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## Chapter 24: Land and Water Resources Impacts

**Section 24-15 Wildlife**



**Section 24-20 Endangered Species**



**Section 24-25 Bibliography**

## FDM 24-1-1 General

May 10, 2021

### 1.1 Originator

The Environmental Services Section is the originator of this chapter. All questions and comments regarding this chapter should be directed to the WisDOT Ecologist at (920) 492-4160 or DOTBiologicalServices@dot.wi.gov.

### 1.2 Objectives

The purpose of this chapter is to provide a brief and general introduction to land and water resources. Chapter 24 provides the background information needed to prepare an environmental document. It is not intended to be a step-by-step guide on how to prepare the Factor Sheets in Chapter 20. Topics discussed include the ecological impacts on natural resources by transportation actions, the significance of these impacts and measures to minimize harm. Chapter 24 provides some materials necessary to support the discussion of highway project effects on natural resources, while Chapter 20 provides the procedure for preparing the environmental documents.

Compliance with the National and Wisconsin Environmental Policy Acts and numerous other state and federal laws requires that agencies disclose, through environmental documents, potential effects of their proposed actions. See Chapter 20 for information on environmental acts, laws, and regulations.

## FDM 24-1-5 Ecological Overview

December 8, 1995

### 5.1 Definition and Concepts

Ecology is the study of the relationships of organisms or groups of organisms to their environment. The interaction of organisms with each other and the physical environment form an ecological system or ecosystem. An ecosystem has function and structure.

One of the structural components of an ecosystem is the biotic community. It is an assemblage of living organisms having mutual relationships among themselves and their environment. The species that exert control over and characterize the community are referred to as the dominant species. If they are removed for any reason, dominance is usually assumed by other species and the character of the community is changed. Communities may be named and classified according to major structural features, such as dominant species, or the physical habitat of the community (e.g., mud-flat, stream-rapids). Density refers to the total number of a species that occupies an area. Diversity refers to the total number of species that occupy an area, species richness, and the total number of individuals within a species, species evenness. Of the total number of species in a community, a relatively small percentage are usually represented and abundant. It is the number of infrequent species that determines the species diversity of the community. A community that has many species that are not abundant is more diverse than a community with few species occurring in large numbers.

One structural component of the biotic community is a population. A population which is a group of interbreeding organisms of the same species occupying a defined space. Populations are characterized by density age structure (ratio of one age class to another), birth and death rates, immigration (addition of new individuals from other areas), emigration (loss of individuals to other areas), and migration (temporary gain or loss of individuals).

### 5.2 Assessment

#### 5.2.1 Analysis of Natural Systems

Natural systems can be analyzed for the purpose of predicting impacts. Analysis involves a thorough description of existing conditions (qualitative and/or quantitative) and identification of community types (based on vegetation and associated wildlife). Quantitative data can be used to help estimate the magnitude of impacts on the ecosystem.

#### 5.2.2 Impact Assessment

Impact assessment involves estimating changes that are expected to occur to an existing situation. The existing conditions are described and compared to expected conditions after a disturbance has occurred. Changes must be looked at in terms of both short-term and long-term effects.

### 5.2.3 Determination of Significance

Impact assessment also involves estimating the significance of changes to existing conditions. Significance, as used in the National Environmental Policy Act (NEPA), requires consideration of both context and intensity.[1]

Context means the significance of an action must be analyzed from several points of view such as society (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. Impacts may be categorized as to their significance to the immediate locale, the watershed, the state, the region or the nation, but all categories must be addressed. Actions that have nationwide impact will lead to determination of greater significance than those of regional or local impact. Both short and long-term effects are relevant.

Intensity refers to the severity of impact. The following should be considered in evaluating intensity:

1. Impacts that may be both beneficial and adverse. A significant effect may exist even if on balance the effect will be beneficial.
2. The degree to which the proposed action affects public health or safety.
3. Unique characteristics of the geographic area such as proximity to parklands, wetlands, wild and scenic rivers, or ecologically critical or unique areas (e.g. fens, bluff prairies).
4. The degree to which the effects on the quality of the human environment are likely to be highly controversial. (e.g. project affects recreational area, a favored wildlife or fishery area, a favored aesthetic landscape, etc.).
5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. (i.e. potential for secondary development).
7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
9. The degree to which the action may adversely affect an endangered or threatened species or its habitat.
10. Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

## 5.3 Factor Sheet Reference List

Users can find the Factor Sheets under "Forms and tools" on the environmental services webpages site at:

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

## 5.4 References

Odum, E.P. 1971. Fundamentals of Ecology. W.G. Sanders Co., Philadelphia, PA.

Smith, R.L. 1980. Ecology and Field Biology. Harper and Row, New York, NY.

[1] "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" Council on Environmental Quality, Executive Office of the President, November 29, 1978.

## FDM 24-5-1 Introduction

December 8, 1995

The purpose of this section is to discuss potential impacts on aquatic systems from highway projects. This section is divided into two subjects: FDM 24-5-5, Rivers, Streams and Lakes and FDM 24-5-10, Wetlands.

Highway projects can present specific problems to each of these types of aquatic systems.

## FDM 24-5-5 Rivers, Streams and Lakes

December 8, 1995

### 5.1 Evaluating Existing Conditions

#### 5.1.1 Hydrology-Physical

**Rivers or streams** are defined as either naturally occurring or human-made watercourses that have distinguishable beds and banks and a flow gradient. They are components of a drainage basin in a watershed and usually serve as habitat for aquatic species.

Where appropriate, physical descriptions of rivers and streams should include geologic and topographic features; geometric characteristics such as depth, width, slope, and velocity; soils and substratum type; and discharge and drainage area data.

Water quality and sediment transport are usually intimately related to the watershed feeding the stream. Consequently, it is important to evaluate the land use and soil characteristics of the project area. Nearby upstream dischargers and downstream receivers should also be noted. They include wastewater treatment plants, industrial dischargers, and water intake systems for municipalities. Information on surface water resources is available by county through the Department of Natural Resources (DNR) District Offices.

Rivers and streams should be characterized based on continuity of flow. Three situations are possible:

1. Permanent (Year-Round) Flow: Rivers and streams that receive water mostly through seepage, subsurface springs, lakes or impoundments. In the immediate drainage area, the water table usually stands at a higher level than the stream bottom.
2. Temporary Flow: Rivers and streams that receive water primarily from surface runoff. Because runoff is seasonal, these streams are dry during part of the year.
3. Intermittent Flow: Rivers and streams that flow alternately on and below the ground's surface. Subsurface flow is usually through coarse sand, gravel, or limestone.

**Lakes** are bodies of water formed in depressions of the earth's surface. A lake with a surface outlet represents a holding and mixing basin for stream flow. Zonation and stratification are characteristics of lakes. The littoral zone is one containing rooted vegetation along the shore. The limnetic zone is one of open water dominated by plankton, microscopic plants and animals that float or drift in water. The deep-water profundal zone is an area of poor light with no rooted vegetation and is inhabited by heterotrophic organisms - those organisms that are dependent on organic matter for food (see Attachment 5.1).

Physical descriptions of lakes should include inlets or outlets, approximate size and depth, substratum and vegetation.

The amount of dissolved oxygen in a lake varies according to depth (or zone) as well as according to season. In summer, the surface waters are warmer than the bottom waters and circulate, not mixing with the colder more viscous bottom waters. The epilimnion is the zone in which sunlight penetrates causing more phytoplankton, activity which in turn produces more dissolved oxygen. The photosynthetic activity, as well as surface motion is lacking in the hypolimnion causing a lack of dissolved oxygen, possibly even a depletion. A depletion would result in stagnation.

In the onset of winter, the oxygen in a lake circulates freely due to the drop-in temperature of the surface waters to equal the bottom waters. This is when the waters are said to turn over. Cold water holds more oxygen. This fact, along with the reduced activity of aquatic organisms usually assures an adequate amount of dissolved oxygen in a lake in the winter unless a lake is too shallow and is ice covered for a long period.

For purposes of impact evaluation, lake trophic state may be an important consideration. The trophic state of a lake describes the nutrient content and productivity (Weller 1981). A lake can change from an oligotrophic state

(low productivity) to a eutrophic state (high productivity) as nutrients are added through surface water flow. The trophic state of a waterbody is influenced by water temperature, water depth, and season and is associated with certain fish and wildlife species.

A highly eutrophic lake will exhibit stagnation, algae bloom, excessive vegetation, and contain fish such as bullhead and carp. These conditions are associated with low dissolved oxygen levels.

### 5.1.2 Water Quality

A good indication of water quality can be gained by observation in the field. Qualitative information to be noted includes type of substratum; water clarity; sources of agricultural, residential, or industrial runoff; odor or other signs of stagnation (e.g., algae blooms, dead fish, excessive weeds); and habitat diversity.

Aquatic insects and fish are good indicators of water quality. Many species can tolerate only clean, well oxygenated water, while others are able to survive low oxygen or polluted conditions. In general, waterbodies with a high diversity of insect or fish species are considered healthier and more stable than those with only a few species.

Quantitative water quality data are available through the Department of Natural Resources (DNR), U.S. Geological Survey (USGS), or private industry for many rivers and lakes; or, if it is necessary, these data can be obtained by individual water quality testing procedures.

Quantitative values of factors such as turbidity, nitrates, phosphates, dissolved oxygen, biological oxygen demand, and conductivity are useful indicators of the existing quality. Standards are available to which the data can be compared. The Region Offices should contact the Office of Environmental Analysis (OEA) for technical assistance if it is determined that such data are necessary.

### 5.1.3 Aquatic Species

If it is desirable to do so, many sampling techniques are available to determine the species of fish, aquatic insects, and bottom dwelling organisms that are present. Generally, the DNR District Office can provide adequate information. In most cases, it is sufficient to know whether a particular waterbody supports a critical resource, such as trout, forage species, or spawning habitat. The presence or absence of vegetation should also be noted. Include the submergent, emergent, and bank or shoreland vegetation that might serve as a source of food or cover, or function to control water temperature.

### 5.1.4 Waterbody Uses

Impact significance is generally based on waterbody use. A description of present use, such as recreational, sport fishery, irrigation, wildlife production, rare plant habitat, etc., should be provided. The DNR can provide information on whether a river is classified as a trout stream or a scenic or wild river. Any upstream or downstream uses that might contribute to, or receive effects from, the project area should also be included. This information can be obtained from DNR watershed basin studies.

Contributors of pollution along large, commercially navigable waterways generally include point sources such as industrial and storm sewers. Nonpoint sources along other waterbodies include urban and agricultural runoff.

The area over which these observations should be made depends upon the waterbody. The idea is to describe those existing situations that could reasonably be expected to either influence the water quality at the project site or that could be receivers of siltation due to construction.

## 5.2 Evaluating Impacts on the Aquatic System

The proposed project activity should be explained in terms of how it will change the existing waterbody. Discuss whether a new or replacement structure is proposed and if there will be a channel change or instream dredging or filling. Document whether a temporary crossing will be provided during construction and if there will be any changes in drainage to and from wetlands. Any other work that could alter the waterbody should also be evaluated.

### 5.2.1 Primary Impacts

Primary impacts are those that would be expected to occur as a result of initial construction. These include:

1. Removal of Bank or Shoreland Vegetation: Can eliminate a source of food input to the water body and can cause a temperature change due to loss of cover that can be lethal to species with narrow temperature tolerances. An increase in temperature would cause a reduction in dissolved oxygen and may result in a reduction in the number of cold water fish species. This activity can also eliminate habitat for wildlife and accelerate bank erosion.
2. Removal or Simplification of Substratum: Can eliminate spawning habitat and benthic food source.

