WASHINGTON STATE WETLAND RATING SYSTEM
for
EASTERN WASHINGTON
Revised

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PREFACE

This document is a revision of the "Washington State Wetland Rating System for Eastern Washington," published by the Department of Ecology in October 1991. The original document was published with the understanding that modifications would be incorporated as we increase our understanding of wetland systems, and as the rating system is used by many different people.

The need to revise the original version became apparent as we have learned more about how wetlands function and what is needed to protect them, especially from the work done to develop methods for assessing wetland functions in the state. Furthermore, several textual inconsistencies and ambiguities were identified that made a consistent application of the ratings by different people difficult. Before undertaking the revisions, comments were sought from a wide range of users of the rating system.

Where possible the comments we have received to date have been incorporated in this revision.

ACKNOWLEDGEMENTS

This document would not have been possible without the participation and help of many people. Special thanks go to the technical committee of wetland experts and planners from local governments who helped develop the objectives for the rating system, reviewed the many drafts of the document, and helped field test the method. The list of participants in the review team is found in Appendix A. We have also received valuable comments from many who took the time to review the draft sent out for public comment, and we wish to acknowledge their efforts. In addition, the staff at the department of Ecology who deal with wetlands also provided much needed review and criticism, especially the regional staff (Cathy Reed and Mark Schuppe in the Central Regional Office and Chris Merker in the Eastern Regional Office).

1. INTRODUCTION

The wetlands in Washington State differ widely in their functions and values. Some wetland types are common, while others are rare. Some are heavily disturbed while others are still relatively undisturbed. All, however, provide some functions and resources that are valued. These may be ecological, economic, recreational, or aesthetic. Managers, planners, and citizens need tools to understand the resource value of individual wetlands in order to protect them effectively.

Many tools have been developed to understand the functions and values of wetlands. The methods range from detailed scientific analyses that may require many years to complete, to the judgments of individual resource experts done during one visit to the wetland. Managers of our wetland resources, however, are faced with a dilemma. Scientific rigor is often time consuming and costly. Tools are needed to provide information on the functions and values of wetlands in a time- and cost-effective way. One way to accomplish this is to categorize wetlands by their important attributes or characteristics based on the collective judgment of regional experts. Such methods are relatively rapid but still provide some scientific rigor (Hruby 1999).

> The Washington State Wetland Rating System categorizes wetlands based on specific attributes such as rarity, sensitivity to disturbance, and functions. In the first edition, the term "rating" was not used in a manner that is consistent with its definition*, a wetland rating system should group wetlands based on an estimate of value or level of functioning on a scale (e.g. high, medium, low). The Washington State Rating System, however, categorizes wetlands based on several criteria such as rarity, sensitivity, and function that are not on the same scale. The term "rating", however, is being kept in the title to maintain consistency with the previous edition. Some local jurisdictions have adopted the rating system in their critical areas ordinances, and a change in title may complicate the use of this revised edition by these jurisdictions.
>
> * rating – A position assigned on a scale; a standing.(American Heritage® Dictionary on Yahoo.com accessed August 2, 2004)

This rating system was designed to differentiate between wetlands based on their sensitivity to disturbance, their significance, their rarity, our ability to replace them, and the functions they provide. The rating system, however, does not replace a full assessment of wetland functions that may be necessary to plan and monitor a project of compensatory mitigation.

The "rating" categories are intended to be used as the basis for developing standards for protecting and managing the wetlands to reduce further loss of their value as a resource. Some decisions that can be made based on the rating include the width of buffers needed to protect the wetland from adjacent development, the ratios needed to compensate for impacts to the wetland, and permitted uses in the wetland. The Department of Ecology has developed recommendations for such protective standards and these are available on the web at http://www.ecy.wa.gov/programs/sea/bas_wetlands/index.html).

The rating system is primarily intended for use with vegetated, freshwater, wetlands as identified using the State of Washington delineation method (WAC 173-22-035). The rating system, however, does not characterize many streambeds, riparian areas, and other valuable aquatic resources.

The rating system is not considered perfect, nor the final answer in understanding wetlands. It is however, based on the best information available at this time and meets the needs of "best available science" under the Growth Management Act. The development of the revised rating system involved the participation of a Technical Review Team consisting of wetland scientists and local planners from eastern Washington. A draft was also sent out for broad review to local planners, wetland scientists and the general public. We anticipate that the method will be further modified over time as we keep increasing our understanding of the wetland resource.

The current version of the rating system was field tested and calibrated in over 90 wetlands throughout eastern Washington. Members of the Technical Review Team and wetland staff from the Department of Ecology visited each site during the spring of 2002 and rated the wetlands using both the old and the revised methods. A companion document, "Washington State Wetland Rating System – Western Washington," is also available.

2. DIFFERENCES BETWEEN THE FIRST EDITION AND THE REVISED EDITION

In fine-tuning this version of the rating system the Department of Ecology is aware that many local governments are using the first edition, or some modified version of it, for managing their wetland resources. The Department's intention in revising the rating system has been to maintain the concept of four wetland categories, while adding refinements that reflect the progress made in understanding how wetlands function and are valued. Five of the original seven criteria for categorization (sensitivity to disturbance, rarity, Natural Heritage wetlands, ability to replace them, and the functions they provide) have been kept.

The other two original criteria for categorization, the presence of Threatened or Endangered (T/E) Species and "wetlands of local significance," have been dropped. The requirements for managing and protecting T/E species in a wetland are very species specific. Recommendations on buffers and mitigation ratios that result from this categorization are too generic to adequately protect a single species. For example, an increase in mitigation ratios and buffers that is usually assigned to wetlands of a "higher" category does not necessarily protect a specific T/E species from impacts**.**

Threatened and endangered species still need special protection, but this protection cannot be accomplished using the rating system. The department of Ecology does not have the expertise to specify standards for protecting each individual T/E species that might be found in a wetland. Local jurisdictions should consult with the appropriate state and federal agencies (U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, State Department of Fish and Wildlife) to develop standards for protecting T/E species using wetlands in their jurisdiction.

Protecting Threatened and Endangered Species in Wetlands

Threatened and endangered species need special protection, but this protection cannot be accomplished using the recommendations associated with the category rating of the wetland. If a T/E species is found living in or using a wetland, the appropriate state or federal agency will need to be consulted to determine what is needed to protect that species in the wetland. This information can be considered as an "overlay" on the category rating. A wetland containing T/E species will have to be protected to meet the requirements of the T/E species as well as those associated with its Category. If the T/E species using the wetland needs to be protected with larger buffers or by some other measures (e.g. no disturbance during the nesting season), then these measures will have to be applied.

For example, a category II riverine wetland that provides overwintering habitat for endangered Coho may need more than the standard buffers recommended for a Category II wetland to protect the fish.

Using "local significance" to determine a wetland category was also omitted from this revision because the criterion is rarely if ever used. Furthermore, the original edition of the rating system required that a local jurisdiction establish independent criteria for categorizing wetlands. The teams reviewing the rating system judged that if local jurisdictions go to the trouble of identifying wetlands of local significance they will also establish standards for protecting and managing these special wetlands. The standards for protecting these wetlands can then be tailored to the specific values or functions that are of local significance, and do not need to be tied to the standards recommended for the rating system.

Information, however, about the presence of T/E species and characteristics that are of local significance is still important in making decisions about a wetland. For this reason, the rating form contains questions about these characteristics of a wetland. Although the information is not used to establish a category, they are data necessary for anyone trying to make decisions about the wetland.

Changes have also been made in the categorization based on how well a wetland performs different functions. The first edition focused on habitat functions because more was known, at that time, about habitat than the hydrologic or "water quality" functions. Our understanding of the latter functions, however, has increased significantly in the last decade, and we are in a position to now include indicators of hydrologic and "water quality" functions in the questionnaire. The categorization based on functions is now equally based on habitat functions, the hydrologic functions (flood storage and reducing erosion), and the functions of water quality improvement (sediment retention, nutrient removal, and removal of toxic compounds). Much of the information on wetland functions used in this version of the rating system was derived from the data and knowledge developed during the "Washington State Wetland Functions Assessment Project" (Hruby et al. 2000).

In the first edition of the rating system, wetlands with a high level of functions, but no other important attributes, could only rate a Category II or a Category III. In this edition, wetlands that are performing all three types of functions well can be rated a Category I. Conversely, wetlands performing all functions poorly are rated as a Category IV.

The Category IV rating based on how well a wetland functions has replaced the former criteria of Category IV based on isolation, size, and cover of invasive species. We now know that some small isolated wetlands are important in certain landscapes and should not be automatically rated as a Category IV.

The distribution of wetlands in different categories in the revised rating system

Data were collected at 90 wetlands to calibrate the revised rating system. At the same time, the wetlands were rated using the old system. The points assigned each question were calibrated to the scores and judgments of functioning developed for the Wetland Function Assessment Project (Hruby et al. 1999, Hruby et al. 2000). The thresholds (scores) for assigning categories, however, were chosen so the distribution of wetlands in the four categories remained roughly the same in the old and the revised system. Reviewers from local governments who participated in developing this draft did not want the relative proportion of wetlands in each category to change between the old and the revised versions. The following table compares the distribution of categories in the 90 reference wetlands using the old and the revised systems.

Number of Wetlands in Each Category

Category	Old Rating System	Revised Rating System
I	15	13
II	42	36
III	33	35
IV	0	6

Comment [1]: The reference sites were specifically chosen to represent the full range of characteristics and functions found in the region. This was important in calibrating the scoring to minimize the potential for finding "outliers" when the rating system came into use. The only bias this introduces into the data is that the distribution of wetland categories represented by the reference set may not match the actual distribution in the region. No claims can be made that the percentage of wetlands in each category of the reference set matches the percentage actually found in the region. This was not considered to be a problem because it was never the intent of the calibration to map the distribution of categories across the region.

3. RATIONALE FOR THE CATEGORIES

This rating system is designed to differentiate between wetlands based on their sensitivity to disturbance, rarity, the functions they provide, and whether we can replace them or not. The emphasis is on identifying those wetlands:

- where our ability to replace them is low,
- that are sensitive to adjacent disturbance,
- that are rare in the landscape,
- that perform many functions well,
- that are important in maintaining biodiversity.

The following description summarizes the rationale for including different wetland types in each category. As a general principle, it is important to note that wetlands of all categories have valuable functions in the landscape, and all are worthy of inclusion in programs for wetland protection.

3.1 CATEGORY I

Category I wetlands are those that 1) represent a unique or rare wetland type; or 2) are more sensitive to disturbance than most wetlands; or 3) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or 4) provide a high level of functions. We cannot afford the risk of any degradation to these wetlands because their functions and values are too difficult to replace. Generally, these wetlands are not common and make up a small percentage of the wetlands in the region. Of the 90 wetlands used to field test the current rating system only 13 (14%) were rated as a Category I. In eastern Washington the following types of wetlands are Category I.

Alkali wetlands - Alkali wetlands are characterized by the occurrence of shallow saline water. In eastern Washington these wetlands contain surface water with specific conductance that exceeds 3000 micromhos/cm. These wetlands provide the primary habitat for several species of migrant shorebirds and are also heavily used by migrant waterfowl. They also have unique plants and animals that are not found anywhere else in eastern Washington. For example, the small alkali bee that is used to pollinate alfalfa and onion for seed production lives in alkali systems. It is a valuable natural resource for agriculture in the western U.S. and especially in eastern Washington (Delaplane and Mayer, 2000). (Note: The "regular" bees used to pollinate fruits and vegetables are generally too large to pollinate the small flowers of these commercially important plants).

The salt concentrations in these wetlands have resulted from a relatively long-term process of groundwater surfacing and evaporating. These conditions cannot be easily reproduced through compensatory mitigation because the balance of salts, evaporation, and water inflows are hard to reproduce, and to our knowledge has never been tried. Alkali wetlands are also rare in the landscape of eastern Washington. Of the several hundred wetlands that were surveyed and visited as part of the function assessment project and the revisions to the rating system, only nine could be classified as alkali.

Alkali wetlands are placed into Category I because they probably cannot be reproduced through compensatory mitigation and are relatively rare in the landscape. No information was found on any attempts to create or restore alkali wetlands. Any impacts to alkali wetlands will, therefore, probably result in a net loss of their functions and values.

Natural Heritage Wetlands – Wetlands that are identified by scientists of the Washington Natural Heritage Program/DNR as high quality, relatively undisturbed wetlands, or wetlands that support state Threatened, or Endangered plant species are Category I wetlands.

Comment [2]: Sensitive" plants are also a criterion for Category I status of wetlands.

Extremely high quality, relatively undisturbed examples of wetlands are very uncommon in eastern Washington. By categorizing these wetlands as Category I, we are providing a high level of protection to the undisturbed character of these remaining high quality wetlands. Examples of undisturbed wetlands help us to understand natural wetland processes. Furthermore, the presence of rare plants in a wetland indicates unique habitats that might otherwise not be identified through the rating system. Rare plant populations are also sensitive to disturbance, particularly activities that result in the spread of invasive species.

The Washington Natural Heritage Program of the Department of Natural Resources (DNR) has identified important natural plant communities and species that are very sensitive to disturbance or threatened by human activities, and maintains a database of these sites.

"These natural systems and species will survive in Washington only if we give them special attention and protection. By focusing on species at risk and maintaining the diversity of natural ecosystems and native species, we can help assure our state's continued environmental and economic health." (DNR http://www.dnr.wa.gov/nhp/index.html, accessed October 1, 2002)

Bogs - Bogs are Category I wetlands because they are sensitive to disturbance and impossible to re-create through compensatory mitigation.

Bogs are low nutrient, acidic wetlands that have organic soils. The chemistry of bogs is such that changes to the water regime or water quality of the wetland can easily alter its ecosystem. The plants and animals that grow in bogs are specifically adapted to such conditions and do not tolerate changes well. Immediate changes in the composition of the plant community often occur after the water regime changes. Minor changes in the water regime or nutrient levels in these systems can have major adverse impacts on the plant and animal communities (e.g. Grigal and Brooks, 1997).

In addition to being sensitive to disturbance, bogs are not easy to re-create through compensatory mitigation. Researchers in Northern Europe and Canada have found that restoring bogs is difficult, specifically in regard to plant communities (Grosvermier et al. 1995, Schouwenaars 1995, Schrautzer et al. 1996), water regime (Grootjans and van Diggelen 1995, Schouwenaars 1995) and/or water chemistry (Wind-Mulder and Vitt 2000). In fact, restoration may be impossible because of changes to the biotic and abiotic properties preclude the re-establishment of bogs (Shouwenaars 1995, Schrautzer et al. 1996). Furthermore, bogs form extremely slowly, with organic soils forming at a rate of about one inch per 50 years in eastern Washington (Rigg 1958).

Nutrient poor wetlands, such as bogs, have a higher species richness, many more rare species, and a greater range of plant communities than nutrient rich wetlands (review in Adamus and Brandt 1990). They are, therefore, more important than would be accounted for using a simple assessment of wetland functions (Moore et al. 1989).

Mature and Old-growth Forested Wetlands with Slow Growing Trees – Mature and old-growth forested wetlands over ¼ acre in size dominated by slow growing native trees are "rated" as Category I because these wetlands cannot be easily replaced through compensatory mitigation. A mature forest of slow growing trees may require a century or more to develop, and the full range of functions performed by these wetlands may take even longer (see review in Sheldon et al. 2004, in press).

These forested wetlands are also important because they represent a second "priority habitat" as defined by the state department of Fish and Wildlife. "*Priority habitats* are those habitat types or elements with unique or significant value to a diverse assemblage of species." (Washington State Department of Fish and Wildlife (WDFW), http://wdfw.wa.gov/hab/phshabs.htm, accessed October 15, 2002). NOTE: All wetlands are categorized as a priority habitat by the WDFW. Forested wetlands, therefore, represent two priority habitats that coincide.

Wetland species considered to be "slow-growing" and native in eastern Washington are western red cedar (*Thuja plicata*), Alaska yellow cedar (*Chamaecyparis nootkatensis*), pine spp. mostly "white" pine (*Pinus monticola*), western hemlock (*Tsuga heterophylla*), Oregon white oak (*Quercus garryana*) and Englemann spruce (*Picea engelmannii*).

Forests with stands of Aspen – Aspen stands in a forested area are "rated" as Category I because their contribution as habitat far exceeds the small acreage of these stands and relatively small number of stems (Hadfield and Magelssen 2004). Furthermore a mature stand of aspen and its underground root system may be difficult to reproduce. Regeneration of aspen stands by sexually produced seeds is an unusual phenomenon (Romme et al. 1997).

