36-square-mile township and are produced on a photographic base at 1"=2000' scale. They are available for review at the county zoning office and most DNR offices. You can order them through the Wisconsin Geological and Natural History Survey - Map Sales, 3817 Mineral Point Rd., Madison, WI 53705 (608 263-7389).

## **State Wetland Regulations**

State laws protect wetlands on the beds of navigable waters and wetlands that may be affected by activities such as construction of channels or filling and grading adjacent to navigable waters (see state water regulations in this chapter).

## **Federal Wetland Regulations**

Congress continues its consideration of revisions to the Clean Water Act which determines the federal role in wetland protection. Watch for changes in this program.

## **Jurisdiction**

Section 404 of the Federal Clean Water Act (CWA) regulates the placement of fill material into U.S. waters including all wetlands. By recent revisions the regulations also apply to other activities that may damage wetlands such as draining, excavation, flooding and burning, if these activities may result in conversion of a wetland to another use.

## **Administration**

Section 404 is jointly administered by the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA). The Corps makes wetland permit decisions based on guidelines developed by EPA [Section 404(b)(1) guidelines]. EPA has veto authority over Corps permit decisions [Section 404(c)]. The Corps and EPA may

bring enforcement actions and levy administrative civil penalties against violators of Section 404 requirements.

The U.S. Fish and Wildlife Service (FWS) confers with state natural resource agencies in reviewing Corps permit applications. It recommends measures to protect fish and wildlife resources and replace wetlands which may be lost to development (mitigation). The Corps is required to consider FWS recommendations but is not required to implement them.

The Corps cannot issue a wetland fill permit if a state has determined that a proposed project would violate the state's water quality standards for wetlands (NR 103 in Wisconsin) or its federally approved coastal zone management plan. This provision (Section 401) is an effective state veto over Corps wetland permit decisions.

### **General and Nationwide Permits**

The Corps may pre-authorize permits on a state, regional, or nationwide basis for similar "minor" activities which will cause only minimal individual and cumulative adverse environmental effects [Section 404(e)(1)]. Nationwide permits are currently available for minor road crossings of wetlands, shoreline protection with rip rap, wildlife and fish habitat projects and other activities which meet specific design criteria. To avoid regulatory duplication, "preapproved" general 404 permits are often available for activities the state also regulates.

### **Individual Permits**

Activities in wetlands not exempted or covered by general or nationwide permits require an individual permit. The Corps issues a public notice describing the project and criteria for permit review to government agencies, newspapers, adjacent property owners and conservation groups. Any person may request notices for specific regions or types of projects. The Corps uses two general standards to evaluate an individual permit:

1) 404(b)(1) CWA Guidelines - No discharge of materials is permitted if there is a practicable alternative to the proposed project which would cause less damage to the aquatic ecosystem. If the project does not require access or proximity to water or wetlands (the water dependency test), it is presumed that there are other workable options. If there are no alternatives, then environmental damage must be minimized and lost environmental values replaced.

2) Public Interest Review - The Corps weighs conservation, wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy supply, safety, food production and general public welfare to determine if a project is contrary to the public interest and therefore not qualified for a permit (33 CFR 325.4).

### **Exempted Activities**

Normal farming, forestry, and ranching activities (including cultivation; soil conservation practices; maintenance of dikes, dams, and levees; and construction of farm ponds, irrigation ditches, and farm or forestry roads) are exempt from the requirements of Section 404 if these practices do not convert wetlands to uplands [Section 404(f)(1)].



## **U.S. ARMY CORPS OF ENGINEERS**

St. Paul District  
1421 U.S. Post Office Bldg.  
St. Paul, MN 55101-1479  
612/220-0369

Stevens Point Field Office  
3105 MacArthur Way  
Plover, WI 54467  
715/345-7911

## **U.S. ENVIRONMENTAL PROTECTION AGENCY**

U.S. EPA Region 5  
77 West Jackson Blvd.  
Chicago, IL 60604  
312/353-2000

### **FOR MORE INFORMATION...**

Review the following publications:

- Building Near Wetlands... The Dry Facts - WDNR WZ-WX021 91/JG WZ41 91.
- A Guide to Protecting Wisconsin Wetlands - UWEX G3059.
- Wisconsin Wetland Inventory Classification Guide - WDNR WZ-WZ023.
- A User's Guide to the Wisconsin Wetland Inventory - WDNR JG-WZ71 91.
- Wetland Functional Values - WDNR WZ-026 93.
- Water Quality Standards for Wisconsin's Wetlands - WDNR WZ-025 92.

## **FLOODPLAIN ZONING**

Floodplain zoning regulations are designed to protect citizens, their property and public investments from flooding. However, preventing development in floodplains has obvious water quality and other environmental benefits. The DNR provides floodplain zoning maps to local governments. The maps identify areas where major floods occur. Regulations prohibit development in the most dangerous flood areas. In other flood areas, development which is built above flood levels, has access to lands outside the floodplain and is otherwise flood protected is allowed.

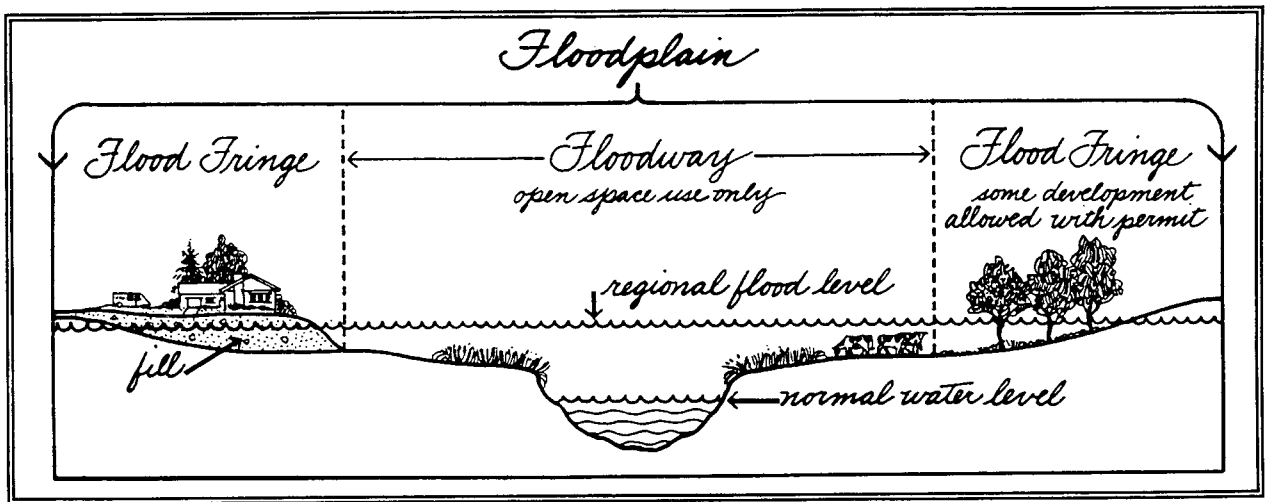
For regulatory purposes floodplains are generally defined as lands where there is a one percent chance of flooding in any year (also known as the 100-year flood). In practical terms, that translates into a 26% or about one in four chance that buildings located in the 100 year floodplain will be flooded during a 30-year mortgage period. Waupaca County administers a floodplain zoning ordinance. Ordinance jurisdiction is based mostly on general federal flood insurance maps and less frequently on detailed hydrologic and hydraulic flood studies with more accurate mapping. The Waupaca County Floodplain ordinance must comply with state ordinance standards adopted by DNR (NR 116). It must also meet federal standards set by the Federal Emergency Management Agency (FEMA) in order for county property owners to qualify for **flood insurance** which is only available under the National Flood Insurance Program.

An offer to purchase real estate should disclose whether a property is located in a floodplain. If it is, federally insured lenders will require the buyer to purchase flood insurance for any structures located in the floodplain in order to qualify for a mortgage (check the closing statement).

The water surface elevation during the 100-year storm, as depicted on adopted zoning maps, establishes the floodplain for regulatory purposes. Regulations divide the floodplain into two districts:

- 1) The **floodway** includes the stream channel and adjacent lands that carry moving water downstream during floods. Floodplain regulations prohibit buildings and filling there.
- 2) The **flood fringe** lies landward of the floodway and stores standing water during major floods. This area can be developed if building sites and access routes to them are elevated to protect from flooding.

Floods may become more frequent and reach higher levels in watersheds where wetlands have been drained, streams channelized and large areas paved or roofed without concern for sound storm water management. Consult the Zoning Administrator to determine whether property is located in a floodplain and to inquire about the regulations.