3. Increase in Suspended Particulate Matter: Can affect aquatic insects and fish directly by covering spawning areas, smothering, and gill abrasion and can decrease productivity by limiting sunlight availability.
4. Alteration of Stream Hydrology: Can eliminate diverse bottom gradient, meanders, and pool and riffle areas resulting in scour around piers and erosion. Velocity changes can also occur.
5. Alteration of Adjacent Wetland Habitat: Can disrupt or eliminate wildlife habitat and reduce flood storage capacity. See FDM 24-5-10 for further wetland information.

### 5.2.2 Secondary Impacts

Secondary impacts occur as a result of primary impacts. These occur over a period of time and although not immediately observable are usually predictable. Secondary impacts may include the following:

1. The introduction of chemical pollutants such as road salt or automobile by-products can adversely affect the quality of the water.
2. Aesthetics and recreational use can be affected.
3. Water quality, vegetational and structural alterations may lead to changes in wildlife and/or human populations and use.

Common knowledge and past experience should allow a reasonable prediction of secondary impacts. Previous, comparable situations can be cited in discussions of secondary impacts. The point is to predict changes that could reasonably be expected to be long-term consequences of the initial action.

## 5.3 Determination of Significance

Impact significance can be estimated based on a thorough knowledge of the local ecology or land use of the project area. Coordination with the DNR, local units of government, and private property owners is the best way to gain information about the uses and importance of the waterbody. Once this has been done, a basis is available for determining significance. Both context and intensity should be addressed.

This type of analysis should be made for all alternatives, comparing each in terms of adverse and beneficial effects. Differences among alternatives should be pointed out. For example, all alternatives might involve a stream crossing, but the crossing site for one alternative might avoid a spawning bed or food source (e.g., a riffle area) considered important to the stream's productivity.

## 5.4 Measures to Minimize Harm

Techniques to reduce adverse impacts should consider the critical nature of the resource being affected. For many projects, the standard specifications outlined in the Standard Specifications for Road and Bridge Construction are adequate procedures to minimize harm. Specifically, the reader is referred to the following sections of the Standard Specifications:

| | |
|---|---|
| standard spec 107.18 | Environmental Protection |
| standard spec 107.20 | Erosion Control |
| standard spec 203 | Removing Old Culverts and Bridges |
| standard spec 205.3.11 | Disposal of Surplus or Unsuitable Material |

Information on standard erosion control measures is also found in Chapter 10.

For certain projects, specific mitigation measures are usually requested by the DNR, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Environmental Protection Agency, or local units of government. Requests to select alignments that would affect the least critical part of the waterbody, to design crossings that minimize work in the waterbody and to keep clearing and grubbing operations to a minimum are common recommendations. Timing of construction activities ("construction windows") to avoid adverse impacts on animal life can also be a type of mitigation. Mitigation by habitat replacement or enhancement for habitat lost to the project may be requested under special circumstances by the DNR or other government agencies.

Where stream channel changes are unavoidable, efforts should be made to reconstruct the channelized segment to hydrologic characteristics similar to the original stream. Thought should also be given to reestablishment of natural bank or shoreland vegetation and to placing clean aggregate on the new stream bottom in order to speed recolonization of food crop species. Basic goals in project planning are:

1. Change existing conditions as little as possible.
2. Where adverse changes are unavoidable, try to implement techniques that could minimize primary

and secondary impacts.

3. Look into possibilities for enhancing remaining undisturbed features of the project site (e.g., adding spawning gravel or creating riffle areas by the addition of riprap).
4. Be aware that mitigation techniques can also cause secondary impacts that can be more undesirable than no mitigation.

Mitigation must have a goal and must be decided upon relative to the current uses of the waterbody. Coordination with the DNR and the U.S. Fish and Wildlife Service will generally provide an acceptable mitigation plan.

### 5.5 Permits

A federal permit may be required. Section 404 of the Clean Water Act requires permit authorization from the U.S. Army Corps of Engineers for the discharge of fill material into waters of the United States. These waters include rivers, streams, lakes, embayments and wetlands. In addition, a Section 401 Water Quality Certification (from the Clean Water Act) must be waived, denied or granted by the DNR before a Section 404 Permit is issued or denied by the Corps. Chapters 30 and 31 in the State Statutes pertain to alterations to or impacts on a waterbody from channel changes, rip-rap, bridges, or other structures. WisDOT is exempt from obtaining Chapter 30 permits for certain activities, according to a Cooperative Agreement between the WisDOT and the DNR for wetland mitigation. This cooperative agreement applies only to highway and bridge projects, and only if the activity is accomplished in accordance with the interdepartmental procedures established in this cooperative agreement.

FDM 21-50 discuss federal and state permits.

### 5.6 Factor Sheets

Factor Sheets F1 through G pertain to aquatic system evaluation and need to be completed when preparing an environmental document if the project affects rivers and their floodplains (F1 and F2) or lakes (G).

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

### 5.7 Reference

"Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act", Council on Environmental Quality, Executive Office of the President, November 29, 1978.

Ruttner, F. 1973. Fundamentals of Limnology. University of Toronto Press. Toronto, Canada.

Weller, M. W., 1981. Freshwater Marshes. Univeristy of Minnesota Press. Minneapolis, MN.

**LIST OF ATTACHMENTS**

Attachment 5.1 Zonation of Lakes

## FDM 24-5-10 Wetlands

*December 8, 1995*

### 10.1 Evaluating Existing Conditions

Wetlands should be described in terms of hydrology, relationship to other waterways, vegetation and soils, and ecology. Following is an outline that defines wetlands and provides several criteria for describing different types. As with other environmental factors, understanding the existing wetland complex is necessary before impacts can be predicted and assessed.

### 10.1.1 Definition and Characteristics

1. Wetlands are "those areas that are saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." [1] The Wisconsin Statutes define a wetland as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions".[2]
2. Saturation ranges from waterlogged soils to permanent, standing water. The degree of saturation

[1] Code of Federal Regulations, 33CFR 323.2(c). Regulatory definition accepted by the FHWA, CORPS, U.S. Fish & Wildlife, U.S. EPA, etc.
[2] Wisconsin Statutes, 23.32(1). Definition used by Wisconsin Wetlands Inventory.

changes with seasonal or annual changes in water levels. Associated plant and animal communities adjust as water levels fluctuate.

3. Wetlands have some of the characteristics of both the aquatic and upland communities.
4. Wetlands are part of the hydrologic cycle (Attachment 10.1):
    - Water enters the groundwater system through recharge areas by precipitation. Water runs off to streams, is transpired through plants, evaporates or seeps into the groundwater.
    - Water that enters the groundwater moves to discharge areas such as springs, lakes, streams, and wetlands.
5. Wetlands can occur in any part of the hydrologic cycle. Characteristics of categories of wetlands, according to Novitzki's (1981) hydrologic classification system, are as follows:
    - Perched wetlands:
        - Occur at the highest point of ground surface in the area's hydrologic cycle.
        - Are usually small in size.
        - Have an impermeable bottom separating them from the groundwater.
        - Serve very little recharge function.
    - Flow-through wetlands (upland slope):
        - Created where a dip in the land surface intersects the water table.
        - Groundwater discharges to the wetland on the upper side and recharges to the zone of saturation on the lower side.
        - May also have relatively impermeable bottom layer.
    - Spring-fed wetlands:
        - Similar to flow-through wetlands with water emerging from groundwater system on upper side.
        - Water usually does not re-enter groundwater on lower side, but leaves the wetland as a stream headwater.
    - River floodplain wetlands:
        - Most common wetlands.
        - Occur along river floodplains and lake margins.
        - Groundwater is discharged through these into streams or lakes.
        - These wetlands may become recharge areas when their water levels are higher than the water table due to heavy precipitation, saturated soils, and low evaporation rates.
6. Wetland soils may be mineral (sand, silt, clay) or organic (peat, muck):
    - Wet mineral soils occur where the water table is slightly below the land surface most of the year. Anoxic conditions are produced and the soils exhibit mottling or gleying.
    - Organic soils occur where the water table is at or above the surface most of the time. These soils are formed by incomplete decay of vegetation that builds layers as it dies. Saturated soils do not contain the necessary oxygen to complete decomposition.

    A list of hydric soils by series and subgroup for Wisconsin (Wis. Bulletin No. 430-5-9) can be obtained from the Natural Resource Conservation Service or through the Office of Environmental Analysis (OEA).
7. Vegetation:
    - Vegetation is indicative of soil type, saturation, soil, water chemistry, and climate.
    - Knowledge of local ecology is important in knowing what types of wetlands occur in various areas of the state.

### 10.1.2 Wetland Classification

The most current wetland classification system is "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin, et al., 1979). Table 4 and Figures 1, 4, 5, and 6 in this publication summarize wetland types in use and adopted by the FHWA and all federal regulatory and resource agencies.

A new federally accepted classification system based on the hydrogeomorphic functions of wetlands may be used in functional wetland assessment. In this case a regional model rather than a national model of wetlands has been proposed by Brinson (1992).

The classification is based on the three basic properties that are incorporated into determination of wetland function:

1. Geomorphic setting (depressional, riverain, fringe or extensive peatlands)
2. Water source (precipitation, lateral flow from upstream/upslope, or ground water)
3. Hydrodynamics (primarily vertical, primarily unidirectional and horizontal or primarily bidirectional and horizontal)

From the three basic properties describing wetlands a particular wetland is given a profile from which the functions it performs are deduced.

For the purpose of the WisDOT wetland mitigation banking program, a classification for wetland type was derived. A correspondence table of this classification with other classifications is given in Attachment 10.2. These wetland types should be used on the factor sheets (E) for environmental documents. The "Wisconsin Wetlands Inventory User Manual" summarizes wetland types for the purpose of wetland inventory mapping.

The DNR has mapped and described the wetlands in Wisconsin based on the Department of the Interior's publication, but with a few simplifications. These maps are printed by township and are available for internal WisDOT use at the WisDOT district offices.

All Wisconsin Wetland Inventory Map Products are now sold by the Department of Natural Resources. Please send Map Order Form and Payment to:

Wisconsin Department of Natural Resources
Bureau of Water Regulation & Zoning, WZ/6
101 S. Webster St., P.O. Box 7921
Madison, WI 53707
(608) 266-8852

Attachment 10.3 is a copy of the DNR map order form.

### 10.1.3 Wildlife

Wildlife use is most easily determined by observation. Ideally, observations should be made during each season because many species use wetlands only seasonally. Migratory birds can be observed best during spring and fall. Information may be obtained through the DNR and the U.S. Fish and Wildlife Service. Wildlife use may also be estimated through knowledge of the area, associated vegetation, and open water conditions.

An approach to discussing wetland wildlife is to list species observed or expected to be present, what parts of the wetlands are being used, and what the observations and assumptions are based on (e.g., actual inventories, vegetation, water conditions, or other criteria). This method provides document reviewers with a better understanding of the habitat value and productivity of the wetland. It also allows a thorough evaluation of impacts, particularly in situations where only a fringe taking is involved.

### 10.1.4 Wetland Functions and Value

Wetland systems serve many functions and provide many benefits. Their potential for supporting large plant and animal populations of diverse species is high. Wetlands act as nutrient traps and thus usually have considerable vegetation. The vegetation provides the base for many aquatic and terrestrial food chains. The reproduction of deep water species may also occur in marsh areas adjacent to a water body.

Wetlands can improve water quality. This is done through the filtering capacity of dense stands of wetland vegetation, which provide an effective means of removing suspended solids from polluted waters.

Wetlands provide important resting, breeding, feeding, and rearing habitat for many species of waterfowl, fur bearing mammals, and fish.

Wetlands contribute to the biodiversity of an area. Primary environmental corridors are areas consisting of a concentration of a variety of natural resource features, such as wetlands, floodplains and woodlands. These areas have been identified by some regional planning agencies in Wisconsin under Section 208 of the Clean Water Act.