Aspen stands are also important because they represent a second "priority habitat" as defined by the state department of Fish and Wildlife. "*Priority habitats* are those habitat types or elements with unique or significant value to a diverse assemblage of species." (Washington State Department of Fish and Wildlife (WDFW), http://www.wa.gov/wdfw/hab/phslist.htm, accessed October 15, 2002). NOTE: All wetlands are categorized as a priority habitat by the WDFW. Wetlands with aspen stands, therefore, represent two priority habitats that coincide.

Wetlands That Perform Many Functions Very Well - Wetlands scoring 70 points or more (out of 100) on the questions related to functions are Category I wetlands.

Not all wetlands function equally well, especially across the suite of functions performed. The field questionnaire was developed to provide a method by which wetlands can be categorized based on their relative performance of different functions. Wetlands scoring 70 points or more were judged to have the highest levels of function. Wetlands that provide high levels of all three types of functions (water quality improvement, hydrologic functions, and habitat) are also relatively rare. Of the 90 wetlands used to calibrate the rating system in eastern Washington, only 12 (13%) scored 70 points or higher. NOTE: There were 13 Category I wetlands overall in the 90 used to calibrate the method: 12 were categorized based on function and 1 because it was an alkali wetland.

The questionnaire on wetland functions is based on the six-year effort to develop detailed methods for assessing wetland functions both in eastern and western Washington. These methods currently represent the "best available science" in rapid assessments of wetland functions.

3.2 CATEGORY II

Category II wetlands are difficult, though not impossible, to replace, and provide high levels of some functions. These wetlands occur more commonly than Category I wetlands, but still need a relatively high level of protection. Category II wetlands in eastern Washington include:

Forested Wetlands in the Floodplains of Rivers

Forested wetlands are an important resource in the floodplains of rivers, especially in the areas through which the river may flow regularly (often called the channel migration zone). These wetlands are rated Category II, at a minimum, because the questionnaire on functions does not adequately capture their unique role in the ecosystem. Trees in the floodplains are critical to the proper functioning and the dynamic natural processes of rivers. Please note, however, that many forested wetlands in floodplains that have structurally complex habitats may actually be a Category I based on the functions.

Trees in floodplains "are a primary factor influencing channel form, creating the pools, riffles and side channels that are essential habitat for many fish and other aquatic species. Erosion is buffered by tree roots and large organic debris introduced into channels through erosion and windfall. Large woody debris forms stable associations when trapped within side channels, and functions to minimize bank erosion, dissipate channel energy, meter flow down the side channels, create localized rearing and flood refuge areas, and contribute to the stabilization of the main river channel." (Gorsline, J. http://www.brinnoninfo.com/channelmigration.htm, accessed October 15, 2002).

Mature and Old-growth Forested Wetlands with Fast Growing Trees

Mature and old-growth forested wetlands with over ¼ acre of forest dominated by fast growing native trees are "rated" as Category II because they are hard to replace within the time-frame of most regulatory activities. The time needed to replace them is shorter than for forests with slow growing trees, but still significant. These forested wetlands are also important because they represent a second "priority habitat" as defined by the Washington state Department of Fish and Wildlife. NOTE: All wetlands are categorized as a priority habitat by the WDFW. Forested wetlands, therefore, represent two priority habitats that coincide.

Native fast-growing wetland trees include:

- Alders – Red (*Alnus rubra*), Thin-leaf (*A. tenuifolia*);
- Cottonwoods – Narrow-leaf (*Populus angustifolia*), Black (*P. balsamifera*);
- Willows- Peach-leaf (*Salix amygdaloides*), Sitka (*S. sitchensis*), Pacific (*S. lasiandra*); and Aspen - (*Populus tremuloides*)
- Water Birch (*Betula occidentalis*)

Vernal Pools – Vernal pools, or “rainpools,” located in a landscape with other wetlands and that are relatively undisturbed during the early spring are rated Category II because the questionnaire on functions does not adequately capture their unique role in the ecosystem.

Vernal pool ecosystems are formed when small depressions in the scabrock or in shallow soils fill with snowmelt or spring rains. They retain water until the late spring when reduced precipitation and increased evapotranspiration lead to a complete drying out. The wetlands hold water long enough throughout the year to allow some strictly aquatic organisms to flourish, but not long enough for the development of a typical wetland environment (Zedler 1987).

The Washington Natural Heritage Program (WNHP) has recognized the vernal pool ecosystem as an important component of Washington's Natural Area System. Vernal pools in the scablands are the first to melt in the early spring. This open water provides areas where migrating waterfowl can find food while other, larger, bodies of water are still frozen. Furthermore, the open water provides areas for pair bonding in the waterfowl (R. Friesz, WDFW, personal communication). Thus, vernal pools in a landscape with other wetlands provide an important habitat function for waterfowl that requires a relatively high level of protection. This is the reason why relatively undisturbed vernal pools in a mosaic of other wetlands are Category II, and isolated undisturbed vernal pools are Category III.

Wetlands That Perform Functions Well - Wetlands scoring between 51-69 points (out of 100) on the questions related to the functions present are Category II wetlands. Wetlands scoring 51-69 points were judged to have relatively high levels of function for most functions, or performed one group of functions very well and the other two moderately well.

3.3 CATEGORY III

Category III wetlands are 1) vernal pools that are isolated, and 2) wetlands with a moderate level of functions (scores between 30 -50 points). Wetlands scoring between 30 -50 points generally have been disturbed in some ways, and are often smaller, less diverse and/or more isolated from other natural resources in the landscape than Category II wetlands.

3.4 CATEGORY IV

Category IV wetlands have the lowest levels of functions (scores less than 30 points) and are often heavily disturbed. These are wetlands that we should be able to replace, and in some cases be able to improve. However, experience has shown that replacement cannot be guaranteed in any specific case. These wetlands may provide some important functions, and also need to be protected.

4. OVERVIEW FOR USERS

4.1 WHEN TO USE THE WETLANDS RATING SYSTEM

The rating system is designed as a rapid screening tool to categorize wetlands for use by agencies and local governments in protecting and managing wetlands. It should be used only on vegetated wetlands as defined using the delineation procedures in WAC 173-22-80. The rating system does not try to establish the economic values present in a wetland; it only helps to identify its sensitivity, rarity, and functions.

Two versions of the rating system have been developed, one for eastern Washington and one for western. This broad division of the state into east and west may not reflect all regional differences in the importance of wetlands Developing special measures to protect locally unique wetlands is recommended where local governments need to provide a level of protection that would not be otherwise provided by the rating system.

4.2 HOW THE WETLAND RATING SYSTEM WORKS

The first edition of the rating system had two forms that needed to be filled out, the "office" form and the "field" form. This revision only has one form, the "rating" form. The information that was incorporated in the "office" form is now included on the first page of the rating form.

The Wetlands Rating Form attached at the end of this document asks the user to collect information about the wetland in a step-by-step process. We recommend careful reading of the guidance before filling out the form. The wetland rating can be based on different criteria, so it is important to fill out the entire rating form. Since a wetland may rate a different category for each criterion, it is the "highest" that applies to the wetland. "Highest" here is defined as the most protective.

4.3 GENERAL GUIDANCE FOR THE WETLAND RATING FORM

<u>Land-owner's Permission</u>

It is important to obtain permission from the land owner(s) before going on their property.

<u>Time Involved</u>

The time necessary to rate wetlands will vary from as little as fifteen minutes to several hours. Larger sites with dense brush may involve strenuous effort. Several of the rating questions are best answered by using aerial photographs, topographic maps, other documents, or a combination of these resources with field observations.

Experience and Qualifications Needed

It is important that the person completing the rating have experience and/or education in the identification of natural wetland features, indicators of wetland function, vegetation classes, and some ability to distinguish between different plant species. We recommend that qualified wetland consultants or wetland experts be used to rate most sites, particularly the larger and more complex ones.

Comment [3]: We also highly recommend that anyone using the rating system take the two day training provided by the Department of Ecology. Data from those using the rating system indicates that users make fewer errors when trained. The variability in scores among those trained is about 10% (+ or – 5 points). The average error among those not trained is + or – 15 points.

Identifying the Boundaries of Wetlands for Rating

First, determine the location and approximate boundaries of the wetland during the site visit. A surveyed delineation of the wetland, however, is not necessary to complete data collection, unless this information is required for another part of your project. It is often useful to have a map or aerial photograph on which the approximate boundaries of the wetland can be drawn. This boundary, however, will need to be verified in the field. A determination of the boundary that is not verified by a field survey may result in a different rating. This is especially true in forested wetlands where the boundaries are difficult to determine from aerial photographs.

Comment [4]: It is highly recommended that you submit aerial photos or drawings of the site. The updated field form identifies the information that should be included on aerial photos or maps and submitted with the form.

The entire wetland within the delineated boundary is to be rated. Small areas within a wetland (such as the footprint of an impact) cannot be rated separately. The rating method is not sensitive enough, or complex enough, to allow division of a wetland into sub-units based on level of disturbance, property lines, or vegetation patterns. Furthermore, users of the rating system are not asked to subdivide a wetland into different wetland classes (hydrogeomorphic (HGM) classes, see p. 21) as is done in the function assessment methods. A wetland with several wetland classes within its boundary is treated as one class for the purpose of rating. The second page of the rating form provides guidance on how to classify for wetlands having several HGM classes within its boundary.

Comment [5]: If you do not have access to the entire site you should do the best you can to answer the questions from aerial photos, using binoculars, or any other additional information. DO NOT RATE ONLY THE PART TO WHICH YOU HAVE ACCESS. Note your lack of access on the data form and note which question are based on interpretation of secondary data.

Identifying Boundaries of Large Contiguous Wetlands in Valleys

Wetlands can often form large contiguous areas that extend over hundreds of acres. This is especially true in river valleys where there may be some surface water connection between all areas of the floodplain or along the shores of a lake. In these situations the initial task is to identify the wetland “unit” that will be rated. For the purposes of the rating system, a large contiguous area of wetland can be divided into smaller units using the criteria described below.

The guiding principle for separating a vegetated wetland into different units for the purpose of rating is changes in the water regime of the wetland. Boundaries between different units should be set at the point where the volume, flow, or velocity of the water changes rapidly, whether created by natural or human-made features. The following sections describe some common situations that might occur. The criteria for separating wetlands into different units for rating are based on the observations made during the field work undertaken to calibrate both the rating system and the methods for assessing wetland functions. They reflect the collective judgment of the teams of wetland experts that developed and calibrated the methods.

Examples of Changes in Water Regime
• *Berms, dikes, cascades, rapids, falls, culverts, and other features that change flow, volume, or velocity of water over short distances.*   • *The presence of drainage ditches that significantly reduce water detention in one area of a wetland.*

Wetlands in a Series of Depressions in a Valley

Wetlands in depressions along stream or river corridors may contain constrictions where the wetland narrows between two or more depressions. The key consideration is the direction of flow through the constriction. If the water moves back and forth freely it is not a separate unit. If the flow is unidirectional, down-gradient, with an elevation change from one part to the other, then a separate unit should be created. The justification for separating wetlands increases as the flow between two areas becomes more unidirectional and has a higher velocity. Constrictions can be natural or man-made (e.g. culverts). (Figure 1)

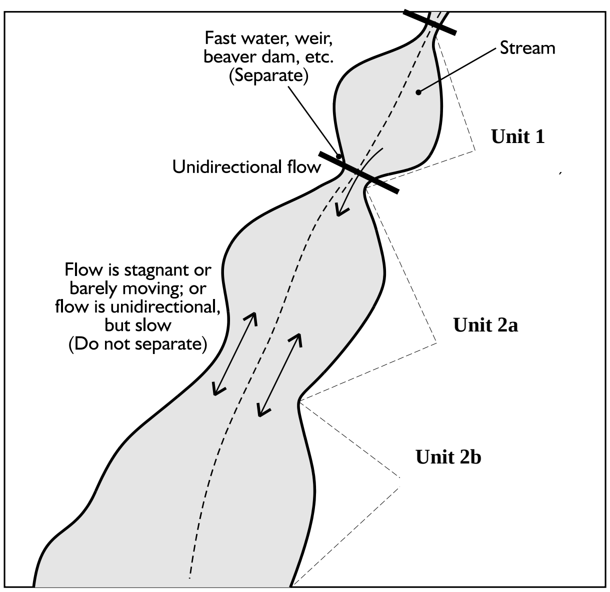
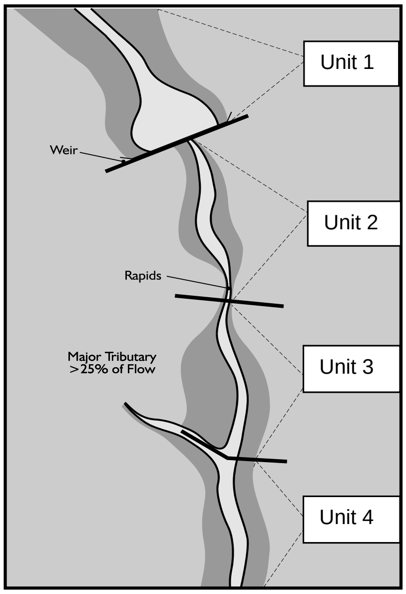


Figure 1. Determining wetland units for rating along a stream corridor with constrictions. Units 2a and 2b should be rated as one larger unit.

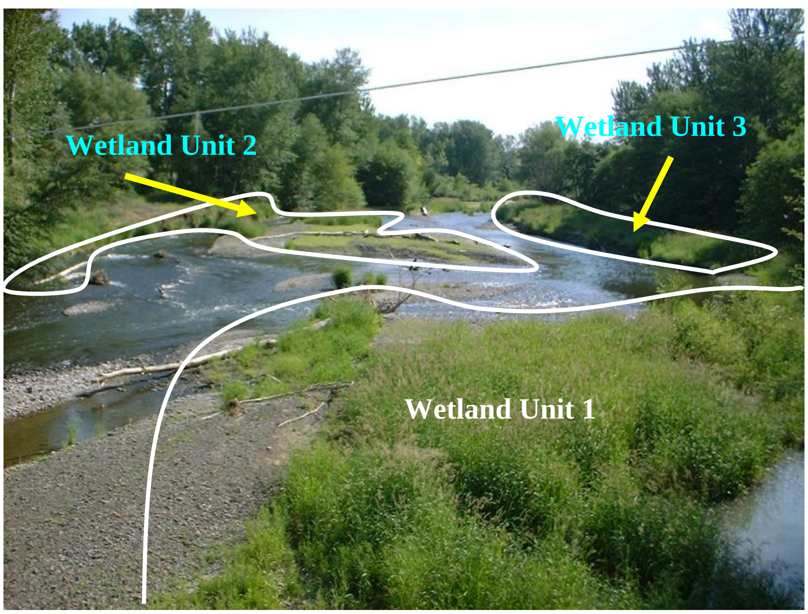
Wetlands Associated with Streams or Rivers



In eastern Washington, linear wetlands contiguous with a stream or river may be broken into units at the point where the wetland vegetation 1) disappears and is replaced with unvegetated bars, 2) becomes narrow for at least 100 (40 m) feet along the stream corridor, or 3) where the water regime changes. A narrow band of vegetation is defined as one that is less than 5 feet in width. Figures 2 and 3 present diagrams of how riverine wetlands might be separated into different units based on changes in water regime and width of vegetation.

Figure 2: Determining wetland units in a riverine system based on changes in water regime.

Figure 3: Determining wetland units in a riverine setting based on breaks in vegetation.



In cases when a wetland contains a stream or river, you must also decide if the stream or river is a part of the wetland. Use the following guidelines to make your decision:

Wetland on one side only — If the wetland area is contiguous to, but only on one side of, a river or stream, *don't* include the river as a characteristic of the wetland for rating.

Wetland on both sides of a wide stream or river — If there is a contiguous vegetated wetland on both sides of a river where the unvegetated channel is greater than 17 ft. (5m), consider **each side as a separate unit**. (see Figure 3 above). **Do not** include the river as a characteristic of the wetland unit for rating.

Wetland on both sides of a narrow river or stream — If the river or stream has an unvegetated channel less than 17 feet (5 m) wide, and there is a contiguous vegetated wetland on both sides, **treat both sides together** as one unit and **include** the river or stream as a characteristic of the wetland.

Identifying Wetlands in a Patchwork on the Landscape (Mosaic)

If the wetland being categorized is in a mosaic of wetlands, the entire mosaic **should be considered one unit** when:

- Each patch of wetland is less than 1 acre (0.4 hectares), and
- Each patch is less than 100 ft (30 m) apart, on the average, and
- The areas delineated as vegetated wetlands are more than 50% of the total area of both wetlands and uplands, or wetlands, open water, and river bars.