☞ **FOR MORE INFORMATION...**

Contact your local zoning administrator or, in smaller communities, the building inspector or municipal clerk. See also the following publications:

- Floods Affect Your Property - WDNR 14-3500(84)
- Answers to Questions About the National Flood Insurance Program - Federal Emergency Management Agency, FIA-2.
- Guide to Flood Insurance Rate Maps - Federal Emergency Management Agency, FIA-14
- Model Floodplain Zoning Ordinance - WDNR Water Regulations & Zoning (Rev. 1991)

## **STATE WATER REGULATIONS**

Most construction activities such as dredging and building bridges or breakwaters in our lakes, rivers and streams require permits from the state Department of Natural Resources (DNR). This is true for all navigable waters including ponds and some streams which may be dry during parts of the year. Consult the area water management specialist at the DNR office in Oshkosh early in the project planning process for advice about permit requirements and project design and information about contractors and nearby material suppliers. The regulations are designed to protect public waters and private property.

Wisconsin Department of Natural Resources  
 Wolf River Basin, Water Management Specialist  
 647 Lakeland Road  
 Shawno, WI 54166  
 (715) 524 - 2183

## Important Points

- Permits cannot be granted which would allow waters (lands below the ordinary high water mark) to be filled for private use.
- Generally, a waterfront property owner may fill to reclaim land lost to erosion from a major event (usually a storm or ice heaving) promptly after the event. Land lost to gradual erosion over the years may not be reclaimed.
- Local and/or federal permits as well as state permits may be required for a single construction project on some waters.
- Local units of government are not exempt from state permit requirements, although certain state and municipal highway projects are authorized by a different process.

The reference chart on the following pages provides a very brief summary of state water regulation laws. For detailed information, consult state statutes and your DNR area water management specialist.

STATE WATER REGULATION LAWS
<p>Bulkhead lines - 30.11, Stats.</p> <ul style="list-style-type: none"><li>• A surveyed line that legally describes the shoreline.</li><li>• Established by municipal ordinance.</li><li>• Must conform as nearly as possible to ordinary high water mark.</li></ul>
<p>Structures and deposits - 30.12, Stats.</p> <ul style="list-style-type: none"><li>• Structures on beds of waters are prohibited unless a permit or other authorization is granted. Most fills and deposits are prohibited.</li><li>• A 30-day public notice period is required before many permits may be granted. Sand blankets, fish habitat structures, riprap, stream fords and boat launch ramps are exceptions to the notice requirement.</li><li>• Permanent boat shelters in the water require permits (NR 326)</li><li>• State and some municipal highway projects are exempted from certain state and local zoning requirements but are authorized under a different process and must meet similar standards.</li></ul>
<p>Boathouses et al. - 30.121, Stats.</p> <ul style="list-style-type: none"><li>• New boathouse or fixed houseboat construction in the water is prohibited.</li><li>• Maintenance of those constructed prior to Dec. 16, 1979 is restricted.</li><li>• Structures in major disrepair may be order removed.</li></ul>
<p>Bridge construction - 30.123, Stats.</p> <ul style="list-style-type: none"><li>• Municipal roadway bridge construction is exempted from permit requirements but must meet standards.</li><li>• A private bridge may be constructed by a riparian if a permit is granted.</li></ul>
<p>Cutting weeds - 30.125, Stats.</p> <ul style="list-style-type: none"><li>• Aquatic weeds which are cut must be removed from the water.</li></ul>
<p>Aquatic nuisance species - 30.1255, Stats.</p> <ul style="list-style-type: none"><li>• "Aquatic nuisance species" is defined.</li><li>• An Aquatic Nuisance Control Council is established.</li></ul>

<p>Fishing rafts - 30.126, Stats.</p> <ul style="list-style-type: none"> <li>• Placement of fishing rafts is prohibited.</li> <li>• Regulated exceptions are provided for the Wolf and Mississippi Rivers.</li> </ul>
<p>Wharves, piers and swimming rafts - 30.13, Stats.</p> <ul style="list-style-type: none"> <li>• Piers and swimming rafts may be placed by riparians without permits if guidelines are complied with (NR 326).</li> <li>• Municipalities may regulate piers, wharves and swimming rafts.</li> <li>• A municipality may establish a pierhead line to limit pier length.</li> </ul>
<p>Obstructions to navigation - 30.15 and 30.16, Stats.</p> <ul style="list-style-type: none"> <li>• Certain obstructions to navigation are prohibited and may be removed by municipalities.</li> </ul>
<p>Diversion of water - 30.18, Stats.</p> <ul style="list-style-type: none"> <li>• Diverting water for irrigation or which will not be returned generally requires permit authorization.</li> <li>• Minor common law uses (e.g., lawn or garden watering) are excepted.</li> </ul>
<p>Constructed waterways and grading - 30.19, Stats.</p> <ul style="list-style-type: none"> <li>• Permits are required to construct waterways connected to or within 500 feet of navigable waters.</li> <li>• Permits are required for grading or filling over 10,000 square feet on the banks of navigable waters.</li> <li>• There are certain exceptions for public highway projects, agriculture and maintenance projects.</li> </ul>
<p>Stream channel changes - 30.195, Stats.</p> <ul style="list-style-type: none"> <li>• A permit is required to change the course of a navigable stream.</li> </ul>
<p>Dredging - 30.20, Stats.</p> <ul style="list-style-type: none"> <li>• A state contract or permit is required to remove any materials from below the ordinary high water mark of any lake or stream.</li> </ul>
<p>Dams, levels and flow - 31, Stats.</p> <ul style="list-style-type: none"> <li>• Dams on navigable and nonnavigable waters require authorization.</li> <li>• Procedures are established to set water levels and flow rates.</li> </ul>
<p>Wolf River protection - 30.25, Stats.</p>
<p>Wild rivers - 30.26, Stats.</p>
<p>Lower St. Croix River protection - 30.27, Stats.</p>
<p>Scenic urban waterways - 30.275, Stats.</p>

## **DAMS**

### **Water Levels and Flow**

Dams control water levels on many natural lakes to improve navigation. On rivers and streams they were constructed historically for milling or power production but the flowages are now important mainly for recreation or as homesites. Many riverine flowages suffer from poor water quality and are choked with aquatic plants and sediment as a result of development activities in their watersheds. Dams affect environmental quality and public safety on many of our waters (flooding and boater safety). DNR regulates dam construction or modification, impoundment water levels and downstream flow requirements to protect public interests in water quality, aquatic habitat, navigation and scenic beauty (see water regulation authorities).

### **Dam Maintenance and Repair**

DNR administers a dam inspection, maintenance and repair program (NR 330 and 333). It requires regular inspection and is funded by inspection fees. Hazard ratings determine whether dams must be modified to increase flood discharge capacities or whether downstream development restrictions should be imposed.

### **Buying or Selling Property with a Dam**

Buyers of property on which a dam is located must show financial ability to maintain the dam. In addition, a permit is required to transfer ownership of dams on navigable streams. These requirements apply not only to properties where concrete or metal water level control structures are located but also to those containing any related earthen dikes. Both buyer and seller must cooperate to complete permit applications. **If dam transfer requirements are not met, the real estate sale may be void.**

#### **FOR MORE INFORMATION...**

Contact the DNR Area water management specialist and see also ss. 31.14, 31.21 (transfer), 31.185 (abandonment) and 710.11 (real estate responsibility), Stats. Review the following publications:

- Dam safety: Know the Potential Hazard - Federal Emergency Management Agency, L152.
- Buying or Selling Property with a Dam - WDNR WZ-010 89.

## **PIERS, DOCKS, BOATHOUSES**

The near-shore areas of our lakes and rivers are important for recreational uses—a principal reason why many people own waterfront property. These areas are also ecologically fragile, biologically productive and contribute to the natural beauty of our waters. Because of these conflicting interests, regulations administered by DNR and Waupaca County govern the type, amount and location of near-shore construction related to storing and mooring of watercraft. The state regulations also describe separate near-shore areas, riparian zones, where each waterfront property owner may place structures. State law restricts pier construction to dimensions necessary for mooring, loading or unloading watercraft. Generally, a **pier** extends perpendicular to the shoreline, and a **wharf** is parallel to and connected to the shore throughout its length. Where near-shore waters are deep enough, a wharf should be constructed to minimize intrusion into the water.

### **Federal Permits**

Permits from the U.S. Army Corps of Engineers are required for piers on designated federal waters which include all of the Wolf River in Waupaca County.

### **State and County Permits**

Marinas for commercial use usually require DNR permits. Generally, piers for use by a single waterfront property owner will not require state or county permits if they comply with these guidelines (the following are state requirements unless noted otherwise):

#### **You must be a riparian:**

- A pier or wharf may only be placed by a waterfront property owner.