Wetlands can serve as effective flood control and erosion buffers. Wetland areas of shallow water and associated vegetation can slow the velocity and desynchronize the peaks of flood water and thus reduce shoreline and river bank erosion. They can also act as groundwater discharge areas and, under some circumstances, as groundwater recharge areas.

Wetlands have recreational value. Activities may include observing birds and other wildlife, fishing, hunting, and

canoeing. Wetlands are also important for their aesthetic value.

### 10.2 Evaluating Impacts on the Wetland

Describe the proposed project in terms of the anticipated work in the wetland. Provide enough engineering detail to explain how wide a strip will be involved, including shoulders, medians, and ditches. Also include land acquired for auxiliary lanes, frontage and access roads, intersections and interchanges, rest areas, waysides, and weigh stations. Explain whether excavation or fill are necessary, whether a structure across the wetland is proposed, what the marsh disposal method will be and where it will be located, and any other activity that will affect the wetland. Encroachments on separated wetlands along the project should be described separately. Determine the number of acres lost or modified at each wetland site.

#### 10.2.1 Primary Impacts

Marsh Disposal: Primary impacts are usually associated with construction. Removal of loose, compactable organic soils for the roadbed core presents a disposal problem. Casting aside this material creates a berm that probably will not settle to the original marsh elevation. This causes a loss of additional wetland acreage or a change to a drier and disturbed wetland. If the material is removed to an upland disposal site, the upland habitat is disturbed.

Hydrology: The relationship of a wetland to the surrounding watershed should also be evaluated. Impacts of highway construction will differ depending upon the water source of a wetland. If the wetland is adjacent to a stream, lake, or other waterbody, a determination should be made as to whether the wetland depends on periodic flooding of the waterway. If the wetland is supported by stream flooding or overland flow, road fill can interrupt flow patterns and reduce flood storage capacity. Drying of portions of a wetland can occur or, conversely, the road fill can act as a dam, creating wetter conditions. Either has the potential for changing the characteristics of the wetland.

If the wetland is not adjacent to a stream, lake or other waterbody, discuss whether the wetland is groundwater dependent or whether it is a perched, water-filled depression in the land surface. This information will help in determining whether a structure or fill will have an impact on the wetland's source of water.

Roadfill can also interrupt groundwater movement which may be an important source of water for the wetland. Depending upon soil types, the weight of the road fill can cause a mudwave effect, where adjacent soil is pushed above its original elevation, causing it to dry out and convert to upland habitat.

Habitat: Since many wetlands are islands of a unique habitat surrounded by upland communities, the loss of this habitat reduces its ability to support wildlife associated with wetlands. Wetland species correspondingly have unique requirements and adaptations that can only be met by the special characteristics of wetlands.

The roadbed can also act as a barrier to the movement of amphibians and reptiles to near-shore breeding areas, and the movement of furbearers among feeding, breeding, and resting areas.

Construction noise has a potential for interrupting courtship, breeding, nesting, and prey/predator location behavior for species that depend upon audio cues for these activities.

#### 10.2.2 Secondary Impacts

These impacts are generally associated with the operation and maintenance of the facility or are those that occur over time as a result of initial construction.

Traffic noise could eliminate use of wetland habitat adjacent to the roadway for breeding purposes by some species. Road kills will occur, particularly during dispersal periods when wildlife are actively moving in response to seasonal water level changes or other breeding and feeding requirements.

Because destruction of vegetation and contamination of open water areas is possible from road salt and automobile by-products, it should be discussed as a potential impact.

### 10.3 Determination of Significance

The significance of impacts should be viewed in terms of the functions of a particular wetland and how these might be affected. Perched wetlands isolated from waterways would best be discussed in terms of aquatic wildlife, waterfowl, and loss of habitat. Those wetlands associated with and dependent upon other waterways require additional discussions on elimination of flood storage and water quality functions, such as sediment and nutrient trapping, as well as wildlife habitat and food chain support.

Fringe encroachments on wetlands tend to be less significant than severances. The fringe of a wetland, however, can provide critical resources, such as food, shelter, or nesting. Size and location of wetlands are also important considerations.

Wetlands with open water are also subject to water quality impacts similar to those discussed for other water bodies. This should be considered when estimating impact significance.

In most cases, impact significance can be estimated based on a thorough knowledge of the local ecology or land use of the project area. Coordination with the U.S. Fish and Wildlife Service, the DNR, and local units of government is a way to gain information about the uses and importance of the wetland. Once this has been done, a basis is available for stating whether the changes proposed will be significant. This type of analysis should be made for all alternatives, comparing each in terms of adverse and beneficial effects. Differences among alternatives should be pointed out. For example, all alternatives might involve wetland loss, but the site for one alternative might be away from a wildlife nesting area or food source.

There are several methods available for assessing wetland significance. All of them are equally acceptable.

A Method for Wetland Functional Assessment (Adamus 1983) has been updated (Adamus 1989) and is referred to as WET 2.0. The WET 2.0 manuals contain information on the functions and values associated with wetlands and provides a method of assessing these values for individual wetlands. Functions covered include groundwater recharge and discharge, flood storage and desynchronization, shoreline anchoring and dissipation of erosive forces, sediment trapping, nutrient retention and removal, food chain support, habitat for fish and wildlife, water quality and active and passive recreation.

The Corps of Engineers, St. Paul district, and the Minnesota Environmental Quality Board, have developed a wetland evaluation methodology (WEM) for the north central states (Minnesota and Wisconsin). This method was derived from Adamus (1983). The method allows the user to select functions to be included in the analysis. This document also provides an overview of unique wetland qualities and qualities of potential legal significance. Functions covered in this manual are flood flow characteristics, water quality, wildlife, fish, shoreline anchoring and visual values.

The Hollands and Magee (1986) evaluation methodology assigns weighted values to the functions evaluated for each wetland. Each wetland is given a total value to be compared with other wetland's total values. Functions covered by this method include hydrologic support, water quality, ground water recharge, biological, shoreline protection, stormwater and flood and aesthetic values.

### 10.4 Measures to Minimize Harm

Because wetlands are recognized and protected by legislation and executive order as critical resources, they should be avoided, where possible, during alignment location studies.

When upgrading a roadway on existing alignment by widening, it is nearly impossible to avoid encroachment into adjacent wetlands. A dilemma is created because, from an overall standpoint, existing alignment reconstruction causes the least impacts; and, yet, where wetlands are involved their preservation is often considered paramount to other land uses. It becomes necessary to justify the use of wetlands on the basis of no practicable alternatives rather than on the basis of reasonable land use trade-offs.

Coordination with the DNR and the U.S. Fish and Wildlife Service can provide recommendations on impact mitigation.

Compensatory mitigation policy is outlined in detail in the DOT/DNR Cooperative Agreement amendment on compensatory migitation. Restoration of former or degraded wetlands or creation of new wetlands can be recommended as compensatory wetland mitigation. If unavailable wetland loss cannot be replaced on or near the project, a wetland mitigation bank site may be available for wetland compensation.

Compensation for wetland loss is based on evaluation of primary and secondary impacts. The replacement of wetland acreage lost is based on ratios of replacement acreage to acreage lost as determined by the probability of restoration or creation success. Any type of compensation should be conducted prior to or in concert with construction of the transportation project. Compensation is for unavoidable wetland losses after all effects to avoid and minimize the impact to wetlands have been taken.

Techniques for increasing open water are beneficial primarily for waterfowl production and might not be the best solution for a particular wetland. For example, in parts of the state where open water is already abundant it could be more beneficial to create upland islands or berms to provide habitat diversity, such as waterfowl resting and nesting sites. Mitigation proposals should be evaluated on a case-by-case basis.

Consideration can be given to utilizing longer structures to minimize fill into wetlands, particularly those that are dependent upon surface water. Techniques to maintain existing flow patterns under the roadway can assist in the maintenance of water levels in portions of the wetland. Passive maintenance of normal flow can be accomplished with pipe culverts, valved pipe, and the use of permeable fills. Water level control structures would be needed to actively manage water levels.

Where possible, roadway severances of wetlands should be avoided. Fringe takings are less likely to cause significant impacts. Marsh disposal into wetlands should be minimized or avoided. Special disposal methods for excavated material are also recommended. Where practicable, slopes can be steepened to minimize the amount of wetland fill. The use of permeable, granular-fill material will help maintain the natural surface water movement.

Construction should be restricted during critical nesting, breeding, or spawning periods, if these have been identified for a project site. Construction windows, if needed, are usually recommended by the DNR or the U.S. Fish and Wildlife Service on an individual project basis. After construction, the disturbed areas will need to be revegetated. On site soil conditions, land contours, and surrounding vegetation are some of the factors to consider when selecting a suitable roadside cover.

Techniques for reducing adverse impacts should consider the critical nature of the resource being affected. For many projects, the standard specifications outlined in the Standard Specifications for Road and Bridge Construction define adequate procedures for minimizing harm. Specifically, the reader is referred to the following sections of the Standard Specifications:

| | |
|---|---|
| standard spec 107.18 | Environmental Protection |
| standard spec 107.20 | Erosion Control |
| standard spec 203 | Removing Old Culverts and Bridges |
| standard spec 205.3.11 | Disposal of Surplus or Unsuitable Material |

### 10.4.1 Wetland Finding

When there is no practicable alternative to an action which involves new construction located in a wetland, the final environmental document should contain the finding required by Executive Order 11990 and by DOT Order 5660.1A, entitled Preservation of the Nation's Wetlands, August 24, 1978.[3] The finding should summarize the following points which should be detailed elsewhere in the environmental document:

- A reference to Executive Order 11990.
- A discussion of the basis for the determination that there are no practicable alternatives to the proposed action.
- A discussion of the basis for the determination that the proposed action includes all practicable measures to minimize harm to wetlands.
- A concluding statement as follows: "Based upon the above considerations, it is determined that there is no practicable alternative to the proposed new construction in wetlands and that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use."

The environmental document should also contain information on the wetland type, acres lost, and a map of the area, such as a wetland inventory map, showing the wetland basin where the project is located.

### 10.4.2 Permits

Federal and state permits are required to discharge fill into wetlands. Section 404 of the Clean Water Act requires permit authorization from the U.S. Army Corps of Engineers of the United States. These waters include rivers, streams, lakes, embayments and wetlands. In addition, a Section 401 Water Quality Certification (from the Clean Water Act) must be waived, denied, or granted by the DNR before a Section 404 Permit is issued or denied by the Corps.

Chapters 30 and 31 in the State Statutes pertain to alterations to or impacts on a waterbody from channel changes, rip-rap, bridges or other structures. WisDOT is exempt from obtaining Chapter 30 permits for certain activities, according to a Cooperative Agreement between the WisDOT and the DNR. This cooperative agreement applies only to highway and bridge projects and does so only if the activity is accomplished in accordance with the interdepartment procedures established in this cooperative agreement.

FDM 21-50 discusses federal and state permits.

### 10.4.3 Factor Sheets

Factor Sheets E1 and E2 pertain to wetland evaluations and need to be completed when preparing an environmental document if the project affects wetland areas.

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

[3] FHWA Technical Adversary, T6640.8, February 24, 1982.

## 10.5 References

[1] Committee on Characterization of Wetlands. 1995. Wetlands: Characteristics and Boundaries. National Research Council. National Academy Press. Washington D.C.

[2] DOT Order 5660.1A, "Preservation of the Nation's Wetlands." August 24, 1978.

[3] Executive Order 11990, Protection of Wetlands. May 24, 1977.

[4] FHWA Technical Advisory, T6640.8. February 24, 1982.

[5] Mitsch, W. J. and J.G. Gosselink. 1993. Wetlands. 2d ed. Van Nostrand Reinhold. New York.