If these criteria are not met, each area should be considered as an individual unit (see Figure 4).

> NOTE: One of the most common "patchwork" landscapes in eastern Washington is one formed by riparian wetlands in the floodplains of rivers and streams. In this landscape, vegetated wetlands, as defined by the delineation manual, are interspersed with "uplands" of cottonwood or willow. In this case use the criteria above. Treat the entire area as a wetland if the areas that meet the criteria for wetlands are greater than 50% of the total area. In this landscape the cottonwoods growing outside the wetland patches should be included as features of the wetland. Such wetlands should be treated as riparian forested wetlands for the purpose of rating them (see p. 86).

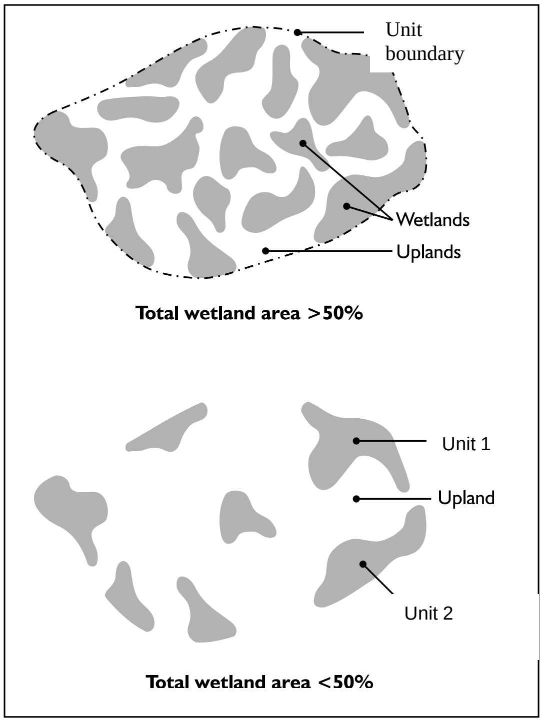


Figure 4: Determining unit boundaries when wetlands are in small patches.

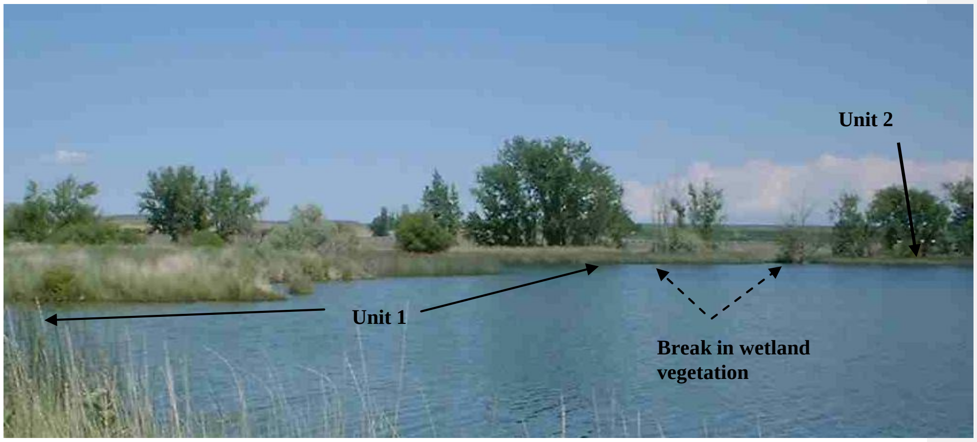
Identifying Boundaries Along the Shores of Lakes or Reservoirs (Lake-fringe wetlands)

Lakes or reservoirs will often have a fringe of wetland vegetation along their shores. Different areas of this vegetated fringe can be categorized separately if there are gaps where the wetland vegetation disappears or where the band of vegetation is very narrow. Use the following criteria for separating different units along a lakeshore.

NOTE: If the open water is less than 20 acres, the entire area (open water and any other vegetated areas) is considered as one wetland unit, and it is a depressional or riverine wetland.

1. Only the vegetated areas along the lake shore are considered part of the wetland unit for the rating system. Open water between areas of vegetation is considered to be part of the lake.
2. If only some parts of the circumference of a lake are vegetated, separate the vegetated parts into different units at the points where the wetland vegetation thins out to less than a foot in width for at least 33ft (10m). (Figure 5)

Figure 5: Break in wetland vegetation along the shore of a lake that separates the wetlands into two units for rating.



Wetlands Bisected by Human-Made Features

When a wetland is divided by a human-made feature, for example a road embankment, the wetland should not be divided into different units if there is a level surface-water connection between the two parts of the wetland. Water should be able flow equally well between the two areas. For example, if there is a wetland on either side or a road with a culvert connecting the two, and both sides of the culvert are partially or completely underwater, the wetland should be rated as one. Make the down gradient wetland a separate unit, however, if the bottom of the culvert is above the high water marks in the receiving wetland, or the high-water marks on either side differ by more than 6 inches in elevation.

Cases when a Wetland Should Not be Divided

Differences in land uses within a wetland should not be used to define units, unless they coincide with the circumstances described above. For example, if half a wetland has been recently cleared for farming and the other half left intact, the entire area functions as, and should be categorized as, one unit.

Comment [6]: Many functions that a wetland unit performs are independent of the land use in the wetland. For example, a depressional wetland has the same amount of storage whether the surface if a shrub community or a pasture. Furthermore, the rating system is not robust enough to capture slight differences in habitat functions within different portions of the same wetland unit. Attempts were made during the calibration to rate different portions of a wetland unit based on differences in land use, but the results did not provide an accurate representation of the system. This compromise is necessary in order to make the tool "rapid" and easy to use.

Large Wetlands where only part of the Wetland is Forested or a Bog

Large wetlands may be rated as Category I because they contain a smaller area of bogs or slow-growing forest. If the entire wetland (including the bog and forested areas) scores between 30 and 69 points for its functions (scores for a Cat II or Cat III wetland), it may be possible to assign a dual rating to the wetland (e.g. Category I/II). Table 1 identifies the cases when dual ratings are possible.

Table 1: Situations where dual ratings may be possible.

Rating Based on Special Characteristics	Score for Functions >= 70	Score for Functions 51-69	Score for Functions 30-50
Cat. I bog	Not possible – Cat. I	I/II	I/III
Cat. I forest	Not possible – Cat. I	I/II	I/III
Cat II forest	Not possible – Cat. I	Not possible – Cat. II	II/III

To develop a dual rating you will need to establish a boundary within the wetland that clearly establishes the area that is the Category I bog or forest or the Category II forest. If you are unable to clearly map the boundaries between the forest or bog and the rest of the wetland it may be impossible to assign a dual rating.

Dual ratings are acceptable only in the case a wetland contains a smaller area of bog or forest. **Wetlands that are a Category I Natural Heritage sites, Category I alkali wetlands, or Category II vernal pools cannot be split.**

The criteria to be used in establishing the boundary between the Category I part of a wetland and the part that is either Category II or III are as follows:

1. For wetland areas that are Category I as a result of the presence of a forest, the boundary between categories should be set at the edge of the forest.
2. For wetland areas that are Category I because they are bogs, the boundary between categories should be set where the characteristic bog vegetation changes (i.e. most of the plants that are specifically adapted to bogs are replaced with the more common wetland species) and/or where the organic soils become shallow (less than 16 inches).

Very Small Wetlands

Users of the rating system often question the effectiveness of the method at rating wetlands that are ¼ acre or less. One tree or shrub may be all that is needed in a small wetland to score points on the data sheet for certain questions. The data collected during the calibration of the method, however, indicate that wetlands smaller than a quarter acre can be rated accurately. The smallest wetlands rated during the calibration were about 1/10 acre in size (see Figure 7 for a example of a small wetland that is about 1/10 acre in size), and all were judged by the field teams to be adequately characterized using the method. Vernal pools were found that were even smaller than this, on the order of 100-200 square feet. These however, were not rated based on their functions using questions about the structure of the wetland.

At present, the accuracy of the ratings has not been tested for wetlands smaller than 1/10 acre, but it may be applicable to even smaller wetlands because the rating of most functions is not dependent on the size or number of characteristics in the wetland. The scoring for the "water quality" functions is independent of size because the functions are rated on the "potential" per unit area. For example the ability of a square yard of organic soil in a wetland to remove nitrogen is not dependent of the size of the wetland. A square

Comment [7]: The expectation is that the rating system will not work well for wetlands smaller than 4000 square feet. I suggest you still rate them, but the scores and category you get are not as robust as for the larger wetlands. We did not have any wetlands smaller than 1/10 acre in our reference set, so we are unable to make a firm conclusion. My experience, however, is that the indicators of function become difficult to interpret in very small wetlands. For example, one large tree may cover 400 square feet of a 4000 square foot wetland and this would give it a "forested" class. It is not expected however that that tree will provide functions to the same level as a forested class in a larger wetland. On the other hand, wetlands that are larger than 1/10 acre are adequately characterized. This is based on the consensus of the different teams (function assessment and rating) that went out into the field.
We do not have any methods to adequately characterize functions in very small wetlands because no research has been done on their functions (with the exception of some studies about amphibians showing that wetlands as small as 200 square feet can provide good habitat).

yard of soil in a wetland of 1/10 acre can be just as effective as a square yard in a large wetland if it undergoes seasonal ponding.

The same is true for the hydrologic functions. A small wetland that stores 3 ft of water during a flooding event is more effective, on a per acre basis, than a large wetland that stores only 1ft. The larger wetland may store a larger volume overall, but it is the volume per unit area that needs to be characterized. Impacts to wetlands are usually calculated by area. For example, an impact to 1/10 acre of a wetland that stores 3 ft of water needs to be mitigated by replacing a similar amount of storage (i.e. 3 ft over 1/10 acre). It makes no difference if the wetland impacted is ¼ acre, 10 acres, or 100 acres in size.

Very small wetlands may not provide good habitat for some of the larger wildlife species such as otter or beaver, but they are known to provide critical habitat for many smaller species. For example, amphibians were found using and breeding in wetlands as small as 270 ft^2 in the Palouse region of northern Idaho (Monello and Wright 1999). Vernal pools as small as 200 ft^2 are used by migrating waterfowl in the Columbia Basin (R. Friesz, personal communication, also droppings of waterfowl were observed around the edges of the vernal pools shown in Figures 38 and 39).

Thus, very small wetlands may be less important for large wildlife but more important for smaller wildlife. Since the methods were judged to be accurate for wetlands as small as a 1/10 of an acre, the review team and the department of Ecology staff decided not to develop a separate rating system for very small wetlands less than 1/10 acre in size.

5. DETAILED GUIDANCE FOR THE RATING FORM

This chapter provides detailed guidance for answering the questions on the wetland rating form. The questions are listed in the order they appear on the form. Results from each section should be summarized in the spaces provided on the first page of the form.

5.1 WETLANDS NEEDING SPECIAL PROTECTION

Some wetlands may have characteristics, conditions, or values that are protected by laws or regulations in addition to the Critical Areas Ordinance or the State and Federal Clean Water Acts. Questions A1-A4 will help you identify whether the wetland being rated also needs to be protected based on laws that are outside the scope of this rating system.

Questions A1 - 4. Check List for Wetlands That Need Special Protection, and That Are Not Included in the Rating

A1. *Has the wetland been documented as a habitat for any federally listed Threatened or Endangered plant or animal species (T/E species)?*

For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database. Contact the U.S Fish and Wildlife Service or the State Department of Fish and Wildlife.

A2. *Has the wetland been documented as habitat for any State listed Threatened or Endangered plant or animal species?*

For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Contact the Washington State Department of Fish and Wildlife or the Natural Heritage Program at the Department of Natural Resources for this information.

A3. *Does the wetland contain individuals of Priority species listed by the WDFW for the state?*

Comment [8]: Any observation of a priority species should be noted. This, however, has no impact on the rating. It is only to make the user/reviewer aware of the fact that the wetland may need additional protection based on what the laws or regulations say is needed to protect that species.

There are 40 vertebrate species, 28 invertebrate species, and 14 species groups currently on the PHS List. These constitute about 16% of Washington's approximately 1000 vertebrate species and a fraction of the state's invertebrate fauna. The current list of priority species can be found on the state Fish and Wildlife Department web page. http://wdfw.wa.gov/hab/phspage.htm

A4. *Does the wetland have a local significance in addition to its functions?*

Local jurisdictions may have classified the wetland using criteria specific to the jurisdiction. For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.

5.2 CLASSIFYING THE WETLAND

Scientists have come to understand that wetlands can perform functions in different ways. The way wetlands function depends to a large degree on hydrologic and geomorphic conditions (Brinson 1993). Because of these differences among wetlands, a new way to group, or classify, them has been developed. This new classification system, called the Hydrogeomorphic (HGM) Classification, groups wetlands into categories based on the geomorphic and hydrologic characteristics that control many functions. This revision to the rating system incorporates the new system as part of the questionnaire for characterizing a wetland's functions.

The rating system uses only the highest grouping in the classification (i.e. wetland class). Wetland classes are based on geomorphic setting such as riverine or depressional. The more detailed methods for assessing wetland functions developed for eastern and western Washington (Hruby et al. 1999, Hruby et al. 2000) refine this classification and subdivide some of the classes further. The categorization of functions developed for this rating system, however, does not require this level of detail.

A classification key is provided with the rating form to help you identify whether the wetland is riverine, depressional, slope, or lake-fringe. The "tidal" and "flats" classes are not needed in eastern Washington because these types of wetlands have not been found in this region. The key contains five questions that need to be answered sequentially starting with the first. The following section describes the criteria for identifying classes in more detail than found on the key.

Question 1: Lake-fringe (Lacustrine-fringe) Wetlands

Lake-fringe wetlands are separated from other wetlands based on the area and depth of open water present. If the area of open water next to a vegetated wetland is larger than 20 acres (8 hectares), and more than 10 feet deep (3m) over 30% of the open water areas, the wetland is considered to be "lake-fringe." These criteria were developed as part of the project to assess wetland functions in eastern Washington (Hruby et al. 2000), and differ slightly from the criteria of lacustrine wetlands in the Cowardin classification (Cowardin et al. 1979) and the criteria for lake-fringe wetlands in western Washington.

Comment [9]: The criterion here is 20 acres of open water (without vegetation). The Shoreline Management Act requires 20 acres of standing water within ordinary high water mark. Thus a 20 acre shallow pond that is completely vegetated would be a lake under the Act but not a lake for the rating system. Shallow ponds should be rated as a depressional wetland regardless of their size.

Comment [10]: The definition of lakes is based on limnological characteristics and not the criteria used in Cowardin or the Shoreline Management Act. Lakes have different environmental processes than small ponds (e.g. stratification, spring turnover, etc.). In general these processes occur in easternWashington only in systems that have at least 6 acres of open water that is deeper than 3 meters

Wetlands found along the shores of large reservoirs such as those found behind the dams along the major rivers (e.g. Columbia, see figure 5) are considered to be lake-fringe. Although the area was once a river valley, the wetlands along the shores of the reservoirs function more like "lake" wetlands rather than "river" wetlands. The technical team revising the rating system decided to include wetlands along the shores of reservoirs as lake-fringe if they meet the thresholds for open water and depth.

Question 2: Slope Wetlands

Slope wetlands occur on hill or valley slopes where groundwater "daylights" and begins running along the surface, or immediately below the soil surface. Water in these wetlands flows only in one direction (down the slope) and the gradient is steep enough that the water is not impounded. The "downhill" side of the wetland is always the point of lowest elevation in the wetland. Figure 6 shows a slope wetland along the Columbia River where groundwater seeps to the surface at a point where the slope of the hillside changes.

Figure 6: Slope wetland along the Columbia River identified by the presence of wetland plants (*Carex sp*. *Juncus sp*.) Wetland occurs where there is a major break in this slope of the hillside.

Some slope wetlands can only be identified by their vegetation. For example, in the Palouse region, you may find a small swale that collects groundwater percolating through the loess (windblown) soils. The only indication that a wetland is present is the stand of cattails growing in the swale (Figure 7). Such swales are not considered to be "riverine" wetlands because there are no indications of a channel with defined banks nor indications of "overbank" flooding.

Figure 7: Slope wetland in Pullman identified by cattails in a swale.

Slope wetlands are distinguished from riverine wetlands by the lack of a defined stream bed with banks that can overflow during floods or high water. Slope wetlands may develop small rivulets along the surface, but they serve only to convey water away from the slope wetland.

