

DATE: March 30, 2011

TO: Wisconsin County Code Administrators

FROM: Heidi Kennedy, Shoreland Policy Coordinator

SUBJECT: Shoreland Mitigation - Suggestions and Resources for County Zoning Ordinances

The recodification of Chapter NR 115, Wis. Adm. Code, created new standards that require the implementation of shoreland mitigation under certain circumstances. In particular, shoreland mitigation is required when a property owner wishes to increase the impervious surfaces on their lot above 15% or the property owner wishes to expand, relocate or reconstruct an existing nonconforming structure. This memo provides some background information to help explain why shoreland mitigation is used, to offer suggestions for developing a mitigation approach for your County's ordinance, and to provide resources for developing or selecting mitigation measures for local implementation.

### Mitigation Background

As with any shoreland zoning standards, it is helpful to understand why mitigation standards are in place when discussing mitigation requirements with property owners. Natural shorelines and littoral zones function to filter runoff, support a healthy fish and aquatic community, provide wildlife habitat through a rich and diverse plant community and sustain natural scenic beauty. Development along shorelines has removed or impaired many of the functions of a natural shoreline. Many of Wisconsin's lakes have lost nearly all of their nearshore wildlife and aquatic habitat, resulting in homogenous plant and animal communities. Although the vegetative buffer standards in NR 115 attempt to protect a 35-foot buffer, the last page of this document contains a chart that illustrates research results on the recommended buffer widths necessary to protect water quality, fish or aquatic communities and wildlife habitat. These results show that while a 35-foot buffer would offer some wildlife habitat and nutrient or sediment control, it may not be sufficient to protect water quality or provide core wildlife habitat.

Over 20 years ago researchers found that aquatic insect diversity drops sharply in streams where watershed impervious surface exceeded 10 to 15%.<sup>1</sup> Fine sediments from impervious surfaces have affected fish spawning, egg incubation and fry rearing in a study of 47 warm water streams in southeast Wisconsin. The study found that fish and insect populations declined dramatically when impervious surfaces exceed about 8-10% of the watershed, and streams with more than 12% imperviousness were shown to have consistently poor fish communities.<sup>2</sup> Figure 1 (last page) further illustrates the negative impacts of impervious surfaces on fish communities. A northern Wisconsin study also found significant declines in insect-eating and ground-nesting birds such as loons and warblers<sup>3</sup> and fewer green frogs on lakes with developed shorelines.<sup>4</sup>

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<sup>1</sup> Klein, R. 1979. Urbanization and Stream Quality Impairment. *Water Resources Bulletin*. 15(4):948-963.

<sup>2</sup> Wang, L., J. Lyons, P. Kanehl, R. Bannerman, and E. Emmons 2000. Watershed Urbanization and Changes in Fish Communities in Southeastern Wisconsin Streams. *Journal of the American Water Resources Association*. 36:5(1173-1187); Wang, L., J. Lyons, and P. Kanehl 2001. Impacts of Urbanization on Stream Habitat and Fish Across Multiple Spatial Scales. *Environmental Management*. 28(2):255-266.

<sup>3</sup> Lindsay, Alec R., Gillum, Sandra S., Meyer, Michael W. Influence of lakeshore development on breeding bird communities in a mixed northern forest. *Biological Conservation* 107(2002) 1-11.

<sup>4</sup> Woodford, JE and M. W. Meyer. 2002. Impact of lakeshore development on green frog (*Rana clamitans*) abundance. *Biological Conservation*. 110(2): 277-284; Meyer, Michael, James Woodford, Sandra Gillum, Terry Daulton. 1997.

Additionally, polluted runoff from storm water or snow melt washes across eroding soil, parking lots, and intensely maintained lawns, carrying with it contaminants, such as suspended solids, nutrients, heavy metals, pathogens, and other toxic pollutants. These nonpoint sources result in 70% of the water pollution to our lakes, rivers and ground water<sup>5</sup>, destroying fish habitat, causing fish kills and mortality for other wildlife, clogging waterways with sediment and reducing recreational use of lakes and streams. Nutrients, such as phosphorus and nitrogen can have harmful effects on waterbodies when they are present in excess, resulting in heavy plant and algae growth, including blue-green algae that may pose serious health threats to animals and humans and impair opportunities for boating, fishing and swimming.

Therefore, to offset the loss of natural shorelines and littoral zones and prevent further impacts from development of Wisconsin's shoreland zones, the new statewide minimum standards under NR 115 contain provisions to further protect the vegetative buffer zone and require the implementation of a shoreland mitigation plan.