[6] Novitzki, R. P. 1981, Hydrology of Wisconsin Wetlands, University of Wisconsin Extension, Geologic and Natural History Survey Information Circular 40, Madison, 30 pp.

[7] “User's Guide to the Wisconsin Wetlands Inventory", Department of Natural Resources. January 1982.

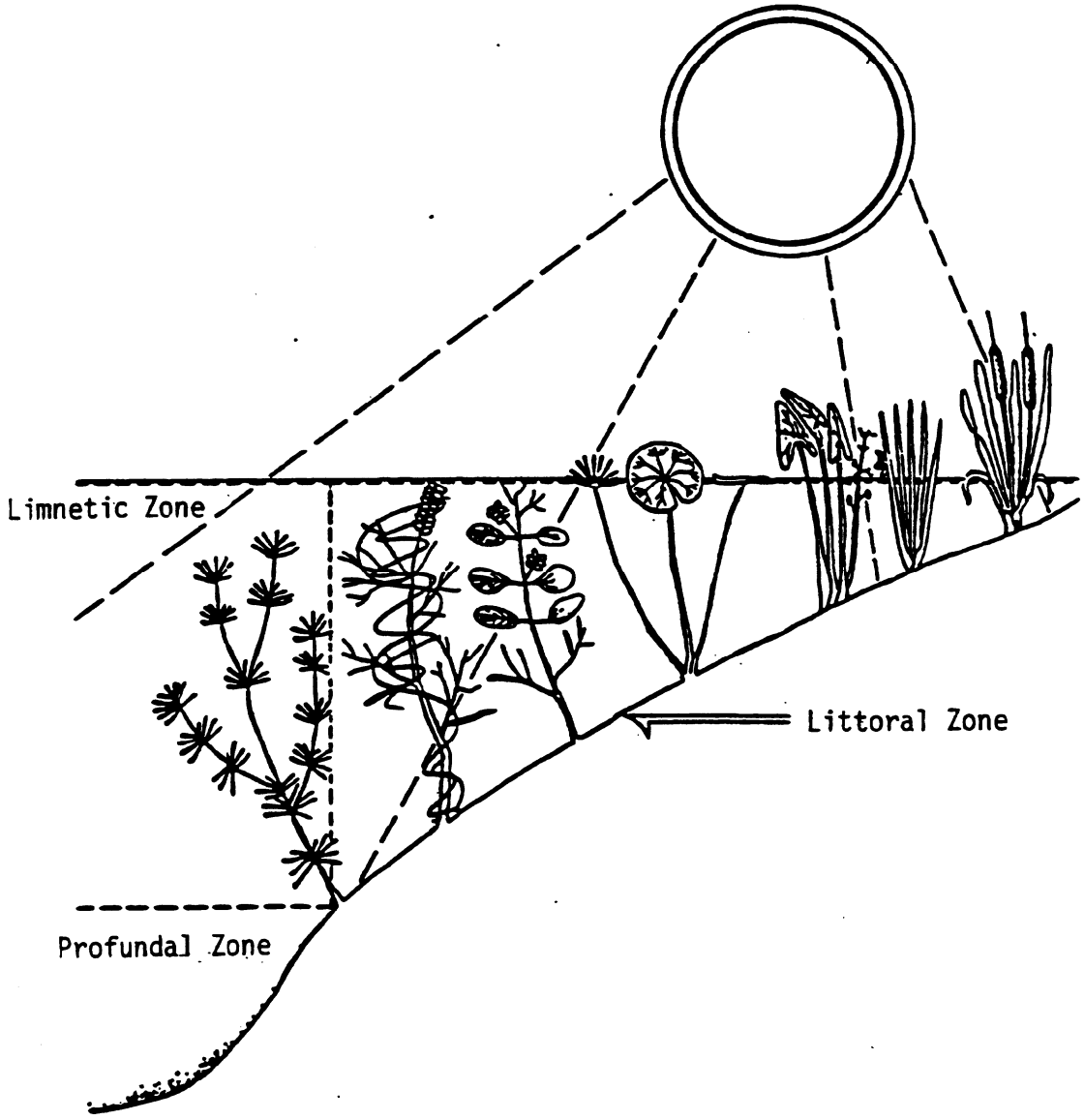
[8] "Wetlands, Floodplains, Erosion, and Storm Water Pumping", Transportation Research Record 948, Washington, D.C. 1983.

[9] Wisconsin Department of Administration. 1995. Basic Guide to Wisconsin Wetlands and their Boundaries. Wisconsin Costal Management Program. PUBL-WZ-029-94.

## LIST OF ATTACHMENTS

| | |
|---|---|
| Attachment 10.1 | The Hydrologic Cycle |
| Attachment 10.2 | Wetland Type Correspondence Table |
| Attachment 10.3 | Wisconsin Wetland Inventory - Map Order Form |

**Zonation of Lakes**



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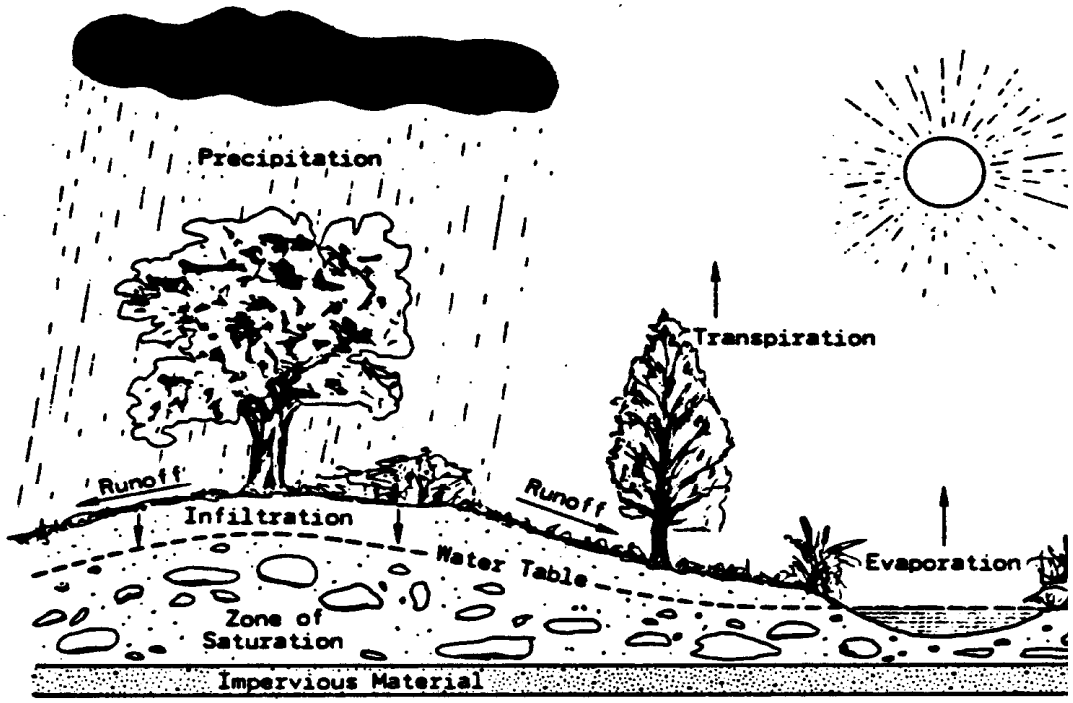
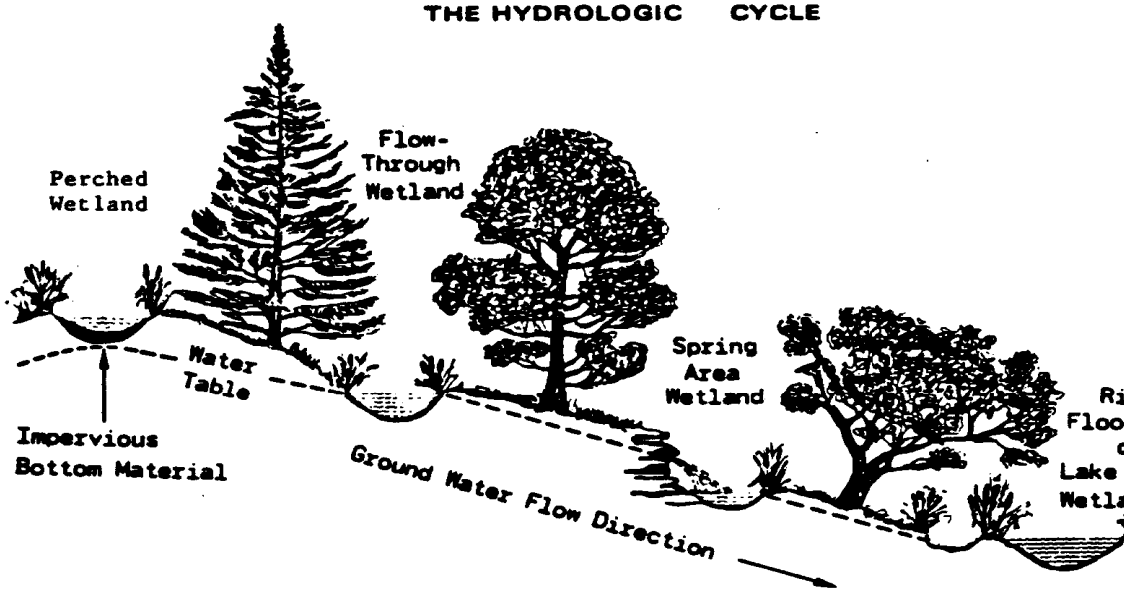



THE HYDROLOGIC CYCLE




WETLANDS AND GROUNDWATER

Wetland Type Correspondence Table. WisDOT Wetland Bank Types and Wisconsin Wetland Inventory.

| Wetland Type | Description | Wisconsin Wetland Inventory (subclasses and modifiers) | Example |
|---|---|---|---|
| RPF | Riparian wetland (wooded)<br>Floodplain forests, shrub carr and alder thickets in riverine or lacustrine system | T (1,2,3)K, S(1,2,3)K, (w,s) | T3Kw<br>S3k |
| RPF(D) | Degraded Wooded Riparian Wetland | T(1,2,3)K, S (1,2,3) K, (a,f,g,v) | T3Kg |
| RPE | Riparian wetland (emergent)<br>Sedge and wet meadows, bars and mudflats, shallow and deep marsh in riverine or lacustine system | E(1,2,3)K<br>F(2,3,4,5)K,<br>E(1,2,3,4,5,6)(K,H,L) | E1K<br>F5K<br>E4H |
| RPE(D) | Degraded Emergent Riparian Wetland | E(1,2,3)K(a,f,g,v)<br>E(1,2,3,4,5,6)(K,H,L)(a,f,g,v) | E1Kg<br>E3Hg |
| M | Wet and sedge meadows, wet prairie, vernal pools, fens | E(1,2,3)K<br>E(1,2,3)K(a,f,g,v) | E3K |
| M(D) | Degraded Meadow | | E3Kf |
| SM | Shallow Marsh | E(1,2,3,4,5,6)(K,H,L) | E3H |
| DM | Deep Marsh | E(1,2,3,4,5,6)(K,H,L) | E3H |
| AB | Aquatic Bed | A(1,2,3,4)(L,R,H)<br>W(2,3,4)H | A3H<br>W3H |
| SS | Shrub Swamp<br>Shrub carr, Alder thicket | S(1,2,3,5,6)K | S3K |
| SS(D) | Degraded Shrub Swamp | S(1,2,3,56)K(g,a) | S3Kg |
| WS | Wooded Swamp | T(1,2,3,5,8)K | T3K |
| WS(D) | Degraded Wooded Swamp | T(1,2,3,5,8)K(g,a) | T3Kg |
| BOG | Open and Forested Bogs | E2,<br>S(2,4,5,6,8,9)K<br>T(2,4,5,6,8,9)K | E2Km<br>S5K<br>T8K |