### Location:

- These structures must be confined to the owner's **riparian zone**. The zone is described by property lines extended into the water perpendicular to the shoreline if the shoreline is straight. A number of methods describe riparian zones where the dividing lines between adjacent owners may not be obvious, such as on points or in bays (see NR 326.07). In addition, the Waupaca County ordinance restricts pier and wharf location to a 30-foot wide view corridor maintained more or less perpendicular to the shoreline (section 5.55).
- A pier may not encircle or isolate part of a lake or river.
- Sensitive resources such as spawning areas or important beds of vegetation should be avoided. DNR fisheries managers, aquatic plant specialists or water management specialists can help to identify these areas.

### Length and width:

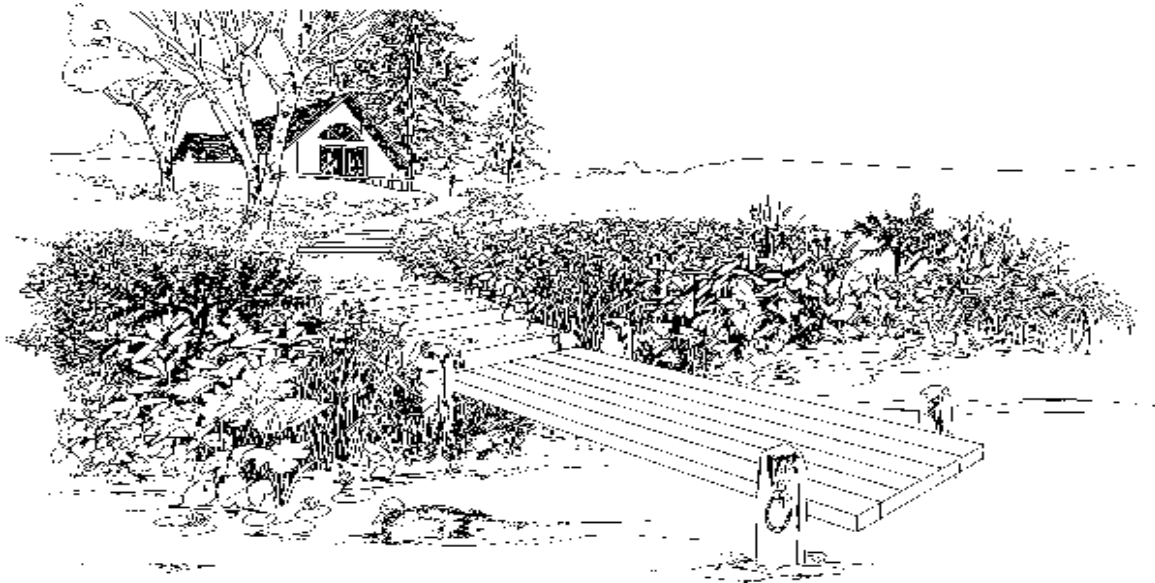
- A pier may extend waterward: a boat length; to the 3-foot water depth contour; or to deeper water if required by the draft of craft using the pier, whichever is greater, if it does not interfere with public rights. Where there is an approved municipal pierhead line, a pier may extend out to it.
- As a general rule, a pier may only be wide enough for safety (six feet is a reasonable maximum width in most cases).

### Construction:

- A pier or wharf can be floating or placed on pilings or posts. Floating piers are best where water levels vary, such as on flowages.
- Polystyrene floats should be coated or encased to resist gas, oil and abrasion. Metal drums should be corrosion resistant and free of any harmful product residue.
- Solid docks on fill and piers on rock-filled cribs or similar foundations require a DNR permit (specific construction criteria apply).
- A pier or wharf may not obstruct the free flow of water or trap aquatic plants.

### Accessories:

- Roofs, canopies, decks and other features not essential for mooring, loading or unloading watercraft are not allowed.



## **BOAT SHELTERS, LIFTS, BOATHOUSES, ETC.**

### **Boat Lifts and Shelters**

- A boat shelter provides a covered berth for watercraft in the water. It may have a roof or canopy but no sides or walls and may include a boat lift.
- Shelters are for storage of a single craft and are limited in size (maximum of 12 X 24 feet on waters less than 1000 acres and 14 X 24 feet if 1000 acres or more).
- Shelters which are removed from waters seasonally (out from December 1 to April 1) do not require a DNR permit but must comply with the same general guidelines as piers.
- Permanent boat shelters require DNR permits and must comply with standards in addition to those listed here (NR 326)
- Roofs must be pitched between 1-2.5 feet from peak to eaves and any storage facilities must be located above the eaves.
- Materials must blend with the summer shoreline background.
- The number of shelters per property is limited to one permanent shelter and a total of two (including seasonal shelters) for the first 100 feet of shore frontage and one additional seasonal shelter for each additional 50 feet of frontage.
- The Waupaca County ordinance restricts pier and wharf location and associated lifts and shelters to a 30-foot wide view corridor maintained more or less perpendicular to the shoreline (section 5.55).

### **Boathouses**

- A boathouse differs from a boat shelter by having sides or walls as well as a roof.
- **On land**, new boathouse construction is prohibited on all county waters by the Waupaca County Shoreland Ordinance. Existing boathouses (as of 6/5/97) may be maintained but may not be improved or rebuilt if substantially damaged (over 50% of fair market value unless damaged or destroyed by violent wind, fire, flood or vandalism (Section 8.33(3))).
- **Over water**, new boathouse construction is prohibited by state law below the ordinary highwater mark (OHWM). Wet boathouses constructed prior to 1979 are allowed to remain but DNR regulations govern their repair and maintenance (NR 325).

### **Decks**

- **Decks over the water are not allowed.** The Waupaca County Shoreland ordinance requires decks and other structures except piers and associated boat lifts and boat shelters to be set back from the shoreline (consult the setback requirements for each class of waterway).

### **Swimming Rafts**

- A riparian may place a swimming raft of modest size (10 X 10 feet suggested) and properly anchored within 200 feet of shore without a DNR permit. It must be confined to the owner's riparian zone and may not obstruct navigation or interfere with public uses of the water.



## **Mooring Buoys**

• Generally, a waterfront owner may place a standard mooring buoy in the owner's riparian zone within 150 feet of the OHWM without a permit from DNR. Local ordinances may authorize placement up to 200 feet from the OHWM and may require permits.

### **FOR MORE INFORMATION...**

Contact the DNR Area water management specialist and see ss. 30.12-13, Stats. and NR 326. Review the following publications:

- Pier Planner - WDNR WZ-017 93
- Guidelines for Marinas and Similar Mooring Facilities - WDNR 4/93
- Boat Shelters: Construction Standards - Wis. Adm. Code, NR326
- Guidelines: Ordinance Writing and Buoy Placement for Wisconsin Waters- WDNR

## ***CONSTRUCTION SITE EROSION CONTROL, STORMWATER MANAGEMENT AND PRIORITY WATERSHEDS***

Water pollution control professionals identify two general types of water pollution sources. Point sources are those where pollutants are transported by a pipe, ditch or some "discernable conveyance" to receiving waters. Nonpoint sources include farm fields or feed lots, construction sites and urban streets and parking lots where nutrients and pollutants move with snowmelt or stormwater runoff overland to our lakes, rivers, streams or groundwater. Most point sources have been effectively controlled by substantial government investment in municipal sewage treatment facilities and by delegated provisions of the federal Clean Water Act and state laws administered by DNR's Bureau of Waste Water Management (WPDES permit system). Nonpoint source (runoff) pollution, on the other hand, remains unabated in most of our watersheds largely because so many daily activities contribute to its effects... farming, construction, fertilizing the lawn, driving the car and the list goes on and on. Our state has initiated three major programs and components of others aimed at reducing nonpoint source pollution.

### **Construction Site Erosion Control and Storm Water Management**

Cities, villages and unincorporated towns with populations over 2500 must administer construction site erosion control provisions of the **state uniform dwelling code** (ILHR 20 & 21). The code requires approval of an erosion control plan for one and two family residential construction. The local building inspector enforces compliance with the plans.

### **FOR MORE INFORMATION...**

Contact the Department of Commerce, Customer Service Center, Box 7969, Madison, WI 53707-7969 (608 267-2423), and review this publication:

- Erosion Control for Home Builders (GWQ001), University of Wisconsin Extension Publications, 30 N. Murray St., Madison, WI 53715

Projects or parts of planned developments which disturb five acres or more require state **storm water management permits**. Thirty days before construction a developer must provide DNR with a "notice of intent" which includes:

- a construction schedule for land disturbing activities and erosion controls;
- a description of proposed erosion and storm water management practices; and
- evidence of plan preparation which meets DNR standards (practices specified in Wisconsin Construction Site Best Management Practice Handbook).

**FOR MORE INFORMATION...**

Contact DNR Storm Water Permits, Box 7921, Madison, WI 53707-7921 (608 266-7078).