### **Mitigation Approaches**

The goal of the shoreland mitigation requirements in NR 115 is to offset the impacts to water quality, near-shore aquatic habitat, upland habitat and natural scenic beauty from shoreland development. To provide flexibility in the implementation of shoreland mitigation and the incentive for the creation of diverse systems or innovation measures, NR 115 does not contain specific performance standards for achieving the goals of shoreland mitigation, but encourages counties to tailor the mitigation system to accommodate the county resources and its residents. To accomplish this, each county should develop an ordinance that contains both a process describing allowable mitigation measures, and objective standards for implementing those measures.

#### Existing Approaches

Shoreland mitigation is not a new concept in Wisconsin. Among the 27 counties that currently require shoreland mitigation (beyond the vegetative buffer mitigation requirement for open sided structures), a number of different systems or approaches to shoreland mitigation are being used. The specific mitigation language for all 27 counties was compiled in 2010 and is available at

[www.wisconsinlakes.org/policy/pdf/CountyImpvSurfaceMitigationOrdinanceExamples.pdf](http://www.wisconsinlakes.org/policy/pdf/CountyImpvSurfaceMitigationOrdinanceExamples.pdf)

Counties with mitigation language in their ordinance are using a number of approaches:

- 1) requiring one or more specific mitigation measures
- 2) requiring one or more mitigation measures and providing a menu of options from which a property owner must choose one or more additional mitigation measures
- 3) a point based system, allowing the property owner to choose from a list of mitigation measures, until the property owner achieves enough points to offset the impacts from their project,
- 4) the Polk County approach which requires restoration of a shoreland buffer but then offers a Land Use Runoff Rating (LURR), which is a tool that calculates the runoff from the property

Regardless of which mitigation approach or system a county develops and implements in their shoreland ordinance, it is important that the ordinance clearly spell out what is required of property owners, and that the shoreland mitigation measures be "designed, implemented and function to restore natural functions and values". NR 115.03(4r). Developing an ordinance that clearly describes the process and standards by which a mitigation plan will be approved will provide clarity to property owners and minimize staff

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<sup>5</sup> Ferguson, B. K. 1998. Introduction to Stormwater: Concept, Purpose, Design. New York: John Wiley & Sons, Inc.

workload. Property owners should be able to identify, within the county's ordinance, the regulations that are applicable to their property and the process they need to follow to make modifications. Further, property owners that are contemplating work on an existing nonconforming structure or increasing their impervious surfaces, will know what they will be required to do or if they are being treated equally with others in the community that are undertaking similar activities in the shoreland zone. Additionally an ordinance that clearly describes the process and standards for shoreland mitigation will reduce the time spent by staff negotiating with property owners to develop an adequate shoreland mitigation plan and reduce complaints by property owners, lake groups or neighbors.

#### Providing Flexibility

Some counties may have concerns about a lack of flexibility if the shoreland mitigation provisions require specific standards and process. For example, an ordinance that contains a detailed process and standards limits a property owners' ability to develop an innovative or creative shoreland mitigation plan that might meet the intent of shoreland mitigation under NR 115 but would not meet the requirement of the ordinance. Similarly, it may be difficult to take into account unique situations that would warrant some variation in the process or standards, if the ordinance contains a detailed process and standards. A final concern is that creating an ordinance that contains specific standards for mitigation, requires the counties go through the ordinance amendment process each time they wish to change the mitigation process or one of the standards for mitigation.

One method in which counties have addressed these concerns is by creating an addendum to the shoreland zoning ordinance that contains the mitigation standards. For example, Washburn County's Shoreland Zoning Ordinance under Sec. 38-596(12) says that the shoreland mitigation standards will be adopted as an addendum to ordinance. The shoreland mitigation standards can then be modified, as needed, without the fear of subjecting the entire shoreland ordinance to unanticipated changes. Another method of creating more flexibility is to add an "other" category in the list of allowed mitigation measures. A category that allows for the approval of other measures, which are not incorporated within the ordinance, but may meet the intent of NR 115, allows for flexibility to accommodate innovative solutions or unique property limitations. An example of a county that has utilized this tool is Douglas County, whose shoreland mitigation provisions includes a variety of mitigation measures but also provides for "[a]ny other mitigation that is deemed appropriate by the Zoning Administrator". However, it is important to remember that mitigation practices and approved plans, should be proportional to and offset the impacts to water quality, habitat and natural scenic beauty from the proposed project.