National Wetland Inventory based on Cowardin, et al. 1987.
P=Palustrine, L=Lacustrine, R=Riverine
EM=Emergent, SS=Shrub/Scrub, FO=Forested, AB=Acquatic Bed, ML=Moss/Lichen
1=persistant, 2=nonpersistant (EM)
1=broad leaved deciduous, 2=needle leaved decidous,etc.(SS,FO)
A=Temporarily flooded
B=Seasonally Flooded
C=Semipermanently flooded
E=Permanently flooded
F=Saturated

Comparative Examples
PEM1F=E1K
PFO1F=T3K
PSS1F=S3K
PEM2C=E4H
PAB2E=A3H

COUNTY MAP INFORMATION

| County | Number of Maps | County | Number of Maps |
|---|---|---|---|
| Adams | 24 | Marathon | 44 |
| Ashland | 43 | Marinette | 52 |
| ♦ Barron | 29 | ♦ Marquette | 19 |
| Bayfield | 52 | Menominee | 10 |
| Brown | 19 | Milwaukee | 8 |
| Buffalo | 25 | Monroe | 26 |
| ♦ Burnett | 28 | Oconto | 32 |
| Calumet | 12 | Oneida | 35 |
| ♦ Chippewa | 33 | Outagamie | 20 |
| ♦ Clark | 37 | Ozaukee | 8 |
| ♦ Columbia | 29 | Pepin | 11 |
| Crawford | 26 | Pierce | 21 |
| Dane | 35 | ♦ Polk | 29 |
| ♦ Dodge | 29 | Portage | 22 |
| Door | 30 | Price | 35 |
| Douglas | 42 | Racine | 11 |
| Dunn | 24 | Richland | 18 |
| ♦ Eau Claire | 21 | Rock | 20 |
| Florence | 18 | ♦ Rusk | 28 |
| ♦ Fond du Lac | 25 | ♦ Sauk | 30 |
| ♦ Forest | 32 | St. Croix | 23 |
| Grant | 37 | Sawyer | 38 |
| Green | 16 | Shawano | 25 |
| ♦ Green Lake | 14 | Sheboygan | 16 |
| ♦ Iowa | 27 | Taylor | 27 |
| Iron | 27 | Trempealeau | 24 |
| ♦ Jackson | 32 | Vernon | 26 |
| Jefferson | 16 | ♦ Vilas | 37 |
| Juneau | 26 | Walworth | 16 |
| Kenosha | 10 | Washburn | 24 |
| Kewaunee | 13 | Washington | 12 |
| La Crosse | 17 | Waukesha | 16 |
| Lafayette | 20 | Waupaca | 21 |
| Langlade | 25 | Waushara | 18 |
| Lincoln | 25 | Winnebago | 16 |
| Manitowoc | 21 | Wood | 23 |

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Scale of Wisconsin Wetland Inventory paper maps is 1:24,000 (1" = 2,000'). Maps cost $5.00 each.

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Return this form and payment to:

Wisconsin Department of Natural Resources
Bureau of Water Regulation & Zoning, WZ/6
101 S. Webster St., P.O. Box 7921
Madison, WI 53707
(608) 266-8852

Form 3500-98 (8-95)

## FDM 24-10-1 Introduction

December 8, 1995

The major vegetation communities of Wisconsin are separated into two distinct provinces - the prairie forest province in the southwest and the northern hardwoods province in the northeast (Curtis, 1959)[1]. These two provinces are separated by a band of overlap, called the tension zone (see Figure 1.1). Counties within this zone have species of both southern and northern communities. Since wildlife is dependent upon vegetation for food and shelter, species distribution parallels vegetation distribution. The tension zone also delineates the range limits of many wildlife species.

Specific information on the types of vegetational communities within the state, as well as descriptions of vegetational communities, can be found in Curtis (1959). The vegetational communities have been arranged according to environmental gradients, of which moisture, light, and temperature are factors. This book is intended to supplement field observation and can serve as a resource for describing vegetational communities. Depending upon the scope of a proposal, it is usually sufficient to identify the basic community type (savanna, prairie, forest, or other) and to list dominant species observed.

### 1.1 Characteristics of Terrestrial Communities

Different terrestrial communities are characterized by their unique vegetation, soil and water conditions. A prairie is a plant community dominated by grasses. Growing with the grasses are many other species of nongrassy herbs which are known by the collective name, forbs. Woody shrubs can be present, as well as tree seedlings. A prairie is defined as an open area covered by low growing plants, dominated by grasslike species of which at least half are true grasses, and with less than one mature tree per acre.1 Xeric, or dry, prairies may occur on topographies varying from flat to steep. The soil blanket is thin, a result of water or wind erosion. Both water-holding properties and nutrient supplies in the soil are good, but the thinness of the layers limits the total quantities of water and nutrients. Mesic prairies are those that have soil conditions intermediate between dry and wet. They are found on flat or gently rolling land forms. The level sites are often on glacial outwash with a stratified and very porous subsoil of sand or gravel, while the hilly sites may be on glacial till or residual or loessial soils on the rolling surfaces of dolomitic bedrock. The surface layer of soil is very rich in nutrients. The soil is moderately to well drained.

A savanna is defined as an area covered by low growing plants, dominated by grasslike species of which at least one-half are true grasses, with more than one tree per acre but with less than one-half of the total area covered by the tree canopy.The soils are generally sandy and well drained. Savannas are generally found on flat or gently rolling land, except for one type, the cedar glade, which can be found on steep hillsides of thin loess over limestone or quartzite bedrock, or a gravelly glacial moraine.

Forests are communities dominated by trees and have at least a 50 percent canopy cover. They occur from wet to well drained soils. In southern Wisconsin, soils can vary from very wet places along streams and lakes, through mesic sites with deep soils, to very dry places on the thin soils of exposed hills and bluffs. Northern forests also occur on a wide range of topographic sites, from very wet to very dry, and from thin rocky soils to deep loams and clays. Wooded areas that are considered wetlands are described in FDM 24-5-10.

[1] Curtis, J.T. 1959. The Vegetation of Wisconsin. University of Wisconsin Press, Madison, WI.

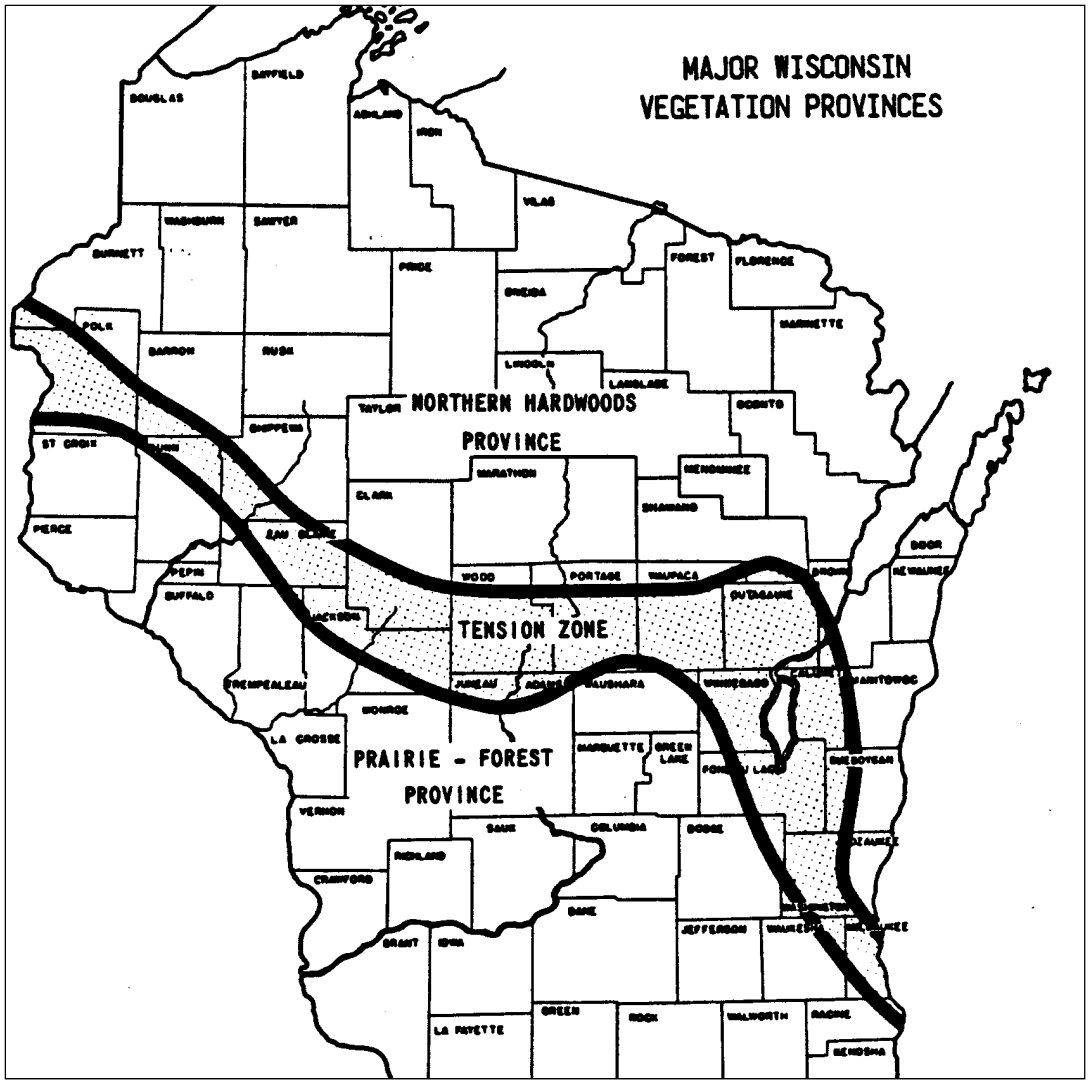


***Figure 1.1. Map Showing Major Wisconsin Vegetation Provinces***

*Adapted from Curtis - 1959*

## FDM 24-10-5 Forest Communities

*December 8, 1995*

### 5.1 Existing Conditions

The immediate project area should be described in terms of the tree species present, including an estimate of maturity (e.g., seedling, sapling, mature tree). Also, indicate which species appear to be dominant. This information is useful in predicting wildlife associations.

Surrounding land use should also be discussed. The value of the woodland depends in part on how much there is in addition to that which will be converted to transportation purposes. An estimate of both the total acreage of the forest unit and the acreage to be taken should be included.

Since the value of the forest community also depends upon its current use, this information should be provided. Wildlife, recreational, forestry, home site, or other uses in the project area can be presented on a land use map exhibit.

### 5.2 Evaluating Impacts on the Forest Community

Describe the proposed project activity in terms of its potential disturbance to the woodland. For upgrading an existing alignment, it is possible that trees will only be removed from the existing forest edge. Relocation might involve either a fringe taking or bisection of the woodland. Provide enough engineering detail to explain how wide a strip will be involved, including shoulders, medians, and ditches. Also include land acquired for auxiliary lanes, frontage and access roads, intersections and interchanges, rest areas, waysides, and weigh stations. Most reviewers are interested in a concise, easily understood explanation of the anticipated physical changes.

Determine how many trees will be affected by listing either the number of trees or the acreage of woodland affected. The types of trees and their approximate sizes should also be described.

### 5.2.1 Primary Impacts

For forested areas, primary impacts are associated with the direct removal of vegetation. Initial clearing and grubbing operations remove the mature trees, saplings, and shrubs. This retards the natural succession to a mature forest. Further, grading and stripping of topsoil clears the ground cover and increases the potential for erosion. This complete removal eliminates use by wildlife and marks the beginning of a permanent barrier--the roadbed core. Loss of humic topsoil can reduce the fertility of the site for future vegetation.