Question 3: Riverine Wetlands

Riverine wetlands are those found in a valley or stream channel where they can be inundated by overbank flooding from the river or stream. They lie in the active floodplain of a river, and have important links to the water dynamics of the river or stream. The distinguishing characteristic of riverine wetlands in Washington is that they are frequently flooded by overbank flow from the stream or river. The flood waters are a major environmental factor that structures the ecosystem in these wetlands and control its functions.

Comment [11]: Wetlands behind dikes are usually disconnected from the active floodplain and no longer are regularly flooded. In this case they should be classified as depressional.

Comment [12]: Note, however, that the definition of frequently flooded is different between eastern and western Washington. See below for the definition for easternWashington.

In eastern Washington the technical committee reviewing the rating system decided that the frequency of overbank flooding needed to call a wetland "riverine" is at least once in 10 years (10 yr. "return" frequency). This is in contrast to western Washington where a wetland has to be flooded at least once every two years to be considered "riverine." The decision to reduce the flooding frequency for riverine wetlands is based on the observations that the region is often subject to periods of drought that may last several years. In periods of drought, wetlands that are an integral part of the river system may not get flooded. Even during periods of drought, however, they still function as an integral part of the river system because they are connected to the underground flows in the valley (hyporheic flows).

Most riverine wetlands in eastern Washington are relatively easy to identify because they lie directly within the channel as vegetated bars (Figure 8), vegetated channels (Figure 9), or are old oxbows within the floodplain (Figure 10). The riverine wetlands in the northeastern part of the state (Ferry, Stevens, Pend Oreille Counties) may be harder to identify because the broad valleys there were formed by glaciers rather than the existing rivers. The valley around Colville for example, is, or used to be, all wetland. These wetlands, however, are mostly slope wetlands rather than riverine. The floodplain of the Colville River is a narrow band within the much larger valley created by the glaciers.

Comment [13]: Wetlands that are created in a river system by some type of obstruction, such as a beaver dam, weir, or debris dam that impound water are considered to be depressional rather than riverine. The major hydrologic factor that maintains and provides the structures in these systems is the ongoing flow that is impounded. The overbank flooding is not as important a factor. A system, however, in which a dam or weir causes a short duration impoundment during a storm would be considered riverine.

Figure 8: Vegetated river bars on the Touchet River that are classified as Riverine wetlands.

Impoundment created by a beaver dam has increased the amount of open water in this wetland.

Figure 9: Riverine wetland in the Palouse where the entire channel is vegetated between the banks and a wetland. This channel has only seasonal flow. It is dry by late summer.

Figure 10: Oxbow wetland on the Colville River that is classified as Riverine.

Question 4: Depressional Wetlands

Depressional wetlands occur in depressions where elevations within the wetland are lower than in the surrounding landscape. The shapes of depressional wetlands vary, but in all cases, the movement of surface water and shallow subsurface water is toward the lowest point in the depression. The depression may have an outlet, but the lowest point in the wetland is somewhere within the boundary, not at the outlet.

Depressional wetlands can sometimes be hard to identify because the depression in which they are found are not very evident. By working through the key it may not be necessary to look at topographic maps, or try to identify that the lowest point of the wetland is in the middle. If a wetland has surface ponding, even if only for a short time, and is not lake-fringe or riverine it can be classified as depressional. Vernal pools shown in Figures 38 and 39, and the Alkali wetlands shown in Figures 40 and 41 are all depressional wetlands.

A depressional wetland can be hypothesized to exist where there is no surface ponding such as a bog without any open water. Such a wetland may be difficult to differentiate from a slope wetland, but is probably rare in eastern Washington. All of the depressional wetlands seen as part of the function assessment project and the revisions to the rating system have had some surface water ponding during part of the year.

Question 5: Wetland Is Hard to Classify

Sometimes it is hard to determine if the wetland meets the criteria for a specific wetland class. You may find characteristics of several different hydrogeomorphic classes within one wetland boundary. For example, seeps at the base of a slope often grade into a riverine wetland, or a small stream within a depressional wetland has a zone of flooding along its sides that would be classified as riverine.

If you have a wetland with the characteristics of several HGM classes present within its boundaries use the Table 2 to identify the appropriate class to use for rating. Use this table only if the area encompassed by the "recommended" class is at least 10% of the total area of wetland being rated. For example, if a slope wetland grades into a riverine wetland and the area of the riverine wetland is ¼ of the total use the questions for riverine wetlands. However, if the area that would be classified as riverine is less than 10% (e.g. 0.5 acres out of a total wetland area of 10 acres) use the questions for the slope wetlands.

Comment [14]: The same applies for other combinations of classes. A unit in which the depressional area is only 5% of the entire unit that is otherwise a slope wetland should be rated as a slope wetland. If, however, the area classified as depressional is 15% of the area of the unit it should be rated as depressional.

Table 2: Classification of wetlands with multiple hydrogeomorphic classes for the purpose of rating.

HGM Classes Within One Delineated Wetland Boundary	Class to Use in Rating if area of this class > 10% total
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine	Depressional
Depressional + Lake-fringe	Depressional

If you are still unable to determine which of the above criteria apply to your wetland, or you have more than two HGM classes within a wetland boundary, classify the wetland as depressional for the rating. Complicated wetlands that have been found in eastern Washington during the calibration of the method have always had some features of depressional wetlands, and thus, could be classified as depressional.

5.3 CATEGORIZATION BASED ON FUNCTIONS

The functions that a wetland performs are characterized by answering a series of questions that note the presence, or absence, of certain indicators. Indicators are easily observed characteristics that are correlated with quantitative or qualitative observations of a function (Hruby et al. 2000). Most indicators are fixed characteristics that describe the structure of the ecosystem or its physical, chemical, and geologic properties (Brinson 1995). Indicators, unfortunately, cannot reflect actual rates at which functions are performed. Rather, they reflect the capacity and opportunity that a wetland has to perform functions (for a detailed discussion of the relationship between indicators and functions see Hruby 1999, Hruby et al. 2000).

The questions about the indicators of functions are grouped by the hydrogeomorphic class of the wetland being rated (depressional, riverine, slope and lake-fringe) and then by the three major groups of functions wetlands perform (improving water quality, hydrologic functions, and wildlife habitat). The more detailed methods for assessing wetland functions in the Columbia Basin (Hruby et al. 2000) are divided into 15 different functions that fall into these three groups. The level of detail regarding functions found in the assessment methods, however, is not needed for the simpler categorization done in this rating system.

"Baseflow Support" as a Function of Wetlands

There was some discussion during the revision of the rating system whether wetlands in eastern Washington provide water to streams during the summer and fall (called baseflow support), and whether this function should be rated along with the other hydrologic functions.

Initially the consensus of the teams developing the methods for assessing functions in Washington (Hruby et al. 1999, Hruby et al. 2000) was that "baseflow support" may be provided by some wetlands, but it was not important enough to assess. More recently, other wetland hydrologists were consulted from around the country and they supported this initial conclusion (R. Jackson and R.J. Pierce, personal communications). There were three major reasons why this function was not judged to be important:

1) Wetlands whose major source of water is groundwater are not providing the function since they do not store significant amounts of surface water to recharge the baseflows.
2) Most surface water left over from spring rains and melting will have evaporated by the late summer when baseflow is most needed. If water is present late in the summer it is usually a result of groundwater.
3) Given the high rate of evapotranspiration (ET) in eastern Washington (in excess of 36 in./yr in many areas), wetlands have to store very large amounts of water before there is a net balance of water going to groundwater. A simple water balance would suggest that a wetland has to impound more than 36 inches (deep) of surface water for there to be a net gain to groundwater in areas where the rate of ET is 36 inches. A net gain to groundwater, and therefore support to baseflow, is possible only when the amount of surface water stored in the wetland is greater than the amount lost through ET.

Much of the information about indicators used in the rating system is based on the seven methods for assessing wetland functions that have been developed in the state (Hruby et al. 1999, Hruby et al. 2000). The scores for the indicators used in this rating system were calibrated by using the information collected during the development of the methods in the Columbia Basin and during field visits outside the Columbia Basin by members of the review team. The rationale for choosing each indicator is given in a shaded box within the description of how to answer the field questions.

Comment [15]: Sometimes users may find it difficult to choose between two descriptions of an indicator and the scoring assigned to those descriptions. Users often have the urge to split the difference in the scoring (e.g. scoring for an indicator jumps from 3 to 5 between two descriptions and the urge is to score the indicator as a [4]). **However, such split scoring is not scientifically acceptable** because the relationships between descriptions are not linear.
If you have difficulty choosing between two descriptions, score the question both ways and then determine if the difference in scoring change the final rating of the unit or the amount of protection it needs. You will need to do more detailed investigations to answer the question if the difference in score impacts the final rating.

Comment [16]: The choice of variables, indicators, and the scoring was based on a consensus of wetland experts with specific knowledge in each function. The resulting function assessment methods and the rating system were then peer reviewed by other scientists.

The three groups of functions (improving water quality, hydrologic functions, and wildlife habitat) are given approximately equal importance in setting the category for a wetland. Improving water quality and the hydrologic functions each have a maximum score of 32 points and the habitat functions a maximum score of 36 points out of a total of 100 points. The decision to give approximately equal weight to each group of functions is based on the fact that the laws and regulations regarding wetlands don't specify that any function, or group of functions, should be given more, or less importance, than another in protecting the wetland.

5.3.1 Potential and Opportunity for Performing Functions

One of the issues inherent in developing a characterization of functions is that the indicators used only represent structural characteristics of a wetland and its landscape. They do not measure rates at which functions are performed nor the ecological processes that control the functions. We are unable, for example, to actually measure the rate of sediment removal because we will probably not be present at the time sediments are coming into the wetland. A measurement of actual sediment removal would require monitoring the wetland during many times of the year and during several storms.

The scoring for each group of functions is divided into two parts to address our inability of measuring rates, processes, and habitat usage. One set of questions uses the structural characteristics in a wetland as indicators of the capability of performing a function. This is called the "Potential" for performing a function. The question we are trying to answer is: does the wetland have the necessary structures and conditions present within its boundaries to provide the function? For example, when characterizing how well a wetland can improve water quality we ask if the wetland has the vegetation to trap sediments and the right soils and chemistry to remove pollutants.

The second part in characterizing the function is called the "Opportunity." These questions characterize to what degree the wetland's position in the landscape will allow it to perform a specific function. For example, for "improving water quality," we ask if there are sources of pollutants in the watershed that come into the wetland. Wetlands found in polluted watersheds have a higher opportunity to perform the function than those that have few if any pollutants in the surface or groundwater. A wetland in a pristine watershed will not remove many pollutants regardless of how capable it is of doing so because none are coming into the wetland.

Comment [17]: Opportunity can also be considered as the "value" that a wetland provides in improving water quality, reducing flooding, or providing habitat. Wetlands that do not receive any pollutants to clean up provide less "value" to society than those that do. This aspect of function is considered important because both the State and Federal Clean Water Acts consider the "beneficial uses" that wetlands provide an important factor to protect.

Example of Differences in Potential and Opportunity Among Wetlands

We have defined the function of "water quality" improvement as "removing pollutants", and wetlands that remove more pollutants are considered to be more valuable and important than those that remove fewer pollutants. This general definition can be translated directly into pounds of pollutants removed per year.

It is not, however, possible to directly measure the amount of pollutants removed in a wetland. In order to characterize the function we collect data on two different aspects of the function that we call potential and opportunity. The potential in this example is the maximum amount of pollutants a wetland can take up in a year given an unlimited amount of pollutants. The potential is based on the physical, biological, and chemical characteristics within the wetland itself. The opportunity in this example is the amount of pollutants actually entering the wetland, and is based on the characteristics of the landscape in which the wetland is found.

Consider two wetlands of equal size. The first wetland can remove a maximum of 20 lbs. of pollutants per year and the second can remove 100 lbs. per year. This is their potential. The first wetland has 100 lbs of pollutants coming into it (the opportunity) so it actually removes its maximum potential (20 lbs/year) but lets 80 lbs continue going downstream. The second wetland only has 5 lbs. of pollutants coming in. Though its potential is much higher than that of the first, it actually removes fewer pollutants (only 5 lbs/year), but it removes all pollutants coming in. The first wetland has a low potential but high opportunity and the second has a high potential with a low opportunity.

Opportunity and potential are both integral parts of wetland functions as we define them. The key concepts in both state and federal clean water acts is to "maintain beneficial uses" and "preserve (and restore) biological integrity" of our waters. In the GMA (RCW 36.70A.172) it states that cities and counties need to "protect the functions and values of critical areas." The beneficial uses, or values, of wetlands in terms of functions is removing nutrients and reducing flooding. The other value of "biological integrity" is defined in terms of the habitat functions. This means that any characterization needs to include both the "potential" and the "opportunity" aspects of the functions. For example, a wetland with good (undisturbed) connections to other wetlands or natural areas (i.e. a high opportunity) will provide better habitat than the same wetland surrounded by a residential or urban area. In the latter case the habitat is not as suitable because many animals that would use the wetland do not have access to it.

Comment [18]: Questions are often raised about proposed developments that could change a wetland's rating by creating an opportunity for water quality improvement that didn't exist before. The rating system has to be applied only to current conditions. And, yes this means that a rating may change as conditions in the surrounding landscape change.

During the permitting process conditions can be set that give reasonable assurance that existing functions will not be degraded. On the other hand, when a local jurisdiction must determine the appropriate rating and buffer for a site to be developed the wetland needs to be rated as is, according to the conditions that exist at the time of rating.

Please note however, that changes in the opportunity for water quality will generally not change the requirement for buffers based on Ecology's recommendations. The width of buffers is usually determined by the score for habitat, and future development in surrounding uplands will almost always reduce the habitat score. Thus, rating a wetland based on its current condition will probably result in wider buffers than would be recommended if the uplands are developed and existing corridors are reduced or disturbed.

The technical team reviewing the rating system for eastern Washington decided to give equal weight to the "Potential" and "Opportunity" in the scoring of the functions. Such a weighting is a value judgment because we do not have any scientific data to indicate which is more important in the overall function in eastern Washington or among wetlands of different types. Other options might have been to give unequal weights to potential and opportunity (e.g. 75% of the score is potential and 25% is opportunity). From the Department of Ecology's perspective the only fair division is to score opportunity and potential equally because we do not have information that would allow us to assign different levels of importance to these two factors of function.

The scoring on the data sheet is set up to reflect this decision. In the sections on the water quality and hydrologic functions there is one question asking whether the wetland has the opportunity to perform the function. If the wetland has the opportunity, its score for the indicators of "potential" is doubled. A more complex scaling of the score for opportunity of the water quality and hydrologic functions was considered, but had to be abandoned based on the experience gained in developing the 7 methods for assessing functions (Hruby et al. 1999, Hruby et al. 2000) and the two rating systems (east and west).

The first reason is that the teams developing the methods could not simplify the list of indicators for assessing the opportunity for most functions. For example, assessing the water quality functions in western Washington in more detail would have required more than 20 environmental indicators. Secondly, there was no consensus among the experts developing the methods in rating the opportunity of individual wetlands used for reference. For example, one reference wetland was observed to receive stormwater draining a residential area. The experts, however, could not agree if the opportunity to remove pollutants was high or moderate. Everyone agreed that it had some opportunity but there was no agreement on how much without taking extensive measurements during storms. Finally, it was difficult to obtain consistent results among users in measuring even a limited number of indicators for opportunity for the water quality and hydrologic functions.

The opportunity for a wetland to provide habitat is easier to characterize. There are four questions that reflect different types of opportunity and levels of opportunity. The scaling for these questions, however, has been set up so the total points possible are the same as the total for the structural indicators of habitat within the wetland itself (its potential).

Example of Scoring Potential and Opportunity

A wetland can score a maximum of 100 points on the questions related to functions (32 points for water quality improvement, 32 points for the hydrologic functions, and 36 points for habitat). The following table shows the results from two different wetlands. One wetland has the opportunity to perform the water quality and hydrologic functions while the other does not. Wetland B, however, has a better potential and opportunity to perform the habitat functions so the final scores are the same.