**Priority Watershed Program**

The State Soil and Water Conservation Board selects priority watersheds for nonpoint source pollution abatement efforts based on criteria in a DNR rule (NR 120). Since program inception in 1978, river systems have received most attention but lakes may be targeted for special efforts in some priority watershed plans. Program success depends on a partnership between DNR and local units of government which must cooperate to:

- establish water quality objectives for a watershed;
- locate nonpoint pollution sources;
- prescribe best management practices (BMP's) to remediate pollution sources;
- encourage landowners to implement BMP's with state financial assistance; and
- monitor water quality to assure that objectives are met.

Best management practices are tailored to watersheds and specific sites. Practices authorized for Waupaca County priority watersheds include:

- porous pavement and street sweeping;
- stream fencing (livestock containment);
- shoreline buffer area restoration;
- streambank and critical area stabilization (riprap, biobank, shaping and seeding);
- grass waterway or tiled terrace construction;
- detention basins;
- wetland restoration;
- lake sediment treatment; and
- conservation and riparian easements.

Two priority watersheds have been authorized in Waupaca County: the Tomorrow/Waupaca and Little Wolf River watersheds. Landowners living within these areas may be eligible for financial and technical assistance.



### **Waupaca County Water Quality Protection Program**

Waupaca County provides financial and technical assistance to landowners for management practices aimed at protection or improvement of water quality. Eligible practices are similar to those listed for the priority watershed program. Landowners throughout the county may contact the Land and Water Conservation Department for information and assistance.

Waupaca County Land and Water Conservation Department  
County Courthouse, 811 Harding St.  
Waupaca, WI 54981  
715 258-6245  
8:00 AM - 4:00 PM, M-F



#### **FOR MORE INFORMATION...**

Contact DNR Bureau of Water Resources Management, Nonpoint Source and Land Management Section, Box 7921, Madison, WI 53707-7921 (608 267-7610).

# III. SHORELANDSCAPE RESTORATION...

## A guide for waterfront property owners

This chapter describes the effects of development on waters, the rationale for shoreland development standards and measures a property owner may take to protect waters and associated property values.

### *Effects of Development on Waters*

**What is your waterfront property worth?** One measure of its worth is the fair market valuation on your annual property tax bill. You probably don't have to be reminded that demand for waterfront property has outpaced the supply and, as a result, prices and resulting taxes have risen significantly. Increasing interest in information about managing waterfront property and rising membership in related local, state and national organizations, indicates a willingness to invest not only money but time, something even more precious in today's fast paced environment.

**Why do you live on the water?** Surveys tell us that of all the reasons for waterfront living, enjoyment of peace and quiet and natural beauty are expressed most often. But all of the reasons that might be chosen (including water sports, boating or holding waterfront property as an investment) depend on a healthy aquatic environment. A healthy lake, river or stream in turn depends on two ingredients. Sound land use practices in its watershed and near shore waters and adjacent lands (we'll call them riparian areas) that retain their natural physical, chemical and biological functions.

**If you own waterfront property, you enjoy special rights.** These riparian rights allow you to place a pier, dock or swimming raft and make other uses of public waters which the public does not share. These privileges bring with them an obligation to abide by state and local regulations designed to protect public interests in waters. You may choose to take additional steps to protect or restore the natural functions of riparian areas. Whether you do it to maintain the value and enjoyment of your property or out of a sense of responsibility to neighbors and the next generation, such a legacy benefits us all.

Our waters age over the course of geologic time becoming shallower and more nutrient rich. Human development of watersheds and riparian areas has accelerated these changes. Now decline in water quality may be noticeable after only a decade or two where natural processes may have taken many centuries. Sediment delivered by runoff obstructs navigation, covers critical aquatic habitats and makes waters turbid. Sediment bars may provide unexploited habitat for invading exotic plant species. Turbidity and prolific algae growth due to high levels of runoff borne nutrients prevent sunlight from penetrating the water and cause a decline in rooted aquatic plants. These plants provide critical habitat and are part of the aquatic food chain. Water turbidity and overabundant algal growth also interfere with sight feeding by game fish and our own recreational activities including aesthetic appreciation of clear waters. In some waters increased nutrient levels favor profuse aquatic plant growth. These "weeds" may become so dense that they hinder navigation and sight feeding by game fish such as pike and bass. Algae and larger aquatic plants produce oxygen during the day but consume it at night and as

they decay. Over abundant stands of either one may cause oxygen depletion under some conditions making waters unavailable to aquatic life. As our knowledge of the effects of development on waters increases, it suggests steps we can take to protect and restore our waters.

**Presettlement North America's riparian areas were covered by native vegetation** growing on soils undisturbed by intensive agriculture or modern construction activities. The vegetation shielded the soil from the erosive impact of raindrops and its roots anchored the soil in place against any overland runoff. Native soils were made porous by the burrowing activities of a myriad creatures from earthworms to rodents. Forest and prairie soils were carpeted with a thick sponge of decaying organic material. The net effect of native vegetation and soils was to allow most precipitation to infiltrate to ground water. Water moved through soil horizons rich in plant roots and microbial activity which removed many of the nutrients which now pollute our lakes, rivers and streams. In many areas what runoff there was, was intercepted by wetlands. Here nature's own water treatment works removed much of the sediment and nutrients before it entered surface waters.

**In addition to declining water quality, fish and wildlife habitat and natural scenery have suffered.** Some of the reasons for dwindling fish and wildlife populations are easy to discover such as over-harvest or direct loss of their living space to development. Others may be more difficult to detect such as bioaccumulation of toxics, predation by domestic pets or invasion by exotic species that may out compete natives. Most biologists agree that habitat fragmentation by development is a critical factor in reduction of native species. Fragmentation may sever seasonal or daily travel corridors between critical habitats or simply squeeze populations into areas too small to meet their physiological and social needs. Increases in noise, light and human activity and major changes in vegetation cover contribute to the habitat loss caused by construction.

Acre by acre and lot by lot we have changed the landscape and its effect on our waters and their biological communities. The construction of buildings, parking areas, roadways and other impervious surfaces reduces the area available for runoff to infiltrate. Agricultural and construction activities have had a similar effect by compacting native soils. The resulting runoff carries soil and its associated nutrients as well as a dirty water cargo from roads and parking areas to our surface waters. Construction and farming activities remove native vegetation often leaving the soil unprotected from erosion for extended periods or replacing it with species much less effective in anchoring soil particles or trapping sediment in runoff.

The development history of a lot on Long Lake in Chippewa County provides an example of the water quality effects of residential construction. The lot is 200 feet deep with 100 feet of shoreline frontage and slopes gently to the lake. In an undeveloped condition its maple-beech forest and sandy loam soils delivered about 1000 cubic feet of water, 0.03 pounds of phosphorus (a key nutrient) and 10 pounds of sediment to the lake annually. In the 1940's a modest cottage, gravel drive and grass corridor to the lake were constructed resulting in an additional 10 pounds of sediment delivered to the lake. Today a year around residence occupies the site. The remaining forested land has been converted to lawn and the drive and a parking area are paved. Runoff has increased to 5 times that of the undeveloped lot. Sediment and phosphorus delivery increased 9 and 7 fold respectively. Consequences of development such as these accumulate lot by lot not

only in riparian areas but throughout a watershed. Simply reducing the amount of land disturbed during construction can provide significant water quality protection.

A Maine study found that even a subdivision with large 1 acre lots, as much wooded area as lawn and minimal road surface exported 5 to 10 times more phosphorus nutrients than the forested area it replaced (Dennis, 1994). The study also predicted that covering only 10% of the watershed with similar low density development would increase phosphorus in the lake by 40-90%. That increase would spur algae production resulting in noticeable reduction in water transparency and reduced oxygen in the hypolimnion (the bottom waters of a thermally stratified lake). These consequences were predicted even with the remainder of the watershed in forest cover.

Riparian areas provide valuable benefits. A well shaded buffer area of 30-60 feet can reduce the **temperature** of runoff flowing through it (USCOE, 1991). Cooler waters hold more life supporting oxygen and slow nuisance algae and plant growth. Riparian springs and seeps discharge groundwater to sustain our trout fisheries during low flow periods in winter or late summer. Stands of waterfront trees and shrubbery **diminish noise** of motorboats and personal watercraft and also **trap wind blown debris** that would otherwise enter the water. They **screen development** to protect scenic vistas you enjoy and can frame the view of the lake or river from your window. Riparian areas provide a **travel corridor** for many species of birds and small mammals. For many reptiles, amphibians, fishes and other species near shore lands and waters provide **essential breeding grounds, food sources or cover** at critical life stages. Sport fishing and enjoyment of wildlife depend directly on the biological health of these lands and waters.