### 5.2.2 Secondary Impacts

Secondary development spurred by new access can contribute to the loss of habitat. Operation and maintenance of a completed facility can cause additional loss of vegetation due to automobile pollutants and salting operations. The creation of edges due to bisecting a woodland can have both positive and negative impacts, which should be addressed in the environmental document. One example of creating an edge effect would be the cutting of trees for highway right-of-way. The direct effect is a reduction of overstory cover and an increase in sunlight penetration into the previously forested area. The increased availability of sunlight permits the growth of a variety of understory species. This increase in understory diversity can result in an increased diversity of animal species. The increased diversity of species is a potentially positive impact on predator populations; whenever a new food base is established, it will be utilized.

While edge effects might be positive, these same conditions may prove adverse. Changes in vegetation or physical conditions of an area of disturbance can adversely affect a critical food or shelter resource for wildlife or affect human activities related to these resources (changes in game animal populations for example). A disturbance which proves beneficial to a predator species, increasing its numbers, may result in a negative impact on its prey species which had not been previously exposed to heavy predation. Increased edge favors populations of edge species such as the cowbird, which adversely affects broods of certain warbler species. In addition, the effects of wind, sun and road salt can cause tree dieback at the edges of previously undisturbed forest.

The significance of this loss can be evaluated by assuming that there is a limited number of organisms that can be supported per unit of space, based on availability of critical resources such as food and cover. Natural fluctuations and factors such as climate, migration, emigration, immigration, seasonal usage, and parameters of animal population dynamics (i.e., mortality, birth rate, age structure, sex ratios) function jointly to determine how many of which species will inhabit an area.

This concept becomes useful when one discusses a unique unit of habitat; that is, an area that can be considered to be an island of one community type surrounded by other land uses. For example, a stand of deciduous trees surrounded by agricultural land, a pine woods surrounded by a savanna, or a wetland surrounded by upland are examples of island habitats that, if reduced in size, have a greater potential for total loss of wildlife because of the reduction in the amount of critical resources needed to support an animal population.

Statements that wildlife will be lost due to habitat destruction must be made considering these concepts. Those species that inhabit island-like units distinct from similar, adjacent habitat will probably be lost. The ability to change homes is species dependent. Species that are gregarious, highly territorial, require large home ranges, have a limited supply of suitable breeding habitat, or have other unique requirements may not survive habitat disruption. Other species that have broader tolerances will likely relocate successfully if similar, adjacent habitat is available. The DNR district wildlife manager will be able to provide information on habitat requirements for specific wildlife species.

To some extent, there will be a replacement of original habitat with new habitat in the highway right-of-way. Grass and shrub successional stages and highway ditches are among some of the most productive habitat for fowl, small mammals, and songbirds. Where the right-of-way provides a new habitat, an increase in diversity of wildlife is likely to result, along with an increase in their predators. A discussion of the amount and type of right-of-way habitat that will be created should also be a part of the environmental document.

## 5.3 Determination of Significance

As with other natural systems, once the basic data have been gathered to describe the existing forest community and its uses, the significance of changing or precluding those uses should be estimated. Again, this should be done in the context of local ecology, critical resources, and the scope of the proposed project. Whenever possible, it should be explained why a particular impact is or is not expected to be significant. In many cases, it will be necessary to rely on other expertise, particularly for wildlife issues. Knowing where to obtain information is important. The DNR, the U.S. Fish and Wildlife Service, local sportsmen, and local

naturalists are often good sources of information on habitats of local interest. This type of analysis should be made for all alternatives, ranking each in terms of adverse and beneficial effects. Differences among alternatives should be pointed out. For example, all alternatives might involve woodland loss, but the site for one alternative might be away from a wildlife resting area or food source.

### 5.4 Measures to Minimize Harm

Where appropriate, alignments that involve fringe takings rather than severances should be selected; these are less likely to have significant impacts. Where severances are unavoidable, it is important to determine whether critical habitat exists within the proposed corridor.

If sensitive species have been identified in the project area, construction time constraints should be included in special provisions that will not interfere with mating or nesting behavior. This is particularly true where construction noise could be significant.

Maintenance practices that allow successional layers of vegetation to establish (as opposed to clear-cutting and mowing) provide habitat diversity and are more economical.

Consideration should be given to incorporating animal movement pathways into project design. Migration routes of mammals, amphibians, and reptiles should be identified. Information on methods to minimize adverse impacts can be obtained from the DNR wildlife manager.

Where forested lands are bisected, a buffer zone shrub layer should be allowed to establish itself to help prevent the side effects of drying, wind-throw, and tree dieback. In areas where heavy salting is anticipated, salt tolerant species could be planted in the buffer zone.

Grading sites should be revegetated as soon as possible. For the majority of projects, the basis for erosion control measures are outlined in WisDOT standard construction specifications. Landscape architectural services are available through the WisDOT. Before utilizing any methods to minimize harm, thought should be given to whether these methods could cause additional impacts.

## FDM 24-10-10 Non-Forested Communities

*December 8, 1995*

### 10.1 Existing Conditions

Generally, non-forested upland communities may be defined as having less than 50 percent canopy cover. More than 50 percent cover would indicate a closed tree stand or forest. Canopy cover is defined as the aerial extent of branches and leaves. A complete canopy cover occurs when the ground is completely hidden by tree tops when viewed from above. Lesser percent cover refers to the canopy relative to open space within a stand of vegetation.

Non-forested communities with scattered trees are called savannahs. Oak openings, cedar glades, pine barrens, and scrub oak barrens are types of savannahs, depending upon the dominant vegetation. Other open areas (without mature trees) include prairies, grasslands, sandy shore, and rock cliff communities.

Open grass areas are often utilized as pastures adjacent to tilled agricultural land. Wildlife use is usually limited to small mammals and bird species that nest in dense grasses. If these open areas are adjacent to wooded tracts, they might be used as supplemental feeding areas by woodland species.

Grass areas that are not tilled often retain some prairie vegetation. Such areas are particularly prevalent along railroads and old highways in the southern portion of the state. Because there are so few remaining, prairie remnants may harbor threatened or endangered plant species.

### 10.2 Evaluating Impacts on Non-Forested Communities

Describe the proposed project activity in terms of its potential disturbance to the non-forested communities. Provide enough engineering detail to explain how wide a strip will be involved, including shoulders, medians, ditches, auxiliary lanes, frontage roads, intersections, interchanges, etc. Determine the acreage to be affected for each type of non-forested community.

#### 10.2.1 Impacts

Impacts can be directly related to the removal of vegetation. These may be short-term impacts if the reestablished right-of-way vegetation provides similar habitat. The wildlife species may be able to relocate successfully provided that an alternate site is available and is able to support the additional population. Other impacts such as erosion, construction noise, or secondary land use changes are similar to those discussed for forest communities.

### 10.3 Determination of Significance

The significance of impacts should be viewed in terms of the functions of a particular nonforested community and how these might be affected. The size, location and local availability of a similar type of nonforested community are important considerations. The DNR and the U.S. Fish and Wildlife Service can provide information to help in determining the significance of the impacts.

### 10.4 Measures to Minimize Harm

If a unique plant community or a critical wildlife resource has been identified, steps should be implemented to avoid these or to minimize adverse effects.

These steps include, but are not limited to the following:

1. Roadway alignment designed to avoid critical habitats.
2. Construction time constraints to avoid interference with breeding or nesting behavior.
3. Erosion control measures.
4. Revegetation as soon as possible after construction.

#### 10.4.1 Factor Sheets

Factor Sheets H1 and H2 pertain to terrestrial systems evaluations and should be completed when preparing an environmental document if the project affects upland habitat.

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

### 10.5 References

Curtis, J.T. 1959. The Vegetation of Wisconsin. The University of Wisconsin Press, Madison, WI.

Rosendahl, C.O. 1970. Trees and Shrubs of the Upper Midwest. University of Minnesota Press, Minneapolis, MN.

## FDM 24-10-15 Agricultural Lands

*December 8, 1995*

State and federal legislation and regulations have been enacted to preserve farmland. The purpose of the Federal Farmland Protection Policy Act, 1981, and the rule promulgating this Act, 7 CFR 658, is to minimize the role federal programs have in the conversion of farmland to nonagricultural uses. Farmland refers to land in any of four different categories: 1) prime farmland; 2) unique farmland; 3) farmland other than prime or unique that is of statewide importance; or 4) farmland other than prime or unique that is of local importance. Prime farmland does not include land already in or committed to urban development or water storage. The Farmland Conversion Impact Rating form establishes a method to systematically evaluate impacts on agricultural land by using specific criteria and a point rating system and is coordinated through the Natural Resource Conservation Service (NRCS). This form must be used if federal funds are used on the project. This requirement is further discussed in FDM 5-5-5 and FDM 20-45-35.

Wisconsin Statute (S.32.035) requires the Department of Agriculture, Trade and Consumer Protection (DATCP) to prepare an Agricultural Impact Statement if more than five acres of land from any one farm operation would be acquired. A farm operation is defined as "any activity conducted solely or primarily for the production of one or more agricultural commodities in sufficient quantity to be capable of contributing materially to the operator's support". If the total acreage is five or fewer acres, the Agricultural Impact Statement may be prepared at the discretion of the DATCP. FDM 20-45-35 discusses the preparation and processing of Agricultural Impact Statements. Chapter 20 further details federal and state legislation and regulations.

Soil type, series and location can be obtained from soil survey maps prepared by the U.S. NRCS. These maps consist of soil series and type contours superimposed on air photos.

For agricultural purposes, soils are grouped into capability classes, according to their potential limitations for long-term production of common crops and permanent vegetation. Assignment of any of these classifications to a particular agricultural tract is based upon the actual or potential use being important enough so that it is feasible to operate under that classification, i.e., a marketable commodity is being or could be produced. There are eight capability classes, with the risk of soil damage or limitations in use progressively greater from Class I to Class VIII.

### 15.1 Land Suitable for Cultivation and Other Uses

Nationally, farmland is categorized as prime or unique and is further designated as having either statewide or local significance. The NRCS has used capability classes and subclasses to describe several types of important

farmlands for Wisconsin. Factors considered in the classification are moisture supply, temperature, pH, water table, flooding, erosivity, permeability, and presence of rock fragments.

### 15.1.1 Prime Farmland

These are the best agricultural soils in the state. Prime refers only to the productive capacity of the land for crops as affected by soil fertility, growing season and moisture supply. All soils in capability Class I and Subclasses IIe, IIs and IIw are included in this class.

### 15.1.2 Unique Farmland

This class includes land that is used to produce specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Included are soils presently being irrigated in capability Subclasses IVs, IVe, VIs, and VIe on zero to 12 percent slopes. Also included are lands presently used for growing high value crops, such as cranberries, apples, mint, etc., on Class IV through VII land.

### 15.1.3 Farmland of Statewide Significance

These are productive soils, but when used for cultivated crops soil conserving practices are more difficult to apply and maintain. This land supports farm operations important to the state's economy, such as pastureland. NRCS considers all soils in capability Subclasses IIIe, IIIs and IIIw in this category.

### 15.1.4 Farmland of Local Importance

These are productive farmlands that have more use restrictions, and soil conserving practices are difficult to apply and maintain. This class includes specialized enterprises such as Christmas or nursery tree production. Included are soils in capability Subclasses IVe, IVs, IVw, Vw, VIe and VIIe.

The NRCS developed a list of Wisconsin soils that are prime farmland, unique farmland, and soils of statewide and local importance. The latest version (June 1984) lists the soil names, percent slopes, symbols used on soil survey maps, counties where found, and additional remarks. This information may be obtained from:

Natural Resources Conservation Service
4601 Hammersley Road
Madison, Wisconsin 53711

### 15.1.5 Factor Sheets

Factor Sheets D1 and D2 and the Agricultural Impact Notice Sheets pertain to agricultural land evaluation and need to be completed when preparing an environmental document.