FUNCTION	Wetland A	Wetland B
Potential for Improving Water Quality	14	14
Opportunity for Improving Water Quality	Yes (score x 2)	No
TOTAL for Improving Water Quality	**28**	**14**
Potential for Decreasing Flooding and Erosion	6	12
Opportunity for Decreasing Flooding and Erosion	Yes (score x 2)	No
TOTAL for Decreasing Flooding and Erosion	**12**	**12**
Potential for Habitat	12	16
Opportunity for Habitat	8	18
TOTAL for Habitat	**20**	**34**
TOTAL score for all functions	**60**	**60**

5.3.2 Classifying Vegetation

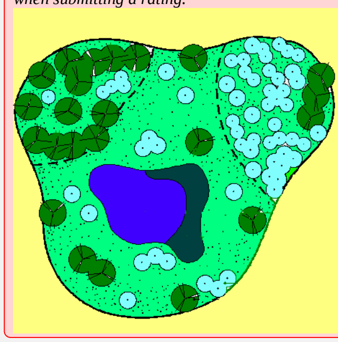
There are several questions on the data sheet that ask you to classify the vegetation found within the wetland into different types. This should not be confused with classifying the wetland itself as described earlier. The classification of vegetation used for the rating system is mostly (with some exceptions noted in the field form) based on the "Cowardin" classification, and the criteria for these categories are adapted from Cowardin (1979). "Cowardin" vegetation types are distinguished by the uppermost layer of vegetation

Comment [19]: It is important that you read the field form carefully and understand when the Cowardin classification is used to describe vegetation and when it is not. There are three different criteria used to describe vegetation – Cowardin (where cover of vegetation type is at least 30% within a polygon), total area covered (where cover is 100% within a polygon but multiple polygons are added together to get a total for the wetland); and "dense" (where cover is at least 75% within a polygon).

(forest, shrub, etc.) that provides more than 30% surface cover within the area of its distribution. If the total cover of vegetation is less than 30% the area does not have a vegetation type. It should be identified as open water or sand/mud flat.

Comment [20]: If the vegetation is deciduous and you are rating the wetland during periods when leaves have fallen, try to reconstruct what the cover would be when the plants are fully leafed out. A deciduous forest of big-leaf maple would still be considered a forest using the Cowardin classification even in winter when there are no leaves present.

Comment [21]: It is very helpful to the reviewer if you provide a drawing or map of the Cowardin vegetation classes like the one below. *NOTE: Due to the deficiencies of WORD, the classes could not be labeled on this figure, but they should be included when submitting a rating.*



A **forested area** is one where the canopy of woody vegetation over 20 ft. (6 m) tall (such as cottonwood, aspen, cedar, etc.) covers at least 30% of the ground. Trees need to be rooted in the wetland in order to be counted towards the estimates of cover (unless you are in a mosaic of small wetlands as defined on p. 15). Some small wetlands may have a canopy but the trees are not rooted within the wetland. In this case the wetland does not have a forested class.

A **shrubby area** (scrub/shrub) in a wetland is one where woody vegetation less than 20 ft. (6 m) tall is the top layer of vegetation. To count, the shrub vegetation must provide at least 30% cover and be the uppermost layer. Examples of common shrubs in eastern Washington wetlands include the native rose, young alder, young cottonwoods, and red-osier dogwood.

An area of "emergent plants" in a wetland is one covered by erect, rooted herbaceous plants excluding mosses and lichens. These plants have stalks that will support the plant vertically in the absence of surface water during the growing season. This vegetation is present for most of the growing season in most years. To count, the emergent vegetation must provide at least 30% cover of the ground and be the upper-most layer. Cattails and bulrushes are good examples of plants in the "emergent" plant type.

> Herbaceous plants are defined as seed-producing species that do not develop persistent woody tissue (stems and branches) but die back at the end of the growing season.

An area of aquatic bed plants is any area where rooted aquatic plants such as lily pads, pondweed, etc. cover more than 30% of the "pond" bottom. These plants grow principally on or below the surface of the water for most of the growing season in most years. This is in contrast to the "emergent" plants described above that have stems and leaves that extend above the water most of the time. Aquatic bed plants are found only in areas where there is seasonal or permanent ponding or inundation. *Lemna sp.* (duckweed) is not considered an aquatic bed species because it is not rooted. Aquatic bed vegetation does not always reach the surface and care must be taken to look into the water.

Sometimes it is difficult to determine if a plant found in the water is "aquatic bed" or "emergent." A simple criterion to separate emergent and aquatic bed plants most of the time is--If the stalk will support the plant vertically in the absence of water, it is emergent. If, however, the stalk is not strong enough to support the plant when water is removed, it is aquatic bed.

Examples of how different areas might be classified are given below.

- An area (polygon) of trees within the wetland boundary having a 50% cover of trees and with an understory of shrubs that have a 60% cover would be classified as a "forest." The trees are the highest layer of vegetation and meet the minimum requirement of 30% cover.

- An area with 20% cover of trees overlying a shrub layer with 60% cover would be classified as a “shrub.” The trees do not meet the requirement for minimum cover.
- An area where trees or shrubs each cover less than 30%, but together have a cover greater than 30% is classified as “shrub.”
- When trees and shrubs together cover less than 30% of an area, the zone is assigned to the dominant plant type below the shrub (e.g. emergent, aquatic bed, mosses and lichens) if these have greater than 30% cover.

Plants in the “emergent” category are further divided by their height. You are asked to identify emergent plants that are 0-12 inches (0-30cm) high, 12-40 inches (30-100cm) high, and more than 40 inches (> 1m) high. This estimate should be based on the maximum height the plant reaches during its growth period and the amount of cover provided by each height category. These categories are again distinguished on the basis of the uppermost layer of emergent plants that provides more than 30% surface cover within the area of its distribution. For example, an area with a 50% cover of bulrushes (plants > 40 inches) with an understory of sedges also covering 50% of a specific area (plants 12-40 inches high) would be mapped as having plants > 40 inches.

If you visit the wetland during the winter and early spring, many of the emergent plants will have died back and the stalks will be lying on the ground. Try to estimate how high the stalks would have been during the spring or summer.

You are asked to characterize the vegetation types in terms of how much area within the wetland is covered by a type. <u>The thresholds for scoring differ among the questions so use caution in filling out the rating form.</u>

To complete the next part of the rating form you will first need to classify the wetland into one of the four hydrogeomorphic classes. Answer only the question that pertains to the HGM class of the wetland being rated. The first letter of the question on the rating form identifies the wetland class for which the question is intended:

D = Depressional, R = Riverine, L = Lake-fringe, S = Slope.

The guidance below is divided into sections according to the HGM class of the wetland being rated. Each question on the rating form is addressed in turn.

5.3.3 Questions Starting with "D" (for Depressional Wetlands)

Water Quality and Hydrologic Functions in Depressional Wetlands

D 1.0 Does the Depressional Wetland have the Potential to Improve Water Quality?

D 1.1 *Characteristics of outflows of surface water from the wetland*: (This indicator is used in both the water quality and the hydrologic functions.)

> **Rationale for indicator:** Pollutants that are in the form of particulates (e.g. sediment, or phosphorus that is bound to sediment) will be retained in a wetland with no outlet. Wetlands with no outlet are, therefore, scored the highest for this indicator. An outlet that flows only seasonally is usually better at trapping sediments than one that is flowing all the time because there is no chance for a downstream release of particulates for most of the year (a review of the scientific literature on the "trapping" potential of wetlands is found in Adamus et. al. 1991).

As you walk around the edge of the depressional wetland note carefully if there are any indications that surface water leaves the wetland and flows further downgradient. The question is relatively easy to answer if you find a channel. Many depressional wetlands in eastern Washington, however, have outflows only during the wet season or during summer thunderstorms (seasonally or intermittently flowing). These are harder to locate and identify because they have no banks. Some indicators of seasonal outflows are as follows:

- A swale at one end of a depression that has a gradient away from the wetland and that has wetland vegetation in it (Figure 11).
- A section along the circumference of the wetland where the herbaceous vegetation is all lying in one direction and perpendicular to the circumference (last year's reed canary grass in Figure 11 is oriented in the direction of the outflow).
- A ditch that has been dug to drain the wetland

You are asked to characterize the surface outlet in one of three ways for the scoring, and these are:

- Wetland has no surface water outlet - You find no evidence that water leaves the wetland on the surface. The wetland lies in a depression in which the water never goes above the edge (Figure 12).
- Wetland has an intermittently flowing, or highly constricted, outlet. Intermittently flowing means that surface water flows out of the wetland during the "wet" season (seasonal outflow) or during heavy thunderstorms. Highly constricted outlets are those that are small or heavily incised, narrow channels anchored in steep slopes. In general, you will find marks of flooding or inundation three feet or more above the bottom of the outlet if the outlet is severely constricted. Another indicator of a severely constricted outlet is evidence of erosion of the down gradient side of the outlet.
- Wetland has a permanently flowing surface outlet - This means that the wetland is a depression along a permanently flowing stream or is the point of

Comment [22]: A depressional wetland with occasional outflow resulting from stormwater runoff from an adjacent developed area is considered to have intermittent flow.

Comment [23]: This is called three feet of live storage.

Comment [24]: This includes depressional wetland where ditches are the permanently flowing outlet and where the water level fluctuations are less than three feet.

groundwater discharge that does not dry out. Permanently flowing means that it flows most of the time. One can expect that some "permanent" flows dry up during periods of drought. In general, water should be flowing all year in 8 years out of 10 to be considered "permanent."

- NOTE: If you cannot find an outlet, or do not have access to it, in the depressional wetland, assume it is severely constricted when rating it.

Figure 11: The seasonal outflow of a depressional wetland. The swale is dry for most of the year, but is filled with reed canary grass. The arrow points in the direction of the outflow.

Last year's reed canary grass that is lying in the direction of the outflow.

Figure 12: A depressional wetland on a basalt plateau with no surface water outlet.

D 1.2 *The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).*

Rationale for indicator: Clay soils, organic soils, and periods of anoxia in the soils are all good indicators that a wetland can remove a wide range of pollutants from surface water. The uptake of dissolved phosphorus and toxic compounds through adsorption to soil particles is highest when soils are high in clay or organic content (Mitsch and Gosselink 1993). Anoxic conditions (oxygen absent), on the other hand, are needed to remove nitrogen from the aquatic system. This process, called denitrification, is done by bacteria that live only in the absence of oxygen (Mitsch and Gosselink 1993).

To look at the soil, dig a small hole within the wetland boundary and pick a sample from the area that is about 2 inches below the surface. Usually it is best to sample the soil toward the middle of the wetland rather than at the edge. Do not, however, sample the soil under areas of permanent ponding. Avoid picking up any of the “duff” or recent plant material that lies on the surface. First smell the soil and determine if it has a smell of hydrogen sulfide (rotten eggs). If so you have answered the question. If the soil is not anoxic, determine if the soil is organic or clay. If you are unfamiliar with the methods for doing this, a key is provided in Appendix B.

Comment [25]: *Question: Does a clay-loam qualify as a clay for this question? Does a silt-loam? What if I can get a ribbon longer than an inch and the soil is a silt-loam?*
A. See the NRCS web page on soils for more descriptions on how to identify soils. http://soils.usda.gov/technical/manual/contents/chapter3e.html

Comment [26]: If the unit is found within an area that is mapped as an organic or clay soils by the NRCS in their county soil maps you do not need to do any further investigations. Consider the unit to have clay or organic soils.

Comment [27]: The presence of organic or clay soils anywhere within the wetland unit counts. There is no scaling for this question based on the size of the patch of soil. This simplification is necessary because it is not possible to develop a reproducible map of different soils in wetland unit within the time frame for doing a rating.

Comment [28]: Below the duff layer

Comment [29]: During additional field work and training sessions we have found that the smell of hydrogen sulfide is not necessarily a good indicator of the presence of an organic soil. Do not use the smell as the sole indicator for determining the presence of an organic soil. Use the NRCS indicators that are in Appendix C.

D 1.3 *Characteristics of persistent vegetation (emergent, shrub, and/or forest):*

Rationale for indicator: Plants enhance sedimentation by acting like a filter, and cause sediment particles to drop to the wetland surface (for a review see Adamus et al. 1991). Plants in wetlands can take on different forms and structures. The intent of this question is to characterize how much of the wetland is covered with plants that persist throughout the year and provide a vertical structure to trap or filter out pollutants. It is assumed, however, that the effectiveness at trapping sediments and pollutants is severely reduced if the plants are grazed.

If you are familiar with the Cowardin classification of vegetation, you are looking for the areas that would be classified as “Emergent”, “Scrub/shrub,” or “Forested.” These are all “persistent” types of vegetation; those species that normally remain standing at least until the beginning of the next growing season (Cowardin et al. 1979). If you need help in identifying these types of vegetation review the discussion on p. 29. Emergent plants do not have to be alive at the time of the site visit to qualify as persistent. The dead stalks of emergent species will provide a vertical structure to trap pollutants as well as live stalks.

Comment [30]: To meet the "class" requirement for Cowardin, a polygon of vegetation within the wetland unit needs at least 30% cover of the specified vegetation type (forest, shrub, etc.). However, to count this the Cowardin polygon as a "vegetation structure" in the rating system the polygon (where the class cover is 30% or more) has to represent at least 10% of the wetland in wetlands that are smaller than 2.5 acres, or at least 1/4 acre in wetlands that are larger. The “30% rule” applies to specific areas or polygons within a wetland unit. A vegetation class **does not** have to cover 30% of the entire wetland unit.

You are asked to characterize the vegetation in terms of how much area within the wetland boundary is covered. There are three size thresholds used to score this characteristic – more than 1/10 of the wetland area is covered in persistent vegetation; more than 1/3 is covered; or more than 2/3 of the area is covered. These thresholds can usually be estimated visually in small wetlands. Large wetlands, however, may require you to draw the area of persistent vegetation on a map or aerial photo before you can feel confident that your estimates are accurate. **NOTE: this question applies only to persistent vegetation that is ungrazed** (or if grazed the vegetation is taller than 6 inches).

Comment [31]: This question also applies to persistent vegetation that is not mowed or cut. Any vegetation that is less than six inches high does not count in this question.

An easy way to estimate the amount of persistent vegetation is to draw a small diagram of the wetland boundary and within it map the areas that are open water, covered with aquatic bed plants, mudflats or rock. Also include areas that are grazed because much of the vertical structure of wetland plants is removed when plants are grazed. The remaining area is then by default the area of persistent vegetation. Figure 13 shows a depressional wetland in which persistent vegetation is between 1/10 and 1/3 the area of the wetland.

Comment [32]: **Question:** *We are dealing with a wetland that has been a part of a grazing rotation for several years. As of yesterday, the wetland had not been grazed yet this year; however, in a week or two the land-owner is likely to rotate some of his animals into the wetland as a part of his annual grazing rotation. How long does a wetland need to be abandoned to be considered ungrazed?*
A. This question reflects the bigger issue of temporal changes in natural systems that we cannot capture in a "snap-shot" approach to characterizing wetlands. The suggested approach in this case would be to go back to the original function and start from there. The way I would phrase the question is: Is the vegetation in the wetland 6" or less at the time when the wetland is receiving surface waters that transport sediment and pollutants? If the grazing occurs in summer (because the area is too wet for cows in the winter) but the vegetation has time to grow again before the flood season, then the system is ungrazed because it will have the higher vegetation at the time of flooding. If however, the grazing pressure is intense enough that the grass does not have time to recover during the flood season then it should be considered "grazed.

Figure 13: A depressional wetland where persistent vegetation is between 1/10 and 1/3 the area of the wetland.

D 1.4 *Characteristics of seasonal ponding or inundation*:

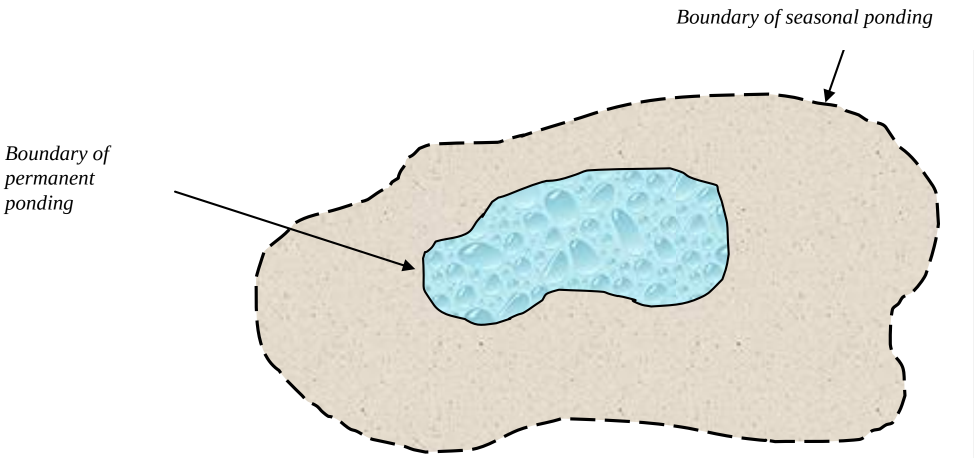
Rationale for indicator: The area of the wetland that is seasonally ponded is an important characteristic in understanding how well it will remove nutrients, specifically nitrogen. The highest levels of nitrogen transformation occur in areas of the wetland that undergo a cyclic change between oxic (oxygen present) and anoxic (oxygen absent) conditions. The oxic regime (oxygen present) is needed so certain types of bacteria will change nitrogen that is in the form of ammonium ion (NH_4^+) to nitrate, and the anoxic regime is needed for denitrification (changing nitrate to nitrogen gas) (Mitsch and Gosselink 1993). The area that is seasonally ponded is used as an indicator of the area in the wetland that undergoes this seasonal cycling. The soils are oxygenated when dry but become anoxic during the time they are flooded.