Riparian areas are perhaps most important as the **last chance for vegetation and soils to trap sediment and nutrients** before they damage our waters. Once regarded as a nuisance, wetlands adjacent to streams and behind lakeside ice push ridges are especially valuable for these functions and for the wide variety of life that they support. They provide wildlife watching opportunities not available elsewhere.



**Basic principles guide waterfront property development.** You may have had the foresight to **minimize the area disturbed during construction** of your waterfront home, fencing off areas to protect native vegetation and prevent soil compaction. You may have been especially careful to preserve native trees, shrubs and ground cover because you realized that they are uniquely adapted to the soil, moisture, light, temperature and other microclimate features of your lot. They have tolerated variations in those conditions from season to season and year to year without need for fertilizers, pesticides or significant maintenance and will continue to anchor soils, infiltrate water and provide wildlife habitat and natural beauty indefinitely.

An important first step is to determine the approximate **size of the watershed** that drains through your property to the lake or river. If it is large or densely developed with a large proportion of impervious surfaces, it may produce more runoff in even modest storms than can be treated by efforts on your property. Runoff from development higher in your local watershed may flow in a gully or ravine which requires bank stabilization or a detention pond near you. If this is the case, consider working with local municipal officials and neighbors to plan and implement **storm water management** practices "upstream" from your property.

**Water power transports nutrients and pollutants** from your lakeside or riverside lot. Doubling the velocity of water enables it to move particles 64 times larger, allows the transport of 32 times more material and makes its erosive power 4 times greater. Your end objective is to reduce the amount of water that runs off the land.

**Minimize the amount of impervious surface** (the "footprint" of house, outbuildings, paved drive or parking areas, patio, etc.) which prevents water from infiltrating into the soil. Porous paving materials for parking and patio areas are available. Consider bark mulch for low use walkways.

**Direct downspouts** to conduct rainwater to a dry well, a French drain (a buried trench lined with geotextile filter fabric and filled with washed stone) or surface detention area. Construct them so that any overflow will move away from the foundation of your home. Rock mulch near buildings is generally not recommended since it encourages water to pond near the foundation and seep inside.

Research demonstrates that as these factors become more severe, **wider riparian buffer areas are required** to effectively protect water quality:

- a large, highly developed upstream watershed
- impermeable surfaces or compacted soils

- steep slopes
- long slopes
- uneven slopes causing channelized flow
- sparse ground cover and vegetation

A Virginia study showed removal of 55% of N (nitrogen) and 60% of P (phosphorus) from runoff in a 16 (5 meters) foot vegetated filter strip. However, enough N and P remained in the runoff to support plant and algae growth in receiving lakes and streams. Increasing the filter strip width to 33 feet (10 meters) removed an additional 20% of total N and P. Reviews of scientific literature conclude that buffers of 49-98 feet (15-30 meters) provide minimal maintenance of most riparian area functions. Effective buffer area width varies with the condition of the buffer and the function supported. Basic wildlife habitat functions require relatively wide riparian buffer areas of up to 656 feet (200 meters), (Johnson & Ryba, 1992). However, just as threats to water quality and aquatic ecosystems are cumulative, so are the **benefits of even modest riparian buffer areas**. You can start by leaving as little as 10 or 15 feet next to the water unmowed.

The **condition of a buffer area** is as important as its width. Avoid activities that compact soils. Preserve leaves, twigs and other natural ground litter which decay to bolster soil fertility and its ability to hold water and nutrients. Protect or establish native grasses, forbs and other ground cover. They will not require routine maintenance or application of fertilizers or pesticides as turf grasses do. Many native species have square, triangular or round stems (mint, sedge and reed families et al) and remain erect during rainstorms and persist through the winter to slow spring runoff and trap sediment and associated nutrients. Flat stemmed turf grasses bend during runoff and are much less effective sediment traps. Consult the county's University Extension or Land Conservation office for information about native species and sources of seed or stock. In many areas soils retain a native seed bank that, if undisturbed by mowing and herbicide application, will produce native forbs and wildflowers. Confine turf grass lawn to moderate to high traffic and recreation areas away from the shore. Test your soil to determine nutrient requirements. Purchase low or no phosphorus fertilizer to avoid potential runoff to nearby waters.

**Divert water away from erodible areas and provide opportunities for it to infiltrate or evaporate** from surface detention ponds. **Long slopes accelerate the erosive power of water** and may require a berm, swale or tiled terrace to intercept runoff before it causes erosion. Similar measures will protect areas of unstable soils (often sandy or with poorly established ground cover). Conduct waters to a surface detention or infiltration site. You may need professional assistance to compute the necessary size of detention basins and to lay out a berm or swale along the proper contour for infiltration or deflection. Plant detention basins with vegetation adapted to periodic flooding.

Think of riparian areas as consisting of **three stories of vegetation**. Each has distinct functions which would be lost if any story were to dominate the others. All provide water quality benefits by shielding soils from erosive raindrop impact and by anchoring soil particles with their roots. They all metabolize nutrients, produce oxygen and push moisture back into the air by transpiration. But dense stands of conifers are best for year around visual screening, noise reduction and shelter from winter storms. The midlevel shrub story is a grocery store for birds and small mammals. But before you modify vegetation, consider how your property functions as part of larger **neighborhood and regional environments**. In attempting to provide all the habitat requirements for a few



local species you may disrupt a larger ecosystem. Your wooded lot may be the last travel corridor to water for local deer and that old field may be the sole remaining nesting site for bobolink and singing grounds for whippoorwill.

One of the first steps in deciding whether or how to alter the vegetation or topography of your property is to **inventory** what you currently have. An approach might be to list the benefits your property provides and the threats to them. Map the land contours, drainageways, soils, vegetation, wildlife sightings and habitats. Note outdoor use areas where only turf grasses will stand up to the traffic. Record the location of the well and drain field if you have an onsite waste disposal system. **Tour your property during a rainstorm** which produces significant runoff to locate existing and potential problems. Map eroded shoreline and drainage channels, plumes of sediment from runoff entering the lake or river and other areas where water may cause erosion. Also note potential sites for drains, diversion berms or storm water infiltration ponds. Judge the severity of runoff and erosion problems on your property and plan storm water and vegetation management practices described here to solve them. A number of very good manuals are available to guide your decisions (see Part II). Consult a professional landscape architect or the Waupaca County Land and Water Conservation Department to confirm your plan and for other professional advice.

**Avoid terracing** and other activities which remove natural vegetation, compact soils or add substantial fill over the root zone of shrubs and trees. Extensive land disturbing activities may also invite invading weeds or exotic plant species which may be difficult to eradicate.

**Access to the shore** over a steep bank or through a wetland may present a special challenge on your property. An elevated walkway or pier on posts over a wetland preserves its habitat, water quality and aesthetic values. A similar approach avoids the erosion associated with dug-in stairways over sandy soils or steep slopes. The Waupaca County Ordinance limits construction in these sensitive areas to what is essential for access to the shoreline and requires location within the 30-foot wide view corridor (section 5.5). Consult the county Zoning Office for advice and about permit requirements.

The **shoreline and near shore waters** are the focus of our water recreation activities. They are also the most biologically productive part of aquatic systems. Their health is essential for many species. Rooted aquatic vegetation near shore dampens wave and current energy and anchors bed sediments. It provides a hunting ground, refuge and nursery for many fishes. Overhanging trees and bank vegetation contribute similar functions.



In some ways we bring our city habits to the waterfront. In town, a concrete curb separates private property from public thoroughfares and provides a convenient limit for addictive lawn mowing and grass trimming activities. But concrete, masonry, steel or wooden seawalls are seldom an appropriate waterfront corollary. **The shoreline is a living bridge** between interdependent aquatic and terrestrial worlds. It is a high energy environment of rising and falling water levels, wind driven waves and ice. Construction of seawalls disturbs vegetation and beach slopes adapted to the natural pulse of local waters. Seawalls reflect wave and ice energy scouring the near shore area of aquatic vegetation and often damaging adjacent unprotected properties. They are a barrier to species that must move between aquatic and terrestrial environments to complete their life cycles. Many inevitably fail because they are improperly constructed or because they cannot withstand the formidable power of ice.

If you detect significant recent erosion on your shoreline, simple bank sloping, bioengineered revegetation or rock riprap will provide protection in most cases. Ample literature and County Land and Water Conservation Department or DNR consultants will guide you to an appropriate choice.

Bioengineered revegetation is a new approach to shoreline restoration. Manufactured coconut fiber rolls or tightly bound brush bundles are staked at the shoreline. They dampen wave or current energy and provide a substrate for inserting suitable native aquatic plants. As sediment becomes lodged in the bundles, bank vegetation colonizes them. The bundles are gradually incorporated in a root mass which protects the shoreline.