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

## FDM 24-10-20 Natural Areas *December 8, 1995*

### 20.1 Definitions

Natural areas, as defined by the Wisconsin Natural Areas Preservation Council, are tracts of land or water so little modified by human activity or sufficiently recovered from the effects of such activity that they contain intact native plant and animal communities believed to be representative of the presettlement landscape. There are two types of natural areas: dedicated and designated. Dedicated natural areas are those areas that are officially listed by the Department of Natural Resources (DNR) and the Wisconsin Natural Areas Preservation Council and have been dedicated by the Governor of Wisconsin. Designated natural areas are locations of significant pieces of habitat listed on an inventory of natural areas. Designated natural areas have not been dedicated by the Governor.

Both types of natural areas are ranked into the following three basic categories according to their quality.

1. Natural Areas of Statewide or Greater Significance: Natural areas of statewide or greater significance are those natural areas which have not been significantly modified by human activity, or have sufficiently recovered from the effects of such activity so as to contain nearly intact native plant and animal communities which are believed to be representative of the pre-settlement landscape.
2. Natural Areas of Countywide or Regional Significance: Natural areas of countywide or regional significance are defined as those natural areas which have been slightly modified by human activities or which have insufficiently recovered from the effects of such activity, but which still contain good examples of native plant and animal communities representative of the pre-settlement landscape. These natural areas are of lesser significance because their quality is less than ecologically ideal and

because there is evidence of past or present disturbances, such as logging, grazing or water level changes as a result of ditching, filling, or pollution. These natural areas may also be of insufficient size to be of statewide significance. These areas, if protected in an undisturbed condition, may be expected to increase in value over time. Therefore some of these areas may eventually become natural areas of statewide significance.

3. Natural Areas of Local Significance: Natural areas of local significance are defined as those natural areas which have been significantly modified by human activities but have, nevertheless, retained modest amounts of natural cover. Natural areas of local significance may reflect patterns of former vegetation or serve as examples of the influence of human settlement on vegetation. These natural areas may also be expected to increase in value if protected.

Classification of an area into one of these categories is based upon consideration of the diversity of plant and animal species and community types present; the structure and integrity of the native plant or animal community; the extent of disturbance from human activities such as logging, grazing, water level changes, and pollution; the commonness of the plant and animal communities present; any unique natural features within the area; the size of the area; and the area's educational value.[2]

### 20.2 Effects on WisDOT Project Activity

Dedicated natural areas are protected from disturbance in that the land can only be altered if approved by the Governor and the Legislature. Designated natural areas have no specific protection; however, when the DNR is notified of a proposed project, it can indicate whether any designated natural areas are at or near the project site and recommend avoidance of the area. Discharge of dredged or fill material into headwaters, wetlands, or isolated water bodies within natural areas requires an individual Section 404 Permit. See FDM 20-50 for permit information. Public opinion can also influence project plans by favoring preservation of a designated natural area.

Information on the locations of dedicated and designated natural areas may be obtained from local governmental offices, regional planning commissions, district DNR offices, the Office of Environmental Analysis (OEA) or the DNR Bureau of Endangered Resources in Madison.

Bureau of Endangered Resources
Department of Natural Resources
Box 7921
Madison, WI 53707

[2] Southeastern Wisconsin Regional, Planning Commission, Technical Report, Volume 4, Number 2, March 1981.

## FDM 24-15-1 Introduction

December 8, 1995

The purpose of this section is to discuss potential impacts on wildlife. The scope, location, and design of a proposed project determine these impacts and the extent to which they have an effect on wildlife.

For the purposes of this section, it is assumed that there are four phases of development: design, construction, operation, and maintenance. Each phase can present specific problems to wildlife. Basically, primary impacts are those associated with the construction phase and secondary impacts, with the operation and maintenance of the completed facility.

## FDM 24-15-5 Impacts-Design

December 8, 1995

The location of a highway and its extent (both length and breadth) are very important factors in determining wildlife impacts. The impacts of land acquisition for a highway cannot be thought of solely in terms of the strip that will be used for the roadbed itself. Among the many activities that require secondary acquisition of land are auxiliary lanes, frontage and access roads for local users, intersections and interchanges, medians or other barriers, rest areas, waysides, and weigh stations. This partial list does not include secondary development that may be spurred by the existence of new access.

Of primary concern is the identification of wildlife species and the habitats upon which they depend. These inventories should be developed at an early stage, with natural or critical areas being avoided. Location studies refine the information necessary for selecting a particular route within the selected corridor and present that information for public review. During this phase, specific fisheries and game requirements should be determined. The information needed to define potential wildlife problems, such as the removal of food or cover within critical habitats, the bisection of ranges and territories, and the obstruction or alteration of movement corridors can be obtained from the Department of Natural Resources (DNR) or the U.S. Fish and Wildlife Service.

Under certain circumstances, WisDOT projects may be in conflict with the terms of the Migratory Bird Treaty Act of 1918. This Act regulates the taking of migratory birds, their nests, eggs, parts, or products. For example, the demolition or maintenance of bridges may destroy the nests, eggs, or unfledged young of cliff and barn swallows, which are protected under the Act.

It is also during the design phase that forethought should be given to what the agency is willing to do about impacts once they are identified. Mitigation should be planned from the early phases of project development; it is difficult to incorporate changes into a project that has already been designed and is ready for construction.

## FDM 24-15-10 Impacts - Construction

December 8, 1995

The construction phase is very critical to wildlife. It is during this phase that the majority of physical and biological changes of the environment occur, or the stage is set for further impacts of other phases. There are specific stages within this phase for which potential impacts can be identified and evaluated.

### 10.1 Clearing and Grubbing

The primary impact of this stage is the removal of existing vegetation and habitat. The degree of impact on wildlife would depend on the extent of vegetation removed, whether it supplied critical cover or a critical food source, and the probability of wildlife successfully relocating to a similar, nearby habitat. There is also a potential for erosion and sedimentation if adequate measures are not taken to protect the soil and nearby water bodies.

### 10.2 Stripping Top Soil

A high potential for erosion exists wherever topsoil is removed and stockpiled. If near watercourses, erosion can impact aquatic life. The exposed subsoil is less fertile than topsoil and will not readily support vegetation. Also, soil fertility is decreased and can be reestablished only when topsoil is replaced. This complete removal of vegetation eliminates the area's use by wildlife. In addition, the roadbed core becomes a permanent barrier

### 10.3 Earthmoving

There is often a need for borrow pits and disposal areas. Those borrow pits that contain standing water may create breeding and resting ponds for waterfowl if they are properly finished. They may provide a basin that is:

1) entirely water, 2) water and wetland, or 3) entirely wetland. Types incorporating wetland and water with gradual slopes are suitable habitats for waterfowl. Size and proximity to the roadway will determine the extent of usage, especially for breeding nesting, and rearing areas. Additionally, depth, shape, extent of shoreline, soils, and water quality determine the extent to which a borrow pit will be a productive resource.

Disposal of unsuitable material can cause an additional loss of habitat, depending on where it is placed. If not adequately removed or if protection is not provided for nearby waterways, overburden material can be a source of siltation and pollution.

### 10.4 Construction Noise

Most studies on the potential impacts of construction noise on wildlife have been done with laboratory animals. However, it is likely that some of these conclusions could apply to natural populations. In particular, construction in previously remote areas relatively free from noise would have a potential for disrupting wildlife. Since construction normally occurs from early spring until late fall, there is a potential for noise impacts during the time period when most wildlife species are breeding.

Laboratory studies have shown various effects on animals when noise levels are within the range of 72 dBA to 101 dBA. It is recognized that parameters, such as duration of exposure, whether the noise is intermittent or continuous, and its source affect the results of such studies. This information is provided to give an idea of the types of effects that can occur when noise is at levels normally produced by construction equipment.

Experiments with fowl showed cessation of brooding altogether or a reduction in the number of eggs hatched when brooding continued. Mice exposed to noise at various stages of pregnancy showed effects ranging from resorption of the fetuses, aborting, and giving birth to young that weighed less than offspring of control group animals not exposed to noise. Effects on adult animal populations have demonstrated behavioral changes, such as decreased activity, increased aggression, refusal to eat, and weakened reflexes.

Animals likely to be affected by noise are those that are capable of responding to sound energy, especially those that rely on auditory signals to find mates, stake out territories, recognize young, detect and locate prey, and evade predators. Species that are not responsive to or do not rely on sound signals for important functions could be indirectly affected if noise affects their prey.

Details on noise related impacts on specific species of wildlife may be available from the Department of Natural Resources (DNR) Wildlife Manager or the U.S. Fish and Wildlife Service.

### 10.5 Structures in Waterways

Construction of bridge piers and footings can modify the hydrologic regime of a river, which in turn can affect aquatic life. Scour at bridge piers or upstream and downstream from a structure can create pools and riffle areas that were not part of the natural characteristics of the river. There is a potential for either an increase or decrease in species diversity depending upon the type of stream involved and the extent of hydrologic modification.

Culverts, depending upon type, size, and length, can present passage problems for fish and small mammals. In general, shorter culverts with open bottoms provide the best passage for fish. Access to spawning and rearing areas can be eliminated if location and design of culverts is not done considering the natural use of a stream. Small mammals that have established movement routes along stream banks might be forced to cross the roadway if their normal paths are altered.

### 10.6 Roadway Barrier and Rights-of-Way

The most obvious effect of highway construction occurs when the roadway acts as a berm that remains as a permanent severance. This berm can act as a deterrent to the normal movement of wildlife as they travel among resting, feeding, mating, and nesting sites throughout the course of a day, week, or season.

Precise wildlife movement patterns are not usually known. This is due in part to the lack of, or short observation times (i.e., one season preceding construction is not adequate), or to natural changes in activity patterns, such as those observed during the mating season of many species. This adds to the difficulty of predicting whether a particular roadway location will affect movement patterns. If a project warrants it, this information might have to be determined through study and observation.

Trapping and road mortality information indicates that small forest mammals are reluctant to venture onto road surfaces where the distance between forest margins exceeds 65.5 feet; wider roads are crossed almost exclusively by medium to large sized mammals. Four-lane divided highways are as effective a barrier to the dispersal of small forest mammals as a body of water twice as wide.

Another possible effect on animal movement is that animals might adjust their movement patterns to utilize the roadway corridor because of the lease of travel along the cleared areas, thus expanding their ranges.

The movement of deer across roadways is largely dependent upon surrounding land use. In forested areas, deer utilize the right-of-way primarily for grazing. Generally, they are attracted to grazing areas that have wooded cover available within 25 yards on either side of the roadway. In agricultural areas, use of the right-of-way decreases and there is an increased tendency for deer to cross the roadway for access to fields.

## FDM 24-15-15 Impacts - Operations

*December 8, 1995*

Operation is defined here to include daily or seasonally routine activities that occur after the highway is built. Traffic movement, automobile pollutants, and application of de-icing chemicals can affect wildlife throughout the life of the roadway. The most observable effect on wildlife is injury and mortality associated with animal/vehicle collisions.

Some general circumstances contributing to traffic hazards for wildlife have been identified. At high speeds, drafts from autofans may reduce songbirds' ability to fly clear of the vehicle. Animals have been observed to dart from cover close to the roadway into the path of cars. After dark, the glare of approaching headlights may blind or confuse an animal adjacent to or crossing the roadway. Seasonal and climatic conditions may influence wildlife mortality rates. Increased activity during breeding season and during favorable weather conditions may result in higher mortality rates. The mortality of cottontails, fox squirrels, muskrats, opossums, skunks and raccoons has been associated with increased activity during the breeding season and normal periods of dispersal. Scavengers and other predators are at increased risk of being hit by vehicles when attracted to the remains of road killed animals on the roadway.