To answer this question you will need to estimate how much of the wetland is seasonally ponded with water. This is the area that gets flooded at some time of the year, the water remains on the surface for 2 months or more, and then it dries out again.

Comment [33]: Two months of ponding has to be continuous to allow for anoxic conditions to develop.

One way to estimate this area is to make a rough sketch of the wetland boundary, and on this diagram draw the outside edge of the area you believe has surface water during the wet season. If the wetland also has permanent surface water you will have to draw this and subtract it when making your estimate (see Figure 14).

Figure 14: Sketch showing the boundaries of areas that are seasonally ponded and permanently ponded. The answer to question D 1.4 for this wetland is that the area seasonally ponded is more than ½ the total area of the wetland.



The boundary of seasonal ponding will usually coincide with the delineated boundary of the wetland in depressional wetlands of the Columbia Basin. The best indicator of the boundary where ponding lasts for more than two months is the upper edge of the areas where wetland plants are dominant (>50% cover of facultative, facultative-wet, or obligate species). This edge is often very distinct in the Columbia Basin.

There may be periods of time when a depressional wetland is flooded only very briefly during exceptionally heavy rainfall or snowmelt. This area of "brief ponding" should not be counted as "seasonal ponding." For example, if a site is visited during the wet season and wetland vegetation is inside the area of ponding then the area outside of the wetland vegetation line is probably only "briefly ponded." During the dry season, the boundary of areas ponded for several months (*seasonal ponding*) will have to be estimated by using one or more of the following indicators.

- Marks on trees and shrubs of water/sediment/debris (Figure 15). The boundary of seasonal ponding can be estimated by extrapolating a horizontal line from this mark to the edge of the wetland.
- Water stained vegetation lying on wetland surface (grayish or blackish in appearance such as downed and fragmented bulrush stems).
- Dried algae left on the stems of emergent vegetation and shrubs and on the wetland surface (Figures 16, 17).

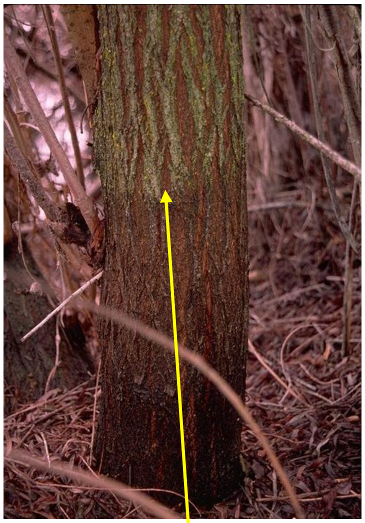
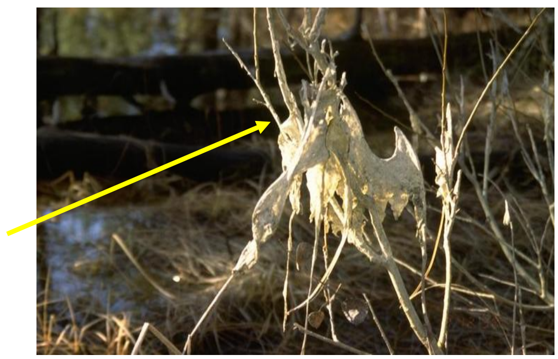


Figure 16: Small depressional wetland covered with algae. The edge of the algae marks the area that is seasonally ponded.

Figure 15: Water mark on tree showing vertical extent of seasonal ponding.

Figure 17: Algae left hanging on vegetation as wetland dried out. The top of the algae marks the vertical extent of seasonal ponding. The boundary of seasonal ponding can be estimated by extrapolating a horizontal line from this mark to the edge of the wetland.



NOTE: Avoid making visual estimates of area covered by seasonal ponding when standing at the wetland edge. These estimates are usually very inaccurate. A simple sketch, or a drawing of the boundary on an aerial photograph, is a much more accurate tool to use for estimating area.

D 2.0 Does the Depressional Wetland Have the Opportunity to Improve Water Quality?

> **Rationale for indicator**: The opportunity for wetlands to improve water quality in a watershed is related to the amount of pollutants that come into the wetland. Qualitatively, the level of pollutants can be correlated with the level of disturbance, development, and intensity of agriculture in the landscape. For example, relatively undisturbed watersheds will carry much lower sediment and nutrient loads than those that have been impacted by development, agriculture, or logging practices (Hartmann et al. 1996, and Reinelt and Horner 1995). The opportunity that a wetland has to improve water quality is, therefore, linked to the amount of development, agriculture, or logging present in its immediate surroundings or in the up-gradient part of its contributing basin.
>
> For the purpose of rating, it is assumed that a wetland has the opportunity to improve water quality if the amount of pollutants coming into the wetland as a result of human activities is higher than the pollutants (sediment and nutrients) that would be coming from natural causes. It is the removal of this excess pollution that is considered to be a valuable function for society.

Answer YES if there are pollutants caused by human activities in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland.

Users of the rating system must make a qualitative judgment on the opportunity of the depressional wetland to actually improve water quality by asking the question. Are there any sediments, nutrients, toxic chemicals, or other pollutants coming into the wetland from human activities that can reduce water quality waters downgradient from the wetland? Pollutants can come into a wetland both through groundwater and surface runoff.

A key to characterizing the opportunity for this group of functions is to consider the routing of runoff into and through a wetland. If adjacent areas lack evidence of surface runoff that enters the wetland, then few if any pollutants may be transferred to the wetland. Some systems of ditches that are found along the edges of wetlands route polluted runoff away from the wetland. If the wetland never floods then the pollutants have no chance to interact with the wetland. In these cases the wetland would not have the opportunity to improve water quality even though pollutants are introduced into the aquatic system in the vicinity of the wetland.

The question on the rating form lists several examples of conditions that result in pollutants reaching a wetland and therefore provide the opportunity for the wetland to improve water quality. You are asked to note which of the following conditions provide the sources of pollutants.

- Grazing in the wetland or within 150ft. The issue here is nutrients coming into the wetland from animal droppings, from domesticated animals. The wetland has the opportunity to improve water quality if you can see recent droppings from domesticated animals, and you judge that nutrients and bacteria from these can be washed into the wetland.
- Wetland intercepts groundwater within the Reclamation Area. Groundwater within the reclamation area is polluted with pesticides and high levels of nutrients

Comment [34]: Septic fields do contribute nitrogen to groundwater because it is not degraded underground. Generally I suggest that wetlands would get the multiplier if there are any septic fields within 300 ft of the wetland. There is some information from Cape Cod that suggests the nitrogen from septic systems will travel up to a mile, but this was in sandy soils. Opportunity should not be counted, however, if you know with certainty that the groundwater flows in the direction opposite from the wetland.

Comment [35]: Wetlands can receive polluted waters even if they have well vegetated and large buffers. If a stream enters the wetland that drains areas where pollutants are released then the wetland does have the opportunity regardless the size of the buffer

Comment [36]: If areas that were once downgradient of a wetland have been filled to higher elevations and developed, then contaminated surface water can drain from the filled area to the wetland, and it will have the opportunity. All of the questions in the rating system are based on current conditions even if they have been heavily altered by humans (e.g. wetlands behind dikes are rated as depressional rather than riverine).

(Williamson et al. 1998).

- Untreated stormwater flows into the wetland. Stormwater is a source of sediment and toxic compounds.
- Tilled fields or orchards within 150 feet of wetland. Agriculture is a source of pesticides, nutrients, and sediments. The input of these pollutants to the wetland can be either by surface runoff or windblown dust.
- A stream or culvert brings water into wetland from developed areas, residential areas, farmed fields, roads, or areas that have been clear-cut within the last five years. Streams or culverts can bring in pollutants that are released outside the immediate area of the wetland. If you find a stream or culvert coming into the wetland, you will need to trace the course of the stream and determine if it passes through areas that can release pollutants.
- Land uses within 150 ft of the wetland that generate pollutants (residential areas having more than 1 house per acre, urban areas, commercial areas, and golf courses). These areas potential source of pollutants from lawn care, driveways, pets, and parking lots.

The rating form has space to note potential sources of pollutants coming into the wetland not mentioned above. If you observe or know of other sources, note this on the form.

Note: Depressional wetlands that have no outlet (closed depression) may still have the opportunity to remove nutrients because they are usually connected to the groundwater system. Some pollutants such as nitrates and ammonia can be carried into the groundwater from surface runoff. Closed depressions, therefore, may provide a significant function by removing nitrates before they can get into the groundwater.

Note: Highway infrastructure, both existing and proposed, include features that are designed to convey and treat water for water quality improvements and flow control. These features, including ditches, vegetated filter strips, stormwater ponds, infiltration basins, and other stormwater best management practices (BMPs), route water from and through a project area, and therefore must be understood to adequately make an "opportunity call" for wetlands located near the highway. If these systems are effective at blocking most nutrients and pollutants from getting into a wetland the wetland will **not** have the opportunity to perform these functions.

The data sheet gives the number of points a wetland should score for the indicators of potential. Add the scores for the indicators of potential and multiply by [1] or [2] depending on the "opportunity." The total score should be carried forward to page 1 of the rating form.

D 3.0 Does the Depressional Wetland Have the Potential to Reduce Flooding and Stream Erosion?

D 3.1 *Characteristics of surface water outflows from the wetland:*

Comment [37]: Stormwater ponds do not remove all pollutants leaving them, even those constructed today, and there are ample data confirming this. Thus, a wetland receiving water from a stormwater pond will have the opportunity to further improve water quality. In fact, constructed wetlands are often used to "polish" such discharges. Furthermore, wetlands that receive stormwater are probably located in developed areas where other forms of polluted surface runoff can reach them.

Comment [38]: When considering whether the agricultural practices introduce pollutants to the wetland (and thereby provide it with the opportunity) you need to consider several factors.
First, is the field upslope of the wetland and within 150 ft? If so, you can assume that some contaminated surface water will runoff. If the buffer between the field and the wetland has a good vegetative cover (and/or sod) then rills may not form.
Secondly, fields often have pesticides applied through aerial spraying. In that case one might also expect some overspray when it is windy. Spray can travel between 50-150ft and this would also be a source of pollutants to the wetland.
Third, nutrients added to fields have been shown to infiltrate and contaminate groundwater. This groundwater may then daylight in the wetland and bring in pollutants

Comment [39]: The literature says that it takes at least 150 ft of a vegetated buffer to remove 60-80% of some pollutants from surface runoff into a wetland. That is why 150 ft is used as the guideline in question D2. Thus, untreated runoff from a road or parking lot that is only 50-60 ft away does introduce pollutants to the wetland.

Rationale for indicator: Depressional wetlands with no outflow are more likely to reduce flooding than those with outlets, and those with a constricted outlet will more likely reduce flooding than those with an unconstricted outlet (review in Adamus et al. 1991). In wetlands with no outflow all waters coming in are permanently stored and do no enter any streams or rivers. Constricted outlets will hold back flood waters and release them slowly. Furthermore, wetlands with seasonal outflows in eastern Washington are more likely to reduce flooding than those with permanent flows because these wetlands usually dry up between the times water flows out. This means that the water level will fall below the lip of the outlet and additional storage is created.

See the description for question D 1.1. This question is answered the same way as question D 1.1. The difference between D 1.1 and D 3.1, however, is in the scores assigned each type of outflow. Differences in scores are based on the difference in importance of the outflow characteristics to the "water quality" functions and the hydrologic functions.

D 3.2 *Depth of storage during wet periods:*

Rationale for indicator: The amount of water a wetland stores is an important indicator of how well it functions to reduce flooding and erosion. Retention time of flood waters is increased as the volume of storage is increased for any given inflow (Fennessey et al. 1994). It is too difficult to estimate the actual amount of water stored for a rapid tool such as the rating system, and we use an estimate of the maximum depth of storage as a surrogate. This is only an approximation because depressional wetlands may have slightly different shapes and therefore the volume of water they can store is not exactly correlated to the maximum depth of storage. The correlation, however, was judged to be close enough for the purposes of this rating system.

The depth of the water stored during can be estimated as the difference in elevation between the upper edge of seasonal ponding/inundation and the low point of the wetland as described below (see figure 18).

Comment [40]: This is different than the "live storage" that is estimated in the western Washington Rating System. For eastern Washington we use the total storage (dead + live) rather than just the live storage.

For wetlands that have areas of permanent ponding, the lowest point is the surface of the permanent ponding (as measured at its lowest point, typically in late summer and fall). See Figure 19 for an example. You should estimate the height of seasonal ponding above that. For wetlands that have no areas of permanent ponding, locate the lowest point in the wetland and measure the depth of the ponding above that.

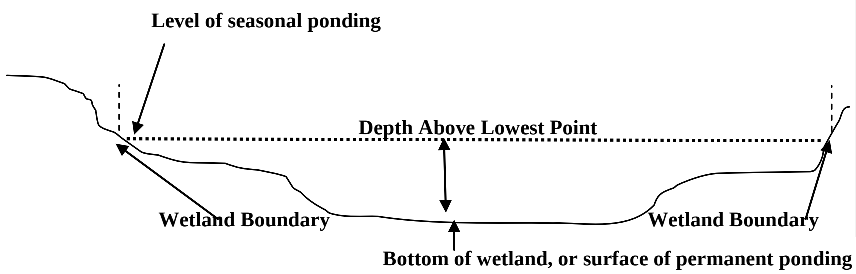


Figure 18 – Measuring maximum depth of seasonal ponding.

Figure 19: A depressional wetland with permanent water present. This is the maximum extent of summer “drawdown” in the wetland. The difference between this level and the seasonal high water mark is more than three feet.

NOTE: During the winter and spring it may be difficult to identify the level to which the water drops during the summer. In general, the level will usually be at the edge of the area dominated by large, obligate, emergent plants such as *Scirpus acutus* or *Typha latifolia* (Figure 20). Use the lower edge of this vegetation as the “bottom” from which to estimate the depth of seasonal ponding. Estimate the difference in elevation between the bottom of the plants and any marks of ponding or inundation along the shore to estimate the depth of seasonal ponding.

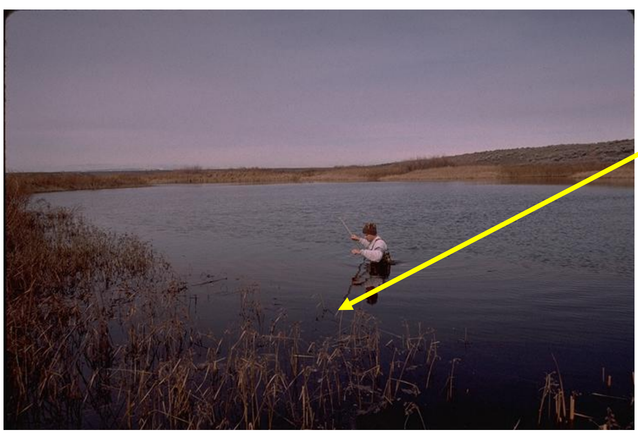


Figure 20: A depressional wetland with water level close to its seasonal maximum. This is the same wetland as shown in Figure 19 but photographed in March rather than late September.

There are five thresholds used to score this characteristic: 3 ft. or more than of storage, 2 ft to <3 ft of storage, 1 ft to <2 ft, 6 inches to <1ft, and less than 6 in. Your measurements, therefore, do not need to be exact. These thresholds can usually be estimated without needing to use special equipment.

Headwater wetlands: This question also asks if the wetland being categorized is a "headwater" wetland. Depressional wetlands found in the headwaters of streams often do not store surface water to any great depth. They are however, important in reducing peak flows because they slow down and "desynchronize" the initial peak flows from a storm (Brassard et al. 2000). Their importance in hydrologic functions is often under-rated (statement of Michael L. Davis, Deputy Assistant of the Army, before the committee on Environment and Public Works, Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety, United State Senate, June 26, 1997). The depth of seasonal storage in headwater wetlands was judged to be an inadequate representation of the importance of these wetlands in the hydrologic functions. For this reason, headwater wetlands are scored 6 points, out of 8 possible, regardless of the depth of seasonal storage.