In the early 2000's, the department developed a mitigation calculator to demonstrate a web-based approach for a property owner to determine what mitigation is required based on their specific project. Although the calculator was based on sound science, it was developed before rulemaking was completed, so it does not reflect the minimum standards for mitigation currently in NR 115. Counties may wish to reference this tool as an example for developing similar web-based tools at the local level, but counties should rely on the Department's mitigation calculator for implementing shoreland mitigation.

#### Proportionality

In the development of a mitigation system and standards, a county should take into consideration the issue of proportionality. The minimum standards in NR 115 require that the mitigation measures, adopted by the counties be proportional to the amount and impacts of the proposed activity. Some counties currently require all properties, regardless of the amount or impacts proposed by the activity, to complete the same amount of shoreland mitigation. In many instances this would exceed the statewide minimum standard of requiring mitigation measures to be proportional to the amount of and anticipated impacts from the project. While requiring the same mitigation plan for every property owner, would be easy to administer,

it is likely to create conflicts in those counties where shoreland mitigation is a new concept for county staff and residents.

Therefore, counties may wish to identify a number of mitigation measures from which the property owner may choose, and consider how the county will determine whether a mitigation plan is proportional to the impacts. As mentioned above there are a number of different approaches to shoreland mitigation. A point system or an system that requires more mitigation measures the larger the project, are examples of proportional systems. As discussed above, the county and the property owner then have the flexibility to tailor a mitigation plan that is proportional and will offset the impacts from the proposed project. Also, providing a number of possible or available mitigation measures allows property owners to design a mitigation plan that suits their preferences, which may reduce conflict and help property owners be more receptive to implementing and maintaining the required mitigation measures.

### **Mitigation Measures**

When developing the mitigation provisions of a shoreland zoning ordinance the department recommends that each county spend some time thinking about the characteristics of the existing shoreland development in their county, and identify in the ordinance which mitigation measures are allowed and the standards for each mitigation measure. Even though re-establishment of a vegetative buffer zone is likely to be the default mitigation practice for many counties, counties will want to consider including additional mitigation practices in their ordinance.

#### Vegetative Buffer Zones

Clearly, the preservation or restoration of a vegetative buffer zone will reflect the intent of mitigation and the standard for structures under section 59.692(1v)(d), Stats. An ordinance that contains vegetative buffer restoration should identify the requirements for a vegetative buffer standard and address some common questions and issues that are likely to arise in the application of vegetative buffer restoration to all shoreland property owners.

In developing the standards for a vegetative buffer, a county should consider the basic methods of establishing and maintaining a vegetative buffer, 1) avoidance, which is for those buffers that are intact or undisturbed, b) natural recovery, which merely requires that the property stop mowing, and c) accelerated recovery, which requires the installation of native plants to achieve the required vegetation density. For owners of properties that have an existing vegetative buffer or have agreed to do natural recovery, the county may simply require the filing of an affidavit that requires that the property owner will not disturb the area and will remain in compliance with the shoreland ordinance. On the other hand, for a property that involves accelerated recovery, the county should require the establishment of all three vegetative layers, the ground cover, the shrub and the tree layer.

Requiring a vegetative buffer zone as the only mitigation option may lead to issues with implementation. Some property owners, may have already restored or have maintained their vegetative buffer zone. Would the property owner have to do nothing to mitigate the impacts to the shoreland zone, under the county's ordinance, regardless of the size or degree of shoreland impacts? Under NR 115, clearly some type of mitigation is required for increases in impervious surfaces and proposed changes to nonconforming structures. While it may be appropriate to give the property owner credit for an existing vegetative buffer zone, credit for an existing vegetative buffer zone will only go so far in offsetting the impacts before additional measures should be pursued.

Also, simply requiring a property owner to restore the vegetative buffer zone may be difficult for property owners, who are unable to do so or who would like to pursue other mitigation options. There may be a number of reasons why a property owner may be unable to restore the vegetative buffer zone. For example, a property owner might have an existing structure, such as a garage, home or boathouse, within 35 feet of the ordinary high water mark and is incapable of meeting the county’s mitigation requirements, if the county’s ordinance does not allow for additional mitigation measures. Another example where implementation of an ordinance may be difficult is when the impervious surface standards are applied to properties that are not lakefront or riverfront property. Unless a county allows for a number of mitigation measures, other than a vegetative buffer, it is likely that property owners in these situations would have to apply for variances to complete their projects.