Rock riprap may be required on higher energy shorelines where current is swift or on a windswept eastern shore of larger lakes. Riprap consists of bank sloping along natural shoreline contours followed by placement of geotextile or specific gradations of crushed rock and larger armor stone. Reestablish natural vegetation on lands disturbed by construction and apply mulch, jute netting or geotextile erosion control fencing as necessary. DNR permits are required for shoreline protection activities.

Attempting **restoration of native aquatic plant communities** near shore requires some investigation and consultation with professionals. Tour your lake or river to determine which native aquatic plants are growing along shorelines similar to yours. Inventory species which grow in comparable water depths and bottom materials along shores with similar wave or current action. A number of aquatic plant manuals are available to assist you. Learn how these species propagate. Often a combination of factors is responsible for diminished populations of native water plants. DNR lake and aquatic plant management specialists or university botanists can help you to discover the root of the problem and recommend a remedy. Techniques for restoration of native aquatic plant beds may be highly site specific and untested. A cautious approach employing good professional advice applied to a small area is a prudent approach to this concern.

Consider limiting boat docking and other recreational activities to a portion of your shoreline (section 5.5). Enjoy the remainder for its natural beauty and the environmental functions it provides. Your shorelandscaping project will reward you with cleaner water, pleasant views, better fishing, more leisure time and a myriad other benefits. It will reward future generations with an endowment of lakes, rivers and streams that we can all be proud of.

## ***Restoration Planning for Your Property***

*The first rule of intelligent tinkering is to save all the parts.*

Aldo Leopold

Step one in landscaping to restore the natural functions of your waterfront property is to inventory what you have. Start with a simple audit listing the things that you enjoy about your property and those that you would like to change (the assets and liabilities). For example, you enjoy having a place for outdoor sports like volleyball but understand that large expanses of turf grass near the water are often not compatible with good water quality and the wildlife that you enjoy (Section 5.53). Your challenge will be to investigate alternative locations and designs for uses of your property that take into consideration its natural functions.

### **Base Map**

This Shorelandscaper's Guide includes two worksheets to help you inventory your property. One is a Base Map to help you describe its geography and development features. Start by drawing in lot lines, any easements, waterline, ordinary highwater mark and the locations of buildings, decks, patios, paved surfaces and utilities (sewer or septic drain field, water, power, etc.). The Base Map will help you to identify these sites. If your parcel is larger than an acre or two, you can use an aerial photograph as an alternative base map. Photocopies of aerial photographs are available at the Waupaca County Property Lister's Office for a nominal charge.

The ordinary highwater mark (OHWM) is the highest point on the bank or shore which shows evidence of the presence and action of water. It is often marked by current or wave erosion but may also be determined by a transition in vegetation from aquatic to terrestrial types or by highwater stains on rocks or trees or more subtle changes caused by the nearby lake, river or stream. Its location is important to you because it marks the bed of the waterway where state permits will be required for many activities and because it is the point from which shore setbacks for buildings and other structures are measured.

Tour your property during a good rainstorm to map topographic and drainage features on the Base Map. Flag them as a guide for later restoration projects if you like (flagging is available at most landscaping and many hardware stores). Determine sources of runoff such as hard surfaces (roofs, compacted or clay soils, etc.) and the route it takes to the waterfront. Note eroded shorelines and other sites. Discover low lying areas that provide opportunities for runoff detention and infiltration.

## **Site Inventory Map**

The second worksheet is a Site Inventory Map. It will assist you in cataloging the existing biological communities and other features on your property along with its capacity to support restored native vegetation and wildlife. The Appendix lists references to help you identify the species that share your home.

The objective here is to inventory the plant and wildlife species that inhabit your lot and the general soil, moisture and light conditions that support them. As you complete the Site Inventory Map divide your parcel into a manageable number of general vegetation types (e.g. turf grass, conifers, mixed forbs, etc.). Use your best judgement or rely on reference materials and experts to discover the natural values and functions of each vegetation type.

Complete the Vegetation Evaluation in the Appendix to help you decide whether to maintain, modify or replace all or a portion of a vegetation type. Weight the benefits and harms for each function category as described in the header of the Evaluation matrix and total the plus and minus columns to get an indication of the net benefit each area provides. The matrix provides a reasonable basis for your decision making.

## **Restoration Plan**

Your completed Base Map describes current erosion and runoff problems as well as the restoration limitations imposed by existing development on your property. The Site Inventory Map and Vegetation Evaluation matrices recount current functions and values of its biological communities and the potential for restoration. A restoration plan describes the location and sequence of practices required for significant improvement of the natural functions of your waterfront property. Here are some general guidelines to keep in mind while deciding on a restoration plan:

- Try to adopt a landscape scale perspective and view your property as part of a regional environment. The water quality improvements that you make will add up lot by lot throughout the watershed. You will be disappointed if you attempt to provide every life requirement (food, water, cover, etc.) for numerous wildlife species in hopes of luring them all. Such attempts often further fragment existing habitat units making them unsuited to their current wildlife residents.
- Try to concentrate compatible human activities in one part of the property leaving some undisturbed areas for wildlife.
- Avoid periods of excessive or infrequent rain which may hinder revegetation.
- Begin with activities which reduce runoff at elevations high on your lot and work toward progressively lower elevations to make repair of "downstream" eroded sites easier and construction of detention sites efficient.
- Work with the natural topography and limitations of the site. Avoid major recontouring and terracing.
- Let soil, slope, light and moisture conditions and the functional values of plants (e.g. dense roots to anchor soils, berry shrubs for food and nesting cover, etc.) guide your revegetation plans.

- Expose as little soil at one time as possible and avoid construction and maintenance activities that compact soils and reduce infiltration.

During the "rainstorm tour" of your property you discovered and mapped sources of runoff, runoff routes and potential detention/infiltration sites. The development inventory that you prepared describes areas that must remain relatively unobstructed for access and maintenance. By now you have decided (based on the Site Inventory Map and evaluation sheets) which if any vegetation types and areas can be altered to provide greater natural values. Preparing the restoration plan is like constructing a puzzle...all the pieces are interrelated and must fit to produce a final product. Follow these steps to complete your puzzle.

### Step 1

**Reduce runoff.** The best time to minimize the area of impervious surfaces and compacted soils which shed water and cause runoff is during the initial planning and construction on your property. But as driveways, walkways, decks and patios age and require maintenance, you might consider replacing them with porous paving bricks, flagstone, shredded bark, elevated walkways or other construction which allows some infiltration. Allow leaves and other organic debris to accumulate as a shield against the erosive force of raindrops and to encourage burrowing worms and insects which increase soil porosity and infiltration. Remember that Waupaca County requires a "vegetation protection area" - the distance based on the lake, river or stream classification (Section 5.5). Many areas retain remnants of a seed bank that will reestablish native vegetation if left undisturbed for a few seasons or you might interplant with native species.

### Step 2

**Stabilize the routes that runoff takes** with vegetation, riprap or drain tile if necessary or velocity reducing measures such as buffer strips, check dams or baffles. Construct a shallow swale or low berm to divert runoff to areas which you have identified for later excavation of detention or infiltration sites. Stabilize the swale or berm with vegetation, fiber matting or other erosion control materials prior to any excavation at the detention site. Avoid extensive soil disturbing activities during spring and fall rainy seasons. Mid September is usually the latest date to establish vegetation cover before winter.

### Step 3

**Detain runoff** before it enters receiving waters. Allow suspended soil and associated nutrients to settle out. Provide opportunities for it to infiltrate, evaporate or transpire from vegetation. Supplement wetland vegetation on the landward side of natural beach ridges. Consider filling gaps in ridges or adding elevation to increase stormwater storage capacity unless these activities would obstruct fish or wildlife movement or significantly damage existing vegetation. Excavate detention sites that you have identified on your Base Map and Restoration Plan. Locate them away from building foundations and slopes that may become saturated and unstable. Some faster draining soils may accept a dry well, perforated drain tile or a French drain (a trench lined with filter fabric and filled with washed stone) for direct infiltration of limited amounts of runoff from downspouts or similar discharges.

#### Step 4

**Restore poorly vegetated areas** based on site limitations (primarily soils, light and moisture) and functional values selected (water quality, habitat, natural aesthetics, etc.). Vegetation with a dense root system and numerous erect stems that persist through winter and spring runoff are beneficial to water quality. Contact the Waupaca County UW Extension office or Land and Water Conservation Department and have your soil tested to determine nutrient levels. Avoid selection of species which require continued supplemental application of fertilizers that may be transported to nearby waters. Select conifers for year around windbreaks and visual screening with the understanding that accumulation of pine needles below will discourage most understory plants. Interplanting, occasional mowing or burning and other techniques can change the species composition of an area over time without extensive land disturbing activities that risk erosion and soil compaction.