To identify if the wetland being rated is a "headwater" wetland, use the information collected in question D 1.1. If the wetland has a permanent or seasonal outflow but NO inflow from a permanent or seasonal stream, it is probably a "headwater" wetland for the purposes of this categorization. NOTE: One exception to this criterion is wetlands whose water regime is dominated by groundwater coming from irrigation practices or from a hillside seep. Depressional wetlands at the base of dams or edge of irrigation canals or slope wetlands are not headwater wetlands, even if they have surface water flowing out of them.

D 4.0 Does the Depressional wetland Have the Opportunity to Reduce Flooding and Stream Erosion?

Rationale for the indicator: The opportunity for wetlands to reduce the impacts of flooding and erosion is based on the presence of human or natural resources that can be damaged by these processes. The indicator used characterizes whether the wetland's position in the landscape will protect downgradient resources from flooding. We ask if there are resources in the watershed that can be damaged by flooding and erosion. These resources include both human and natural ones.

Answer YES if the wetland is in a position in the watershed where the flood storage, or reduction in water velocity, it provides can reduce damage to downstream property and aquatic resources.

One way to consider this question is to ask yourself, where would the surface water coming into a wetland go if the wetland were filled? The surface water that would have been stored in the wetland during storms has to go somewhere. If the surface water runs off directly into a stream or river that has problems with flooding, then the storage provided by the wetland is important because it decreases the downstream flooding. In this case the wetland DOES have the opportunity. If, however, the water leaving the wetland is controlled in some way that prevents it from affecting flooding, the wetland does NOT have the opportunity. A USGS topographic map is a good tool to use to answer this question. The map will show buildings, bridges, or other structures in the floodplain of a river or stream. An aerial photograph can also be useful to identify resources that might be impacted by increases in surface flows.

Comment [41]: Generally, most urban and urbanizing areas can be considered to have flooding problems because of the changes in surface flows due to impervious surfaces.

The landscapes in eastern Washington are quite varied and it may be difficult to judge whether a wetland has the opportunity to perform hydrologic functions. The following points are provided as a guide to help you answer this question.

- Many depressional wetlands with no surface water outflow have the opportunity to perform the hydrologic functions because they are up-gradient of resources. They are actually performing the hydrologic functions at the highest levels possible. No surface water leaves the wetland to cause flooding or erosion. The water either infiltrates to groundwater or it evaporates. To answer the "opportunity" question for a wetland with no outflow, try to picture the wetland as "filled" with a parking lot. Where would the surface water it normally stores flow? If it would flow into a swale, channel, or stream, there is a possibility that the flow would increase flooding or erosion.

- When a wetland is situated upslope of a road where water movement through the road is limited by ineffective culverts, the roadway typically acts a levee, de-coupling upslope wetlands from the floodway. The road delays drainage from entering the floodway in a timeframe where it can contribute to peak flows. Also, the road prevents surface flows within the floodway from directly entering the wetland as they rise and prevent using the storage capacity of wetlands that are upslope of the road. Wetlands upslope of a road **do not have** opportunity to provide hydrologic functions if the road impounds surface water near the rated wetland during flood events and keeps it impounded for some time after the flood recedes. This indicates that the hydrologic connection between the floodway and the upslope area is impaired. If, however, the water impounded on the upslope side of the road recedes at the same rate as a flooding event, you can assume the connections through the road are not constrained. In this case the storage provided by the wetland on the upslope side is important, and the wetland **does have** the opportunity.

- Wetlands that are situated at the base of a hillside, typically receive significant water inputs from groundwater. The rating system includes guidance that states wetlands that receive 90% of their water from groundwater do not have the opportunity. Seep wetlands at the base of hills that are outside of the floodplain generally meet the intent of this criteria because of their landscape position. If the only hydrologic inputs that can be observed are from a spring/seep emerging from a hillslope, then the rated wetland likely does **not** have opportunity. If, however, there are indicators that the wetland receives surface runoff from further up the slope (e.g. small gullies, washes, etc.) as well as groundwater, then the wetland may have the opportunity if there are flooding problems further downstream.

- A depressional wetland that receives only return flow from irrigation also does **not** have the opportunity to perform the hydrologic functions. Since the inflow is controlled, there is little chance that the water coming into the wetland will cause downstream flooding or erosion.

- A depressional wetland behind a dike in a river mouth does **not** have the opportunity because there are few resources further downstream that can be

Comment [42]: Most closed systems have the opportunity if the surface flow in their vicinity drains to a system that has flooding problems anywhere downstream. So even head water systems may have the opportunity. The question you need to ask yourself in looking at closed systems is: Where would the surface water that currently flows into the closed system go if the wetland were filled? Look for a low point around the circumference of the depression and try to project the path of the surface flow from that location. If it goes to a stream or river with a flooding problems (or if salmon redds are present that can be destroyed by excessive velocities) then the wetland has the opportunity.

Comment [43]: The intention here is to address the situation where the depressional wetland is part of a system that has some man-made control (even if not planned) of flooding downstream. We do not assign opportunity to wetlands that are on reservoirs because flooding downstream is controlled by dams or other such structures. The situation we were trying to describe here is a wetland that lies along a road where the water is constrained by an undersized culvert or no culvert at all. In this case the wetland can be considered as part of a "temporary" lake or pond, and we decided that the storage provided by this wetland was not a significant amount and not worth scoring (just like we do not score the storage capacity of lake-fringe wetlands).
There are no "absolutes" in natural systems, and anytime we identify "boundaries" that separate specific "states" we end up with problems. This is one of those. At what point does the storage become insignificant? This bullet was included to address some very strongly felt views of DOT wetland staff based on their experience with roads.

Comment [44]: A wetland can be considered to have more than a 90% GW influence if there is no seasonal or permanent surface water inflow and a very small contributing basin (< 10 times the area of the wetland).

Comment [45]: When a unit has two or more HGM classes you answer the questions for the entire unit, not just the depressional part.
For example, in the case where a small stream (riverine class) flows into a depression that seems to be dominated by groundwater try to judge the total water budget for both the riverine and depressional systems. If the stream coming into the depression is providing less than 10% of the water leaving through the depression you can assume the system is dominated by groundwater.

impacted by flooding, and the wetland is often disconnected from the floodplain.

- A wetland has to receive surface water (either storm or snowmelt) in order for it to reduce flooding. If the source of water to a wetland is groundwater only, then it does **not** have the opportunity to perform the function because it receives no surface water that might cause flooding or erosion further downgradient. For example, alkali wetlands are so dominated by groundwater that they are judged not to have the opportunity to perform the hydrologic functions defined in this rating system.
-

Comment [46]: If the wetland drains to a retention/stormwater system determine if the retention constructed system has a high water overflow or a berm that can be overtopped. The wetland **does** have the opportunity if the storage it provides is more than the extra storage available in the retention system above the 2 year storage level.

<u>5.3.4 Questions Starting with "R" (for Riverine Wetlands)</u>

Water Quality and Hydrologic Functions in Riverine Wetlands

R 1.0 Does the Riverine Wetland have the <u>Potential</u> to Improve Water Quality?

R 1.1 *Area of surface depressions within wetland that can trap sediments and associated pollutants during a flooding event*:

Rationale for indicator: Depressions in riverine wetlands will tend to accumulate sediment and the pollutants associated with sediment (phosphorus and some toxics) because they reduce water velocities (Fennessey et al. 1994), especially when the river floods. Wetlands where a larger part of the total area has depressions are relatively better at removing pollutants than those that have no such depressions.

For this question you will need to estimate the fraction of the wetland that is covered by depressions. Make a simple sketch of the wetland boundary, and on this superimpose the areas where depressions are found. From this you can make a rough estimate of the area that has depressions and determine if this is more than 1/3 or more than 1/10 of the total area of the wetland. Standing or open water present in the wetland when the river is not flooding are good indicators of depressions. Figure 21 shows a riverine wetland with depressions filled with water. In this case the depressions were created by a beaver.

Comment [47]: Generally you would count depressions that hold water for more than week after a flood recedes. If a depression is not flooded at the time of your site visit , look for the deposition of fine or mucky sediments in the bottom of the depression. Fine sediments indicate the water was present in the depression for longer periods of time.

Figure 21: A riverine wetland with two depressions. In this wetland the depressions cover between 1/10 and 1/3 the area of the wetland.

***R 1.2** Characteristics of the vegetation in the wetland:*

> **Rationale for indicator**: Vegetation in a riverine wetland will improve water quality by acting as a filter to trap sediments and associated pollutants. Persistent, multi-stemmed plants enhance sedimentation by offering frictional resistance to water flow (review in Adamus et al. 1991). Shrubs and trees are considered to be better at resisting water velocities than emergent plants during flooding and are scored higher. Aquatic bed species or grazed, herbaceous (non-woody) plants are not judged to provide much resistance to water flows and are not counted as "filters."

For this question you will need to group the vegetation found within the wetland into three categories – 1) Forest or shrub, 2) ungrazed emergent plants (> 6 inches high), and 3) neither forest, shrub nor emergent.

There are two size thresholds used to score this characteristic – more than 2/3 of the wetland area is covered in either emergent, forest, or shrubby vegetation, and more than 1/3 is covered. These thresholds can usually be estimated visually in small wetlands. Large wetlands, however, may require you to draw the area of vegetation types on a map or aerial photo before you can feel confident that your estimates are accurate.

Comment [48]: *Question on R 1.2 and R 3.2: We are dealing with a riverine wetland that has been a part of a grazing rotation for several years. As of yesterday, the wetland had not been grazed yet this year; however, in a week or two the land-owner is likely to rotate some of his animals into the wetland as a part of his annual grazing rotation. How long does a wetland need to be abandoned to be considered ungrazed?*
A. This question reflects the bigger issue of temporal changes in natural systems that we cannot capture in a "snap-shot" approach. The suggested approach in this case would be to go back to the original function and start from there.
The way I would phrase the question is: Is the vegetation in the wetland 6" or less at the time when the river floods and is actually transporting sediment that can be trapped? If the grazing occurs in summer (because the area is too wet for cows in the winter) but the vegetation has time to grow again before the flood season, then the system is ungrazed because it will have the higher vegetation at the time of flooding. If however, the grazing pressure is intense enough that the grass does not have time to recover during the flood season then it should be considered "grazed."

R 2.0 Does the Riverine Wetland Have the <u>Opportunity</u> to Improve Water Quality?

> **Rationale for indicator**: The opportunity for wetlands to improve water quality in a watershed is related to the amount of pollutants that come into the wetland. Qualitatively, the level of pollutants can be correlated with the level of disturbance, development, and intensity of agriculture in the landscape. For example, relatively undisturbed watersheds will carry much lower sediment and nutrient loads than those that have been impacted by development, agriculture, or logging practices (Hartmann et al. 1996, and Reinelt and Horner 1995). The opportunity that a wetland has to improve water quality is, therefore, linked to the amount of development, agriculture, or logging present in its immediate surroundings or in the up-gradient part of its contributing basin.
>
> For the purpose of rating, it is assumed that a wetland has the opportunity to improve water quality if the amount of pollutants coming into the wetland as a result of human activities is higher than the pollutants (sediment and nutrients) that would be coming from natural causes. It is the removal of this excess pollution that is considered to be a valuable function for society.

Answer YES if there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland.

Users of the rating system must make a qualitative judgment on the opportunity of the riverine wetland to actually improve water quality by asking the question. Are there any sediments, nutrients, or toxic chemicals coming into the wetland from human activities that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Pollutants can come into a riverine wetland through groundwater (if the wetland is a place where groundwater comes in from the sides of a river valley), surface runoff, or overbank flooding from a stream or river.

The question on the rating form lists several examples of conditions that result in pollutants reaching a wetland and therefore provide the opportunity for the wetland to improve water quality. You are asked to note which of the following conditions provide the sources of pollutants.

- Grazing in the wetland or within 150ft. The issue here is nutrients coming into the wetland from animal droppings from domesticated animals. The wetland has the opportunity to significantly improve water quality if you can see recent droppings from domesticated animals, and you judge that nutrients and bacteria from these can be washed into the wetland.
- Wetland intercepts groundwater within the Reclamation Area. Groundwater within the reclamation area is polluted with pesticides and high levels of nutrients (Williamson et al. 1998).
- Untreated stormwater flows into the wetland. Stormwater is a source of sediment and toxic compounds.
- Tilled fields or orchards within 150 feet of wetland. Agriculture is a source of pesticides, nutrients, and sediments. The input of these pollutants to the wetland can be either by surface runoff or windblown dust.
- A stream or culvert discharges water into wetland from developed areas, residential areas, farmed fields, roads, or areas that have been clear-cut within the last five years. Streams or culverts can bring in pollutants that are released outside the immediate area of the wetland. If you find a stream or culvert coming into the wetland, you will need to trace the course of the stream and determine if it passes through areas that can release pollutants.
- Land uses within 150 ft of the wetland that generate pollutants (residential areas having more than 1 house per acre, urban areas, commercial areas, and golf courses). These areas potential source of pollutants from lawn care, driveways, pets, and parking lots.
- The river or stream adjacent to the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water. These pollutants can reach the wetland during floods. Generally, a riverine wetland will have the opportunity to improve water quality if the adjacent river or stream does not meet water quality standards. The list of waters that do not meet standards for water quality, as required under Section 303(d) of the federal Clean Water Act can be found at http://www.ecy.wa.gov/programs/wq/links/impaired_wtrs.html

The rating form has space to note potential sources of pollutants coming into the wetland from sources not mentioned above. If you observe or know of other sources, note this on the form.

R 3.0 Does the Riverine Wetland Have the <u>Potential</u> to Reduce Flooding and Stream Erosion?

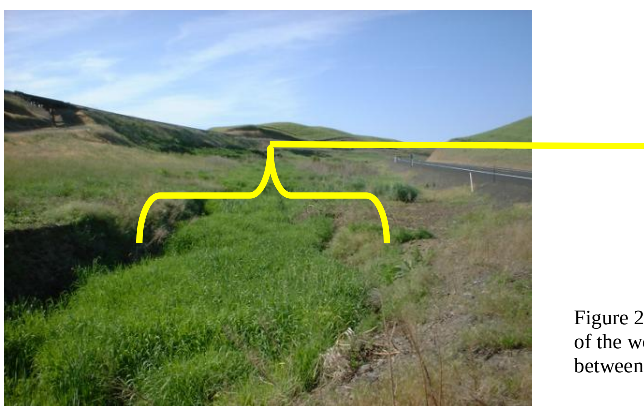
R 3.1 *Characteristics of the "overbank" flood storage the wetland provides, based on the ratio of the channel width to the width of the wetland:*

Rationale for indicator: The ratio of channel width to width of wetland is an indicator of the relative volume of storage available within the wetland. The width of the stream between banks is a good indicator of the relative flows at that point in the watershed. Wider streams will have higher volumes of water than narrower streams. More storage is therefore needed in larger systems to lessen the impact of peak flows. The width of the wetland perpendicular to the stream is used as an indicator of the amount of short-term storage available during a flood event. A wetland that is wide relative to the width of the stream is assumed to provide more storage during a flood event than a narrow one. The ratio of the two values provides an estimate that makes it possible to rank wetlands relative to each other in terms of their overall potential for storage.

You will need to estimate the average width of the wetland perpendicular to the direction of the flow, and the width of the stream or river channel (distance between banks). In these areas calculate this ratio by taking the width of the wetland and dividing by the width of the stream. There are five thresholds for scoring: a ratio or 2 or more, a ratio between 1 and < 2, a ratio between ½ and < 1, a ratio between ¼ and < ½, and a ratio < ¼.

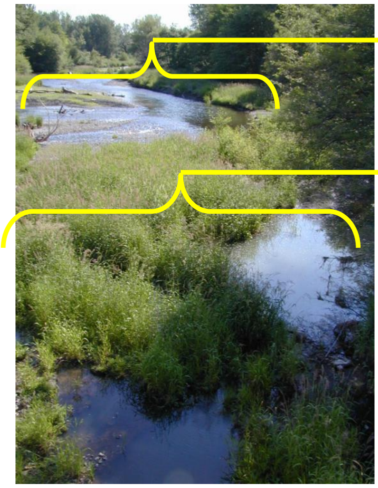
Riverine wetlands are found in different positions in the floodplain and it may sometimes be difficult to estimate this indicator. The following bullets describe some common types of riverine wetland and how to estimate this indicator.