Finally, restoration of the vegetative buffer may be unfeasible if the property has unique site conditions that make it unsuitable for restoration of the vegetative buffer. The site might be experiencing stormwater problems or have shoreline areas of natural rock or sand that are difficult to re-vegetate. In these instances, it would be appropriate for the county to allow other measures for mitigating the impacts from the proposed shoreline development. Consequently, providing a number of mitigation measures creates flexibility for property owners to tailor the mitigation plans to not only personal preferences but also to create plans that are better suited to the conditions of the property and the anticipated impacts of the project.

Other Mitigation Measures

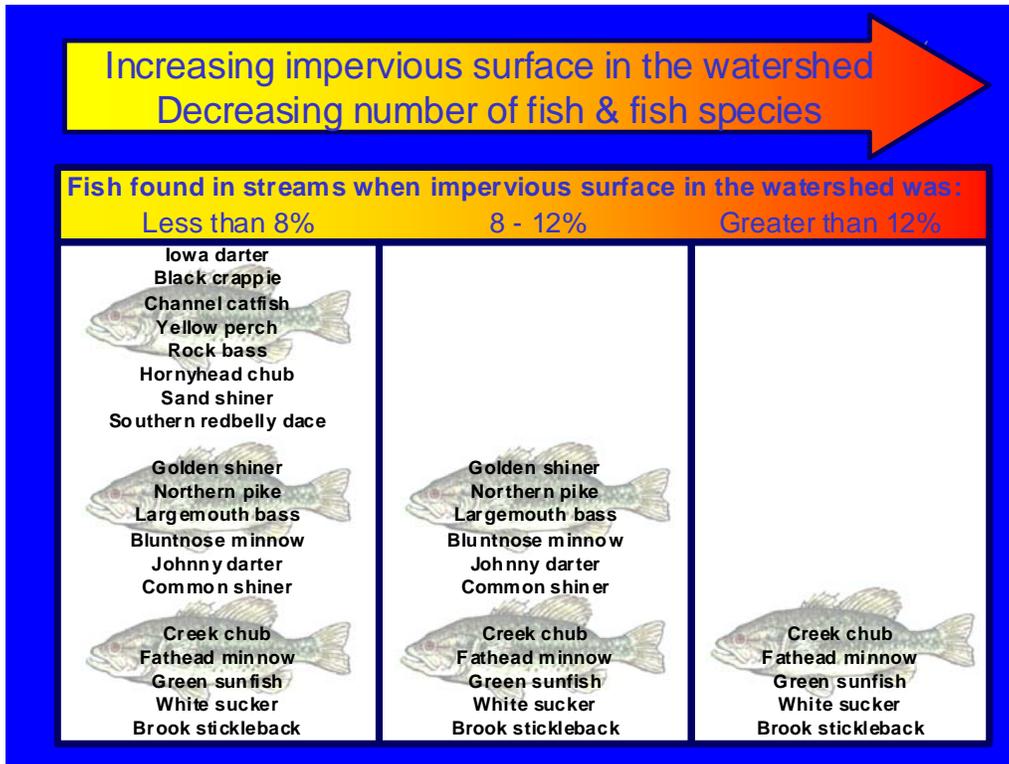
Although the counties may develop their own standards for their mitigation measures, many of the most common mitigation measures are being implemented already in a number of counties around Wisconsin or have standards which have been developed by state or federal agencies. By adopting standards that other counties are already utilizing, a county can save time in ordinance development and can seek advice or insight into how the standard is functioning and being implemented. Below is a list of possible shoreland mitigation measures and some technical resources that may help in the development of shoreland mitigation requirement. There are a number of additional technical resources on the internet that may be of use to counties and property owners.

Mitigation Measure	Action/Practices	Resources for development of standards
Vegetative Buffer	Restoration or Maintenance  Narrowing of view corridor for existing vegetative buffer  Deepening of vegetative buffer  Side yard restoration with native landscaping	NRCS – Field Office Technical Guide (FOTG) Conservation Practice Standard for Shoreland Habitat <a href="http://efotg.sc.egov.usda.gov/references/public/WI/643a.pdf">http://efotg.sc.egov.usda.gov/references/public/WI/643a.pdf</a> Wisconsin Biology Technical Note 1 <a href="ftp://ftp-fc.sc.egov.usda.gov/WI/technotes/biology-tn1.pdf">ftp://ftp-fc.sc.egov.usda.gov/WI/technotes/biology-tn1.pdf</a>  Shoreland Restoration: A Growing Solution (Video) <a href="http://www.extension.umn.edu/Shoreland/videos/Restoration.html">http://www.extension.umn.edu/Shoreland/videos/Restoration.html</a>  Blue Thumb - Minnesota based organization Vegetative buffer video, sample blueprints, cost calculator <a href="http://www.bluethumb.org/shorelines/">http://www.bluethumb.org/shorelines/</a>  The following counties utilize these tools in their mitigation requirements: Adams, Ashland, Barron, Bayfield, Burnett, Calumet, Chippewa, Door, Douglas, Eau Claire, Forest, Green