Selecting plants for native revegetation may appear to be complex. Fortunately help is available from agencies, consultants, native plant nurseries and literature. John Curtis' Vegetation of Wisconsin is a treatise describing the species associations and physical requirements of native plant communities and provides insight to the restoration potential of specific sites. Shoreline Plants and Landscaping is a publication available at the county Extension office which provides similar information in a compact, easy to use format. State and federal wildlife management agencies have information and publications to assist you in selecting species based on their habitat values. Native plant nursery catalogues often categorize stock by their soil, moisture and light requirements (which you have mapped on your site inventory). If you can discover a nearby undisturbed site similar to yours, its vegetation may provide the best recommendations of all. Consult the sources listed in Read More About It in the Appendix for specific information about plant selection, site preparation and maintenance.

#### Step 5

**Stabilize eroded shorelines.** Preserve habitat features such as aquatic plant beds, gravel spawning substrate, overhanging and windfall trees, beach and wetland access routes for spawning fishes, nesting turtles, foraging raccoons, etc. Use an incremental approach to shore protection by matching the practice you choose to the range of water levels and erosive forces of waves, current or ice that occur at your site:

- mild erosion... restore emergent aquatic plants to anchor beach sediment and dampen wave and current action or simply slope and revegetate the bank;
- medium erosion... use bioengineered techniques or light riprap;
- severe erosion... get professional advice about heavier riprap or other construction (seldom are seawalls advisable).

Most shoreline protection activities require DNR permits. Projects which meet design guidelines can be approved quickly. Contact the Water Management Specialist at the local DNR office. Occasionally Corps of Engineers or local permits may also be required. These agencies are a good source of design advice and can provide information about local contractors and materials suppliers.

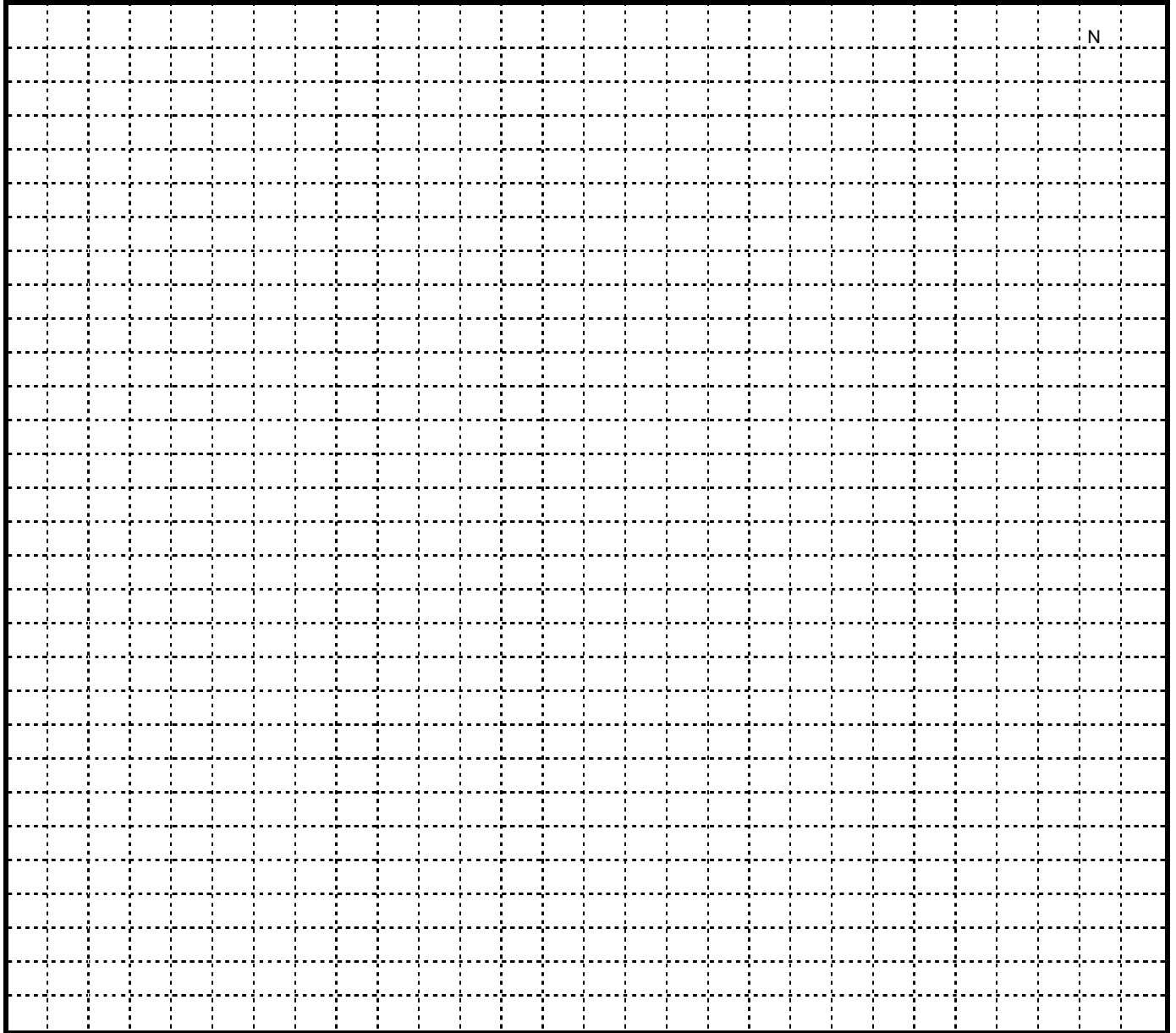
#### Step 6

**"Protect" high use walkways.** Stairways carved into lakeside slopes and worn pathways often become an eroded conduit for runoff. Shredded bark can be an effective

surface on level paths and an elevated wooden walkway over a steep slope or wetland can provide water access.



# SHORELANDSCAPING BASE MAP



Scale - =

Topography

Improvements



lot lines  
waterline  
ordinary highwater mark  
wetland  
runoff sheet flow  
runoff channel  
ponded stormwater  
beach ridge  
erosion

buildings  
paving  
septic field  
well  
buried utilities  
foot path  
stairway  
pier  
deck  
patio

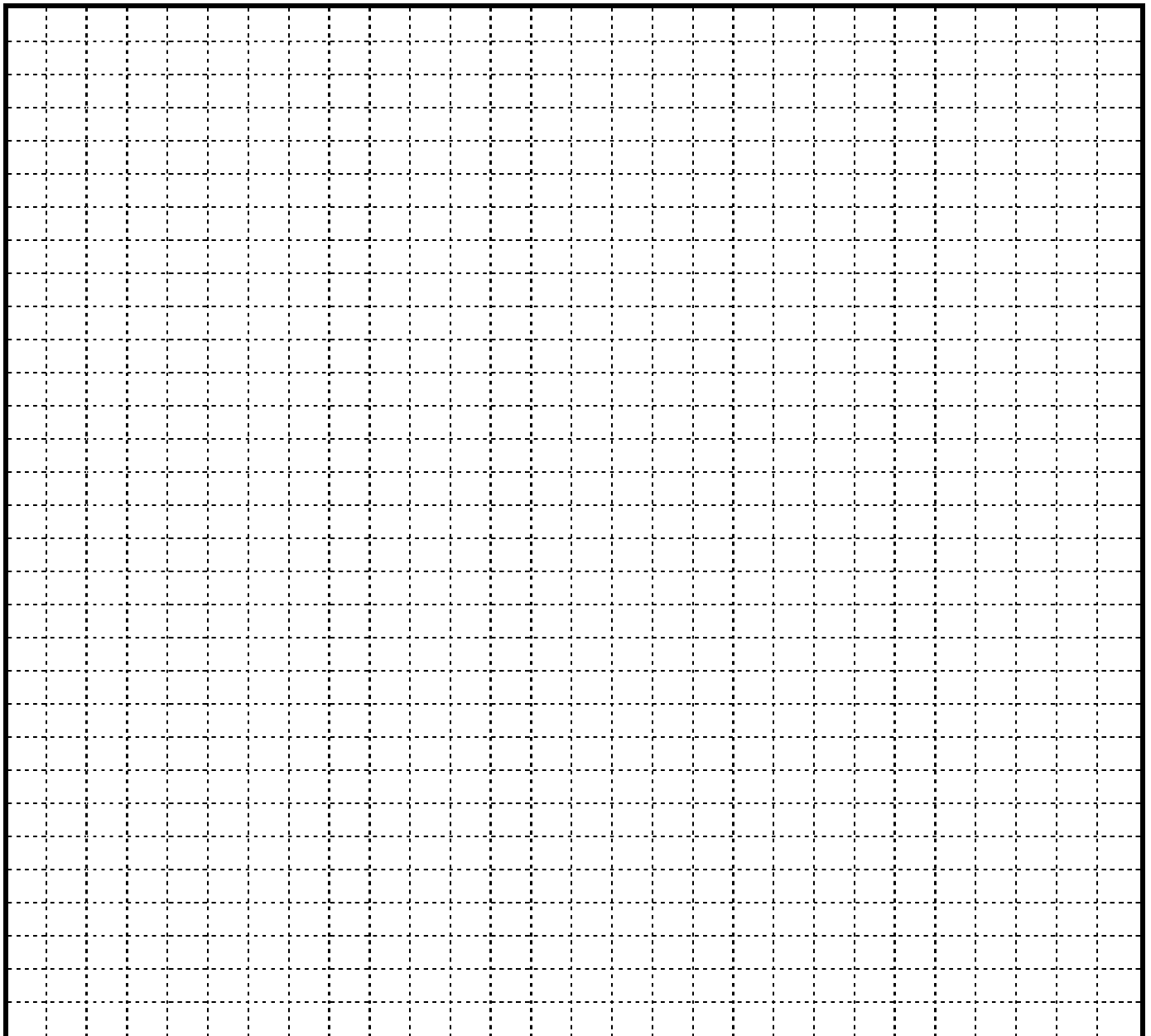
## SHORELANDSCAPING SITE INVENTORY

A large rectangular area filled with a grid of dashed lines, intended for recording site inventory data.

Scale - =

Moisture, Soils & Sun			Vegetation	Wildlife (sightings)
dry	sandy	full sun	conifers	loon
moist	loam	partial sun	nut trees	heron
wet	clay	shaded	bud trees	teal
(dsf = dry sand full sun)			berry shrubs	turtles
			wildflower spp.	frogs
			native forbs/grasses	deer
			turf grass	raccoon
			poorly vegetated	etc.

## SHORELANDSCAPING RESTORATION PLAN



Scale - =

<b>Water Management</b>	<b>Revegetation</b>
diversion     - berm - swale - drain infiltration pond infiltration swale unmowed shore protection (bioengineered or riprap) temporary erosion controls - fabric fencing - jute net	conifers shade trees native forbs/grasses wetland spp. berry shrubs native groundcover recreation area (turf grass)

You have identified and mapped general vegetation types on your site inventory map. Complete the Vegetation Evaluation here to help you decide whether to maintain, modify or replace all or a portion of each vegetation type. Weight the benefits and harms for each function category (e.g., score "3" under water quality benefits if the vegetation type has a dense root system, persists through the seasons and is a wide, level area which intercepts runoff). Add functions and their corresponding benefits and harms to the evaluation sheet as you discover them. Total the plus and minus columns to determine the net benefit each vegetation type provides. This method assumes that all functions listed in the left column of the matrix are equally valuable and, of course, it is not rigorously scientific. It does provide a reasonable basis for your decision making.

<b>VEGETATION EVALUATION</b>				
Area # ___ on the Biological Inventory Map				
<b>Function</b>	<b>Benefits</b> (1-3, 3=most beneficial)	<b>+</b>	<b>Harms</b> (1-3, 3=most harmful)	<b>-</b>
Water quality	dense root mass erect, persistent stems wide, level buffer detention site		eroded channel sheet erosion hard surfaces long or steep slope	
Habitat	food source cover - breeding, nesting, nursery, winter,                escape travel corridor		domestic predators nearby road hazard fragmented habitat nest predators toxic spill	
Aesthetics	scenic vista framed development screened privacy screen debris trap sound barrier		scenic vista obscured unattractive view	
Micro climate	shade windbreak			

Vegetation condition	vigorous growth		road salt damage over browsed exotic invaders poisonous/toxic/hazard fill over root zone	
Soils	uncompacted moist loam thick litter layer		compacted wet clay dry sand	
<b>Net benefit or harm</b> (column totals)				

# CONSULTANTS, INFORMATION & MATERIALS

## Erosion Control and Stormwater Management

Design of Stormwater Wetland Systems  
(# 92710)  
Information Center, Metro Washington  
Council of Governments  
777 North Capitol St., NE, Suite 300  
Washington, DC 20002-4201  
(202 962-3256)

117 University Ave.  
St. Paul, MN 55155  
(800 657-3757)

Lakescaping for Wildlife & Water Quality  
Minnesota's Bookstore  
117 University Ave.  
St Paul, MN 55155  
1-800-657-3757

## Native Plant Restoration

Aquascaping, A Guide to Shoreline  
Landscaping  
Hennepin Conservation District  
10801 Wayzata Blvd., Suite 240  
Minnetonka, MN 55305  
(612 544-8572)

Growing and Propagating Wild Flowers  
Phillips, Harry R.

Landscaping with Wildflowers  
Wilson, Jim

Noah's Garden - Restoring the Ecology of  
America's Back Yards  
Stein, Sara

The Prairie Garden  
Smith, J. Robert & Beatrice S.

Vegetation of Wisconsin  
Curtis, John T.  
University of Wisconsin Press  
114 N. Murray St.  
Madison, WI 53715-1199  
(608 262-8782)

## Fish and Wildlife Habitat

Landscaping for Wildlife  
Minnesota's Bookstore  
117 University Ave.  
St. Paul, MN 55155  
(800 652-9747)

Trout Stream Therapy  
University of Wisconsin Press  
114 N. Murray St.  
Madison, WI 53715-1199  
(608 262-8782)

Woodworking For Wildlife  
Minnesota's Bookstore

## Shoreline and Bank Restoration

Bestmann Green Systems (bioengineering  
consultants and materials)  
53 Mason St.  
Salem, MA 01970  
(508 741-1166)

A Citizen's Streambank Restoration Handbook  
Firehock, Karen & Doherty, Jacqueline  
Izaak Walton League of America  
707 Conservation Ln.  
Gaithersburg, MD 20878-1504  
(800 284-4952)

Lake Smarts: The First Lake Maintenance  
Handbook  
The Terrene Institute  
1717 K St., N.W.  
Washington, D.C. 20005-1504  
(202 833-8317)

Streambank Protection Guidelines  
(# ADA193023)  
Natural Resources Conservation Service  
National Technical Information Service  
5285 Port Royal Rd.  
Springfield, VA 22161  
(701 487-4650)

Streambank Stabilization and Management Guide  
for Pennsylvania Landowners  
State Bookstore  
Box 1365  
Harrisburg, PA 17105

Shoreline Plants and Landscaping  
University of Wisconsin Extension  
30 N. Murray St.  
Madison, WI 53715  
(608 262-3346)

Yard Care and the Environment series  
University of Wisconsin Extension  
30 N. Murray St.  
Madison, WI 53715  
(608 262-3346)

Wildlife Nurseries, Inc.  
Box 2724  
Oshkosh, WI 54903  
(414 231-3780)

## **Sources of Seed, Stock & Materials**

Nursery Sources for Natural Landscaping  
(a comprehensive listing of suppliers in Wisconsin & the upper Midwest)  
University of Wisconsin Extension  
Publications  
30 N. Murray St., Rm 245  
Madison, WI 53715  
(608 262-3346)

The Flower Factory (Plant catalog)  
4062 CTH A  
Stoughton, WI 53589

Marshland Transplant Aquatic Nursery  
Box 1  
Berlin, WI 54923  
(414 361-4200)

Prairie Nursery (Plant catalog & growing guide)  
Box 306  
Westfield, WI 53964  
(608 296-2741)

Prairie Ridge Nursery  
9738 Overland Rd.  
Mt. Horeb, WI 53572  
(608 437-5245)

## **Wildlife and Vegetation Identification**

Basic Guide to Wisconsin's Wetlands and Their Boundaries (PUBL-WZ-029-94)  
Wisconsin Department of Natural Resources  
Bureau of Water Regulation and Zoning  
Box 10254  
Madison, WI 53703

Peterson Field Guide Series  
Mammals, Reptiles, Tracks et al  
Houghton Mifflin Co. Burlington, MA 01803  
(800 225-3362)

Vegetation of Wisconsin  
Curtis, John T.  
University of Wisconsin Press  
114 N. Murray St.  
Madison, WI 53715-1199  
(608 262-8782)

Wetland Plants and Plant Communities of Minnesota and Wisconsin  
Eggers & Reed  
U.S. Army Corps of Engineers  
St. Paul, MN

Wildflowers and Weeds  
Courtenay, Booth & Zimmerman, James H.

Wildflowers of Northeastern and North Central America  
Peterson, Roger Tory & McKenny, Margaret

**What Do You Know? Answer sheet**

1) b & d

2) a, b, c, & d

3) 64

4) c

5) a-5, b-4, c-1, d-3 e-2, 6 & 12

f-8, 10, 11 & 13, g-9, h-7

6) b, c & d

7) T

8) c & d

9) a, b, c & d

10) a, b, c & d