- If the vegetated wetland lies within the banks of the stream or river, the ratio is estimated as the average width of the "delineated" wetland / average distance between banks. Figure 22 shows a wetland where vegetation fills the entire distance between the banks. In this case the ratio is 1. Figure 23 shows a small vegetated wetland on a gravel bar where the distance between banks is much greater than the width of the wetland. In this case the ratio is < ¼.



Distance between banks is the same as the width of the wetland perpendicular to stream flow. The ratio is 1.

Figure 22. A riverine wetland where the width of the wetland is the same as the distance between banks.



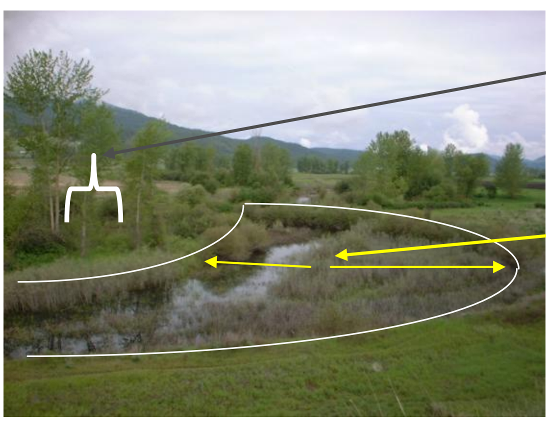
Distance between banks is approximately 150 ft. The width of the river seems smaller in the photograph because it is further away.

Average width of wetland perpendicular to river flow is approximately 30 feet.

Figure 23: A riverine wetland where the ratio of the width of the wetland to the distance between banks is less than ¼ (30 ft / 150 ft = 0.2).

- If the wetland lies outside the existing banks of the river, you may need to estimate the distances using a map or aerial photograph. Riverine wetlands in old oxbows may be some distance away from the river banks. Instead of trying to estimate a width for the wetland and the distance between banks in feet or yards, it may be easier to estimate the ratio directly. Ask yourself if the average width of the wetland is more or less than the distance between banks. If it is more, is it more than twice as wide? If not, the ratio is between 1-2. If the width of the wetland is less than the distance between banks, use the same process: is it less than ¼, or is it less than ½? Figure 24 shows a riverine wetland in an old oxbow where the ratio was judged to be between 1-2.

Comment [49]: In braided channels: If the wetland is associated with only one braid you would still use the cumulative width of all channels to calculate the average width of the channel.



Current location of riverbanks.

The average width of the old oxbow is about ½ the maximum width. When compared to the distance between banks of the river in the background of the photograph, the ratio of width of wetland to width of river is between 1-2. Note: the photograph is not to scale because of differences in the distance from the camera.

Figure 24: A riverine wetland in an old oxbow of the Colville River where the ratio of width of wetland to distance between banks is between 1 – 2.

- If you are including the river or stream as part of the wetland (see p. 15), then the width of the stream is also included in the estimate of the width of the wetland.

R 3.2 *Characteristics of vegetation that slow down water velocities during floods:*

> **Rationale for indicator**: Riverine wetlands play an important role during floods because their vegetation acts to slow water velocities and thereby erosive flows. This reduction in velocity also spreads out the time of peak flows, thereby reducing the maximum flows. The potential for reducing flows will be greatest where the density of wetland vegetation and other obstructions is greatest and where the rigidity of the obstructions is adequate to resist flood velocities (Adamus et al. 1991). The indicator used in the rating system combines both characteristics for the scoring. Shrubs and trees are considered to be better at resisting water velocities than emergent plants. Aquatic bed species are judged not to provide much resistance and are not counted. Wetlands with a dense cover of trees and shrubs are scored higher than those with only a cover of emergent species.

For this question you will need to group the vegetation found within the wetland into two categories – 1) emergent, and 2) forest and/or scrub/shrub. These categories of plants are based on the "Cowardin" classification of wetlands (see p. 29).

There are five size thresholds used to score this characteristic – 1) Forest or shrub for more than 2/3 the area of the wetland, forest or shrub for >1/3 area OR Emergent plants > 2/3 area, and forest or shrub for > 1/10 area OR Emergent plants > 1/3 area.

NOTE: If the wetland is covered with downed trees, you can treat large woody debris as "forest or shrub."

R 4.0 Does the Riverine Wetland Have the <u>Opportunity</u> to Reduce Flooding and Stream Erosion?

> **Rationale for the indicator**: The opportunity for wetlands to reduce the impacts of flooding and erosion is based on the presence of human or natural resources that can be damaged by these processes. The indicators used characterize whether the wetland's position in the landscape will allow it to reduce flooding. We ask if there are resources in the watershed that can be damaged by flooding and erosion. These resources include both human and natural ones.

Answer YES if the wetland is in a landscape position where the flood storage, or reduction in water velocity, it provides can reduce damage to downstream property and aquatic resources. Riverine wetlands are by definition directly linked to the active floodplain (receive overbank flooding at least once in ten years), and thus have the opportunity to perform this function if there are resources that can be impacted by flooding.

This question requires you to consider the resources that might be impacted by flooding or erosive flows. Are there stream banks that might be eroded, structures that can be damaged, or natural resources that can be damaged in areas downgradient from the wetland? A USGS topographic map is a good tool to use to answer this question. The map will show buildings, bridges, or other structures in the floodplain of a river or stream. An aerial photograph can also be useful to identify resources that might be impacted by increases in surface flows.

The landscapes in eastern Washington are quite varied and it may be difficult to judge whether a wetland has the opportunity to perform hydrologic functions. The following points are provided as a guide to help you answer this question.

- There are human structures and activities along the stream or river (roads, buildings, bridges, farms) that can be damaged by flooding.
- There are natural resources downstream (e.g. salmon redds) than can be damaged by flooding.
- A wetland that is adjacent to, or discharges directly to large reservoirs where water levels are controlled does **not** have the opportunity to perform the hydrologic functions. The reservoir acts to buffer the impacts of the loss of water storage if a wetland were filled. For this reason, riverine wetlands that discharge directly into the Columbia and Snake Rivers are considered not to have the "opportunity."
- Wetlands upslope of a road do not have opportunity to provide hydrologic functions if the road impounds surface water near the rated wetland during flood events and keeps it impounded for some time after the flood recedes.

The rating form has space to note observations of resources that could be impacted by flooding not mentioned on the form. If you observe or know of other resources, note this on the form.

Comment [50]: *Question of the Columbia River:* If there are no resources or flooding problems along the streams going into the Columbia then the wetlands would not have the multiplier. I consider the Columbia to be so intensely controlled, even downstream of Bonneville dam that it no longer can be considered as having flooding problems (relative to streams and rivers that are not so intensely controlled).

5.3.5 Questions Starting with "L" (for Lake-fringe Wetlands)

Water Quality and Hydrologic Functions in Lake-fringe Wetlands

NOTE: Lake-fringe wetlands have a maximum score of only 24 points for the water quality functions instead of 32. The technical review team concluded that lake-fringe wetlands do not improve water quality to the same extent as riverine or depressional wetlands because denitrification rates are reduced relative to other wetlands and any pollutants taken up in plant material will be more easily released into the water column when the plants die off.

L 1.0 Does the Lake-fringe Wetland have the Potential to Improve Water Quality?

L 1.1 *Average width of vegetation along the lakeshore*:

Comment [51]: The question is worded in both L 1.1 and L 3.1 as: "Average width …of vegetation along the lakeshore." In using these words we were implying linear distances both along the lakeshore and perpendicular to the shore. Both captions for Figures 29 and 31 also state "along the shores of the lake," and are directly linked only to questions L 1.1 and L 3.1. There is no linkage to question L 1.2 which does deal with area. Whenever the area of vegetation is needed, the word "area" is used in the description of the question (e.g. D 1.3, D1.4, L 1.2). There might be some confusion because the generic term "area" in the figures to denote the location of the vegetation type but the caption specifically avoids using the word area as do the questions on the field form. The written guidance should be given precedence over the figures if there are any confusion in interpretation.

Rationale for indicator: The intent of this question is to characterize the width of the zone of plants that provide a vertical structure to trap or filter out pollutants or absorb them. Wetlands in which the average width of vegetation is large are more likely to retain sediment and toxic compounds than where vegetation is narrow (Adamus et al 1991). Even aquatic-bed species that die back every year are considered to play a role in improving water quality. These plants take up nutrients in the spring and summer that would otherwise be available to stimulate algal blooms in the lake. In addition, aquatic bed species change the chemistry of the lake bottom to facilitate the binding of phosphorus (Moore et al. 1994).

It is difficult to map the outside edge of a wetland when it is along the shores of a lake where open water can extend out for large distances. For this reason the question is phrased in terms of width of vegetation perpendicular to the shore rather than the area of vegetation. There are three thresholds for scoring the average width of vegetation: 1) more than 33 ft (10m), 2) 16 ft to 33 ft (5 – 10 m), and 3) 6 ft to < 16 ft. (2 – 5m).

For large wetlands along the shores of a lake it may be necessary to sketch the vegetation and average the width by segment, and then calculate an overall average. Figure 24 gives an example of such a sketch.

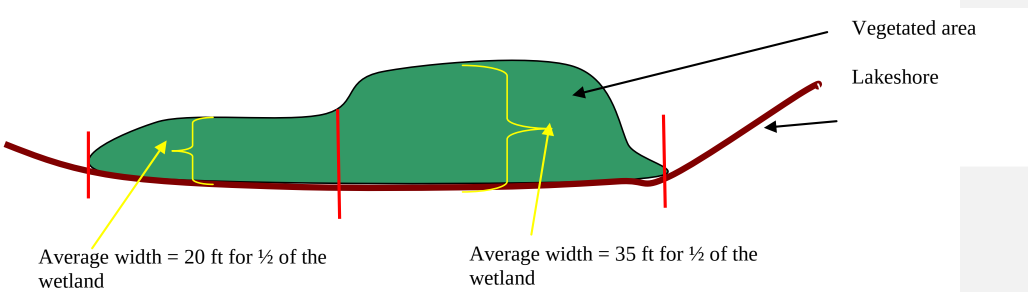


Figure 24: Estimating width of vegetation along the shores of a lake. The average width of vegetation for the entire area is: (20ft x 0.5) + (35 ft x 0.5) = 27.5 ft.

L 1.2 *Characteristics of the vegetation in the wetland:*

> **Rationale for indicator**: The intent of this question is to characterize how much of the wetland is covered with plants that are more effective at improving water quality in a lake environment. Herbaceous species have, in general, been found to sequester metals and remove oils and other organics better than other plant species (Hammer 1989, and Horner 1992). Aquatic bed vegetation is not considered important in sequestering toxic compounds because the toxics will be released in the fall when the plants decompose.

For this question you will need to group the vegetation found within the wetland into three categories – 1) herbaceous, 2) aquatic bed and 3) any other vegetation. For this question, the herbaceous plants can be either the dominant form (in this case it would be called emergent class) or as an understory in a shrub or forest community.

There are several size thresholds used to score this characteristic – more than 90%, more than 2/3, or more than 1/3, of the vegetated area is covered in herbaceous plants or other types. These thresholds can usually be estimated visually in small wetlands. Large wetlands, however, may require you to draw the area of vegetation types on a map or aerial photo before you can feel confident that your estimates are accurate.

NOTE: In lake-fringe wetlands the area of the wetland used as the basis for determining thresholds is only the area that is vegetated. Do not include any open water in determining the area of the wetland covered by a specific vegetation type.

L 2.0 Does the Lake-fringe Wetland Have the Opportunity to Improve Water Quality?

> **Rationale for indicator**: The opportunity for lake-fringe wetlands to improve water quality can be correlated with the amount of pollutants discharged into the lake or watershed upstream of the lake on which the wetland is found. For example, relatively undisturbed watersheds will carry much lower sediment and nutrient loads than those that have been impacted by development, agriculture, or logging practices (Hartmann et al. 1996, and Reinelt and Horner 1995).

Answer YES if the wetland is on the shores of a lake where water quality is a problem. Generally, a lake-fringe wetland will have the opportunity to improve water quality if the adjacent lake does not meet water quality standards. The list of waters in which water quality standards are not met, as required under Section 303(d) of the federal Clean Water Act can be found at http://www.ecy.wa.gov/programs/wq/links/impaired_wtrs.html

In addition, users of the rating system must make a qualitative judgment on the opportunity of the lake-fringe wetland to actually improve water quality by asking the question. Are there any sediments, nutrients, or toxic chemicals coming into the wetland that would otherwise reduce water quality in the adjacent lake? Pollutants can come into a wetland in groundwater or surface water discharging through the wetland to the lake. The following conditions give some examples of conditions that result in pollutants reaching a wetland and therefore provide the opportunity for the wetland to improve water quality.

- Grazing in the wetland or within 150 ft. of the wetland (input of coliform bacteria and nutrients from surface runoff)
- Untreated stormwater flows through the wetland (input of sediment and toxic compounds)
- Tilled fields or orchards within 150 feet of wetland (input of pesticides, sediment, and nutrients: input is either by surface runoff or windblown dust)
- A stream or culvert discharges water directly into wetland from developed areas, residential areas, farmed fields, or clear-cut logging (input of toxic compounds, sediments, nutrients).
- Land uses within 150 ft upslope of the wetland that generate pollutants (residential areas having more than 1 house per acre, urban areas, commercial areas, and golf courses). These areas potential source of pollutants from lawn care, driveways, pets, and parking lots.
- Lakes with moderate to heavy use by powerboats, or the lake-fringe wetland is next to a boat launching ramp.

The rating form has space to note potential sources of pollutants coming into the wetland from sources not mentioned above. If you observe or know of other sources, note this on the form.

L 3.0 Does the Lake-fringe Wetland Have the Potential to Reduce Shoreline Erosion?

NOTE: Lake-fringe wetlands have a maximum score of only 12 points for the hydrologic functions instead of 32. The technical review team concluded that lake-fringe wetlands do not provide hydrologic functions to the same extent as riverine or depressional wetlands. The function of reducing shoreline erosion at the local scale was not judged to be as important as reducing peak flows and reducing erosion at the watershed scale, and should not be scored as highly.

Comment [52]: Lake fringe wetlands reduce erosion by dissipating wave energy before it reaches the shore.

L. 3.1 *Average width, and characteristics, of vegetation along the lakeshore (do not include aquatic bed species)*:

Rationale for indicator: The intent of this question is to characterize how much of the wetland is covered with plants that provide a physical barrier to waves and protect the shore from erosion. This protection consists of both shoreline anchoring and the dissipation of erosive forces (Adamus et al. 1991). Wetlands that have extensive, persistent (especially woody) vegetation provide protection from waves and currents associated with large storms that would otherwise penetrate deep into the shoreline (Adamus et al 1991). Emergent plants provide some protection but not as much as the stiffer shrubs and trees.

This characteristic is similar to that used in L1.1 and L1.2, but the grouping of vegetation types and thresholds for scoring are different. If you are familiar with the Cowardin classification of vegetation you are looking for the areas that would be classified as “Scrub/shrub,” “Forested,” or “Emergent.”

It is difficult to map the outside edge of a wetland when it is along the shores of a lake where open water can extend out for large distances. For this reason the question is phrased in terms of the width and type of vegetation found only within the area of shrubs, trees, and emergents. There are two thresholds for scoring the average width of vegetation: 33 ft (10m) and 6 ft (2m).

For large wetlands along the shores of a lake it may be necessary to sketch the vegetation types and average the width by type. Figure 26 gives an example of such a sketch.

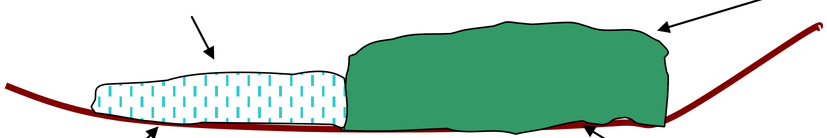


Figure 26: Estimating width of vegetation types along the shores of a lake. The average width of shrubs is 35 ft for ½ the wetland and emergents is 20 ft for ½ of the wetland. This wetland would score 4 points because more than 1/4 of the vegetation is shrubs greater than 33ft. wide.

L 4.0 Does the Lake-fringe Wetland Have the Opportunity to Protect Resources from Shoreline Erosion?

> **Rationale for indicator**: Lake-fringe wetlands have the opportunity to protect a shoreline from erosion if there is some resource that could be impacted by this erosion. For example, houses are often built along a shoreline, and these can