		Lake, Langlade, Lincoln, Marinette, Oneida, Polk, Price, Rusk, Sawyer, Sheboygan, Vilas, Washburn, Washington, Waupaca, Waushara
POWTS	Evaluation and/or replacement in compliance with Comm 83	<p>WI Department of Commerce POWTS program  <a href="http://www.commerce.state.wi.us/SB/SB-PowtsProgram.html">http://www.commerce.state.wi.us/SB/SB-PowtsProgram.html</a>  Comm Ch. 83  <a href="http://legis.wisconsin.gov/rsb/code/comm/comm083.pdf">http://legis.wisconsin.gov/rsb/code/comm/comm083.pdf</a></p> <p>The following counties utilize this tool in their mitigation requirements: Barron, Bayfield, Douglas, Eau Claire, Forest, Green Lake, Langlade, Lincoln, Marinette, Oneida, Price, Rusk, Sheboygan, Washburn, Waupaca</p>
Stormwater Management Practices	<p>Bioretention for Infiltration</p> <p>Compaction Mitigation with Compost</p> <p>Infiltration Trench or Basin (French Drain)</p> <p>Rain Gardens</p> <p>Swales</p> <p>Wet Detention Pond</p> <p>Diversion Channels or Berms</p>	<p>WI DNR Post-Construction Technical Standards for:  <a href="http://dnr.wi.gov/runoff/stormwater/techstds.htm">http://dnr.wi.gov/runoff/stormwater/techstds.htm</a></p> <p>Burnett County  Controlling Erosion and Runoff from Your Waterfront Property  <a href="http://wi-burnettcounty.civicplus.com/DocumentView.aspx?DID=119">http://wi-burnettcounty.civicplus.com/DocumentView.aspx?DID=119</a></p> <p>Blue Thumb – MN based organization  Rain Garden cost calculator, How-to-build videos, design tools  <a href="http://www.bluethumb.org/raingardens/">http://www.bluethumb.org/raingardens/</a></p> <p>The following counties utilize this tool in their mitigation requirements: Adams, Barron, Bayfield, Douglas, Eau Claire, Forest, Green Lake, Langlade, Lincoln, Marinette, Price, Rusk, Sheboygan, Washburn, Waupaca</p>
Non-conforming Accessory or Principal Structures	Removal or Relocation outside of shoreland setback	The following counties utilize this tool in their mitigation requirements: Ashland, Barron, Bayfield, Green Lake, Langlade, Lincoln, Marquette, Price, Sawyer, Vilas, Washburn, Washington, Waupaca