Traffic generated noise can also have an impact on wildlife. The degree of impact would depend upon whether the alignment was new or an alteration of the existing one, and the extent and value of wildlife habitat adjacent to the roadway. Noise impacts are further discussed in FDM 24-15-10.

Considerable literature is available on pollutants generated by the operation of automotive vehicles. Most of these reports, however, do not include information on the effects on wildlife. Some of the potentially hazardous substances resulting from auto operation are grease, petroleum, and n-paraffins resulting from spills or leaks of lubricants, antifreeze, and hydraulic fluids. Traffic related lead is deposited principally through the use of leaded fuels, however, this source will diminish with greater use of unleaded fuels in new vehicles. Some lead results from the wear of tires, in which lead oxide is used as filler material. Zinc is used as a filler in tires and at high concentrations in motor oil as a stabilizing additive. Copper, nickel, and chromium are wear metals from metal plating, bearings, bushings, and other moving parts within the engine. Wildlife that consume vegetation or other food chain components from roadsides could be adversely affected by these substances.

Although it is usually considered to be a maintenance practice, roadway de-icing is included under this section because it is an ongoing seasonal practice involving vehicle movement. Sodium chloride and calcium chloride are used almost exclusively as de-icing agents because of their efficiency in melting ice and snow, availability, and relatively low cost.

Two common additives to highway salts are ferric ferrocyanide (Prussian blue) and sodium ferrocyanide, both used as anti-caking agents. Of these, sodium ferrocyanide is soluble in water and will liberate cyanide in the presence of sunlight. Cyanide is lethal to fish and aquatic life in small concentrations. Salt poisoning of wildlife has also been reported. In one Wisconsin study, cottontails, quail, and pheasant were diagnosed as having been poisoned by sodium chloride. Some wildlife species are attracted to the roadway in winter to lick the salt, jeopardizing both the motorist and wildlife.

There is a considerable amount of literature available on the use of de-icing salts, including effects on vegetation and economic considerations. If it is necessary to evaluate salt impacts in detail, the search for the appropriate literature can be coordinated through the Office of Environmental Analysis (OEA).

## FDM 24-15-20 Impacts - Maintenance

*December 8, 1995*

One of the most extensive maintenance tasks is the upkeep of highway rights-of-way. Depending upon the extent to which they are managed, highway rights-of-way have the potential for providing new habitat for wildlife. Studies on interstate interchanges have shown that although most use is observed in the zone just beyond the right-of-way fence, with moderate mowing practices and shrub plantings, interchanges can provide excellent habitat for songbirds and small mammals. Keeping a diversity of natural plant communities in various successional stages has a positive impact on wildlife food and cover. Extensive mowing and clear-cutting of trees or shrubs eliminates use of the right-of-way except by small grass dwelling species. Such practices also encourage the invasion of noxious weeds and increase the potential for erosion.

Another maintenance activity that can adversely affect wildlife is bridge painting. In the past, bridges were painted with red lead paint for all coats. A process is now utilized that minimizes application of lead paint.

Maintenance repainting involves sandblasting and removal of all scale and other substances to bare metal. The amount of lead entering a stream from this process can be significant. Although not soluble in water, lead particles can be ingested by fish, waterfowl and other wildlife, thus accumulating in the food chain. Sandblast scums on the surface of the water have been found to contain concentrations as high as 240,000 parts per million lead. If this floating scum deposits along the shoreline or on vegetation, it can be consumed in lethal amounts by wildlife or domestic livestock.

Depending upon the availability of funds, the best approach to minimizing adverse impacts is a continuous repainting program to eliminate the need for sandblasting. In addition, it is WisDOT practice to require contractors to contain paint chips with boom devices or to prevent these from falling into the water at all. More information may be obtained from the WisDOT Maintenance Section and the Standard Special Provisions.

### 20.1 Factor Sheets

Questions on Factor Sheets F1, G, H1, and H2 pertain to impacts on wildlife and need to be addressed when preparing an environmental document.

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

### 20.2 References

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Vogt, R.C. 1981. Natural History of Amphibians and Reptiles of Wisconsin. Milwaukee Public Museum, Milwaukee, WI.

## FDM 24-20-1 Introduction

December 8, 1995

The purpose of this section is to identify requirements under state and federal laws for the preservation of threatened and endangered species of plants and wildlife. The basic premise of listing threatened and endangered species for protection is that over time, populations of particular plants and animals have declined. Generally, no distinction is made as to whether this decline is a natural phenomenon or whether it is due to destruction of critical habitat or other means. The point is that once species are listed for protection, for whatever reason, certain procedures must be implemented for their continued preservation.

## FDM 24-20-5 Federal Implementation

December 8, 1995

The purposes of the Endangered Species Act of 1973 are "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species . . ." The 1973 Act was amended in 1978 and 1982.

### 5.1 Definitions

- The term species includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.
- Fish and wildlife includes any member of the animal kingdom, including without limitation any mammal, fish, bird amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof.
- Plant is defined as any member of the plant kingdom, including seeds, roots, and other parts thereof.
- An endangered species is any species which is in danger of extinction throughout all or a significant portion of its range.
- A threatened species is one which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
- Critical habitat, as related to this Act, includes "the specific areas within the geographical area occupied by the species at the time it is listed . . . on which are found those physical or biological features (i) essential to the conservation of the species and (ii) which may require special management consideration or protection; and . . . specific areas outside the geographical area . . . upon a determination by the Secretary [of the Interior] that such areas are essential for the conservation of the species."

A list of all threatened and endangered species is periodically updated and published in the Federal Register. The list is also published in the Code of Federal Regulations, 50 CFR 23.23. Species are added to this list subsequent to a detailed evaluation and review process. Where possible, critical habitats are designated at the time of listing.

For most of Wisconsin, consultation regarding federally listed species should be initiated with the Field Supervisor, U.S. Fish and Wildlife Service, Green Bay Field Office, University of Wisconsin-Green Bay, Green Bay, Wisconsin 54304. For projects located in the Duluth-Superior harbor, the St. Croix River where the river forms the state border, and the Mississippi River to the Minnesota-Iowa border, contact the St. Paul Field Office, 50 Park Square Court, 400 Sibley Street, St. Paul, Minnesota 55101. The Field Supervisor should be provided with a description of the proposed action, a listing of the alternatives and identification of any known species of critical habitat in or adjacent to the project area.

For the most current list of federal and state endangered and threatened species, contact the DNR Bureau of Endangered Resources at:

Wisconsin Dept. of Natural Resources
Bureau of Endangered Resources
Box 7921
Madison, WI 53707
Phone: (608) 266-7012

Location maps for endangered species described above are available from the local DNR office or at the

following:

The Bureau of Endangered Resources
Department of Natural Resources
Box 7921
Madison, WI 53707

### 5.2 References

Code of Federal Regulations, 50CFR.

The Endangered Species Act as Amended by Public Law 97-304.

## FDM 24-20-10 State Law

*December 8, 1995*

Wisconsin's Endangered Species Act (Section 29.415, Wisconsin Statutes) was signed into law in 1971. Chapter 27 of the Wisconsin Administrative Code contains the rules necessary to implement the statute and, in conjunction with that statute, governs the taking, transportation, possession, processing or sale of any wild animal or wild plant specified on the Wisconsin list of endangered or threatened species.

This list, published in Chapter NR 27, consists of three parts: 1) wild animals and wild plants on the U.S. list of endangered and threatened foreign species; 2) wild animals and wild plants on the U.S. list of endangered and threatened native species; and 3) a list of endangered and threatened Wisconsin species. The Wisconsin Department of Natural Resources (DNR) periodically reviews and updates this list. Copies may be obtained from the DNR, Bureau of Endangered Resources.

The DNR has an additional category called watch status. Species in this category are those about which some problem of abundance or distribution is suspected but not yet proved. It is an informal, nonlegal category. The main purpose is to focus attention on certain species before they become endangered or threatened.

The following discussion summarizes Wisconsin's endangered species legislation.

Definitions from SS.29.415(2) and NR 27:

Endangered Species means any species whose continued existence as a viable component of this State's wild animals or wild plants is determined by the Department of Natural Resources to be in jeopardy on the basis of scientific evidence.

Threatened species means any species of wild animals or wild plants which appears likely, within the foreseeable future, on the basis of scientific evidence, to become endangered.

Wild animal means any mammal, fish, wild bird, amphibian, reptile, mollusk, crustacean, or arthropod, or any part, products, egg or offspring thereof, or the dead body or parts thereof.

Wild plant means any undomesticated species of the plant kingdom occurring in a natural ecosystem.

Take means shooting, shooting at, pursuing, hunting, catching or killing any wild animal or the cutting, rooting up, severing, injuring, destroying, removing, or carrying away any wild plant.

Statute 29.415 prohibits the following actions, except as allowed by a Department of Natural Resources rule or permit.

1. No person may take, transport, possess, process or sell within this State any wild animal specified by the Department's endangered and threatened species list.
2. No person may process or sell to another person any endangered or threatened species of wild plant.
3. No person may remove or transport any endangered or threatened species of wild plant away from its native habitat on public property or property which he or she does not own or lease, except in the course of forestry or agricultural practices or in the construction, operation or maintenance of a utility facility.

This Statute provides for agreements between the DNR and other state agencies, federal agencies, or private persons for developing programs designed to conserve designated species. There are no provisions for the relocation of listed species by WisDOT, nor are there permit provisions that would allow removal or relocation by WisDOT.

### 10.1 Effects on WisDOT Project Activity

Threatened and endangered wildlife: Since the language of the state law prohibits the taking, transporting, possessing, processing, or selling of wildlife species, it is unlikely that WisDOT project activity would be affected. At present, taking is not construed to include destruction or removal of a species' habitat and thus

indirectly the species itself. The federal law, however, prohibits the destruction or removal of critical habitat as well as the species.

Threatened and endangered plants species: Since the state law prohibits the removal of a wild plant species from its native habitat, this prohibition would apply to WisDOT project activities, such as relocation, widening, or other upgrading that would involve removal of listed species. This prohibition precludes construction that would require removal of threatened or endangered plants. For new construction on new alignment, it is essential to coordinate closely with the DNR to determine whether such species are present. It is likely that the DNR would require alignment modifications to avoid these sites. For improvements on existing alignment where species cannot be avoided, it is possible that they can be relocated to similar habitat in the new right-of-way. Each instance will need to be resolved on a case-by-case basis.

The Wisconsin Endangered and Threatened Species lists and location information may be obtained from the Wisconsin Bureau of Endangered Resources, Department of Natural Resources, Box 7921, Madison, Wisconsin 53707. The lists include federal and state listed species. Additional sources of information include the following state publications:

- Department of Natural Resources, "Endangered and Non-game Species Handbook," (1724.5).
- "Wisconsin's Endangered Birds and Mammals," a supplement to Wisconsin Natural Resources, September-October 1979.
- "Wisconsin's Endangered Reptiles, Fish and Molluscs," a supplement to Wisconsin Natural Resources, July-August 1980.
- "Wisconsin's Endangered Flora," a supplement to Wisconsin Natural Resources, July-August 1982.
- The Vanishing Wild, Department of Natural Resources, 1979.

### 10.1.1 Factor Sheets

Factor Sheets F1, G, and H1 have questions that pertain to threatened and endangered species and need to be addressed when preparing an environmental document.

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/environment/formsandtools.aspx

**FDM 24-25-1 List of References** *December 8, 1995*

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"Wetlands, Floodplains, Erosion, and Storm Water Pumping", Transportation Research Record 948.

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