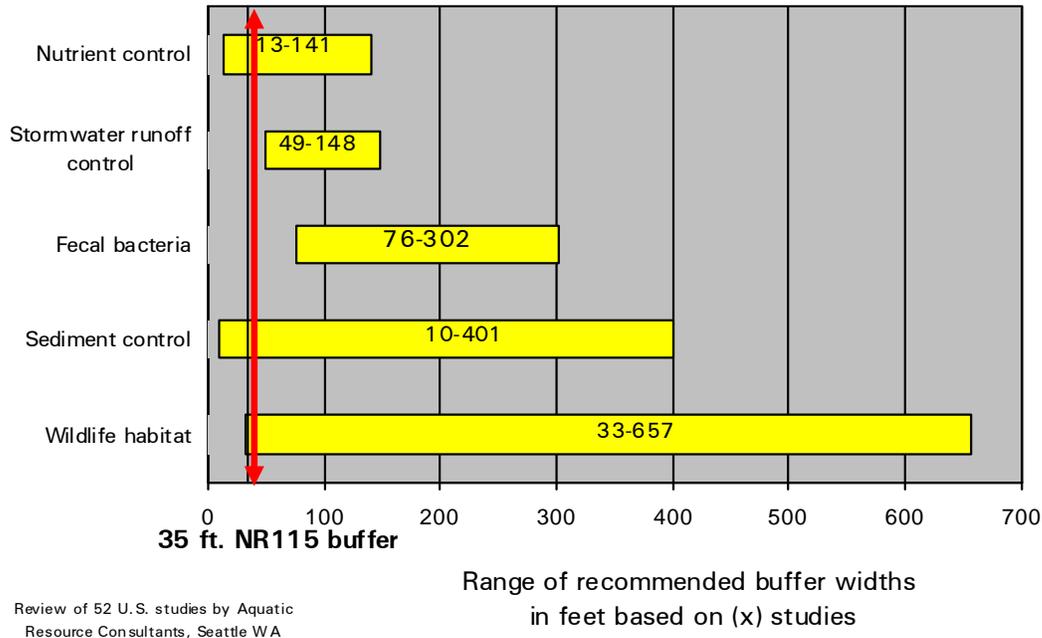
Impervious Surfaces	Removal of existing or replacement of existing with a pervious surface	<p>Permeable or Pervious Pavers and Pavement</p> <p>The following websites include information, specifications, links to find contractors and examples.</p> <p><a href="http://www.paversearch.com/permeable-pavers-introduction.htm">http://www.paversearch.com/permeable-pavers-introduction.htm</a></p> <p><a href="http://www.icpi.org/node/549">http://www.icpi.org/node/549</a></p> <p><a href="http://www.concretenetwork.com/concrete/porous_concrete_pavers/">http://www.concretenetwork.com/concrete/porous_concrete_pavers/</a></p> <p><a href="http://www.perviouspavement.org/benefits_economic.htm">http://www.perviouspavement.org/benefits_economic.htm</a></p> <p>University of New Hampshire Stormwater Center: Design Specifications for Porous Asphalt Pavement and Infiltration Beds</p> <p><a href="http://www.unh.edu/erg/cstev/pubs_specs_info/unhsc_pa_spec_10_09.pdf">http://www.unh.edu/erg/cstev/pubs_specs_info/unhsc_pa_spec_10_09.pdf</a></p> <p>University of New Hampshire Stormwater Center: Fact Sheets, including winter maintenance fact sheet; You-Tube videos.</p> <p><a href="http://www.unh.edu/erg/cstev/pubs_specs_info.htm">http://www.unh.edu/erg/cstev/pubs_specs_info.htm</a></p> <p>The following counties utilize this tool in their mitigation requirements: Lincoln, Polk (through LURR), Washington</p>
Neutral or Earth Tone Colors	Painting structures	<p>The following counties utilize this tool in their mitigation requirements: Bayfield, Douglas, Eau Claire, Forest, Langlade, Price, Sheboygan, Waupaca</p>
Shoreland Lighting	Eliminating or changing shoreland lighting	<p>Sensible Shoreland Lighting</p> <p><a href="http://dnr.wi.gov/org/water/wm/dsfm/shore/documents/shorelandlighting.pdf">http://dnr.wi.gov/org/water/wm/dsfm/shore/documents/shorelandlighting.pdf</a></p> <p>The following counties utilize this tool in their mitigation requirements: Bayfield</p>
Shoreline Modifications	Removal of shoreline structures such as, seawalls, riprap beaches, firepits, fountains.	<p>For removal of seawalls, riprap, beaches or other structures below the ordinary high water mark see DNR Waterway and Wetland Permits website at:</p> <p><a href="http://dnr.wi.gov/waterways/">http://dnr.wi.gov/waterways/</a></p> <p><i>(Note: Removal of seawalls or riprap is not always appropriate along shorelines with steep slopes or high wave energy)</i></p> <p>The following counties utilize this tool in their mitigation requirements: Bayfield, Douglas, Rusk</p>
Shoreland-wetlands	Protection or Restoration	<p>WI DNR website for wetland restoration</p> <p><a href="http://dnr.wi.gov/wetlands/restoration.html">http://dnr.wi.gov/wetlands/restoration.html</a></p>
Other	Other practices as approved by County	<p>The following counties utilize this tool in their mitigation requirements: Bayfield, Burnett, Douglas, Marquette, Rusk, Vilas, Washington</p>

**Figure 1**



**Figure 2**

Recommended Shoreline Buffer Widths - a Research Summary



Johnson, Alan W. (Aquatic Resource Consultants, Seattle, WA) and Diane M. Ryba. A Literature Review of Recommended Buffer Widths to Maintain Various Functions of Stream Riparian Areas. Prepared for King County Surface Water Management Division, 1992. 29 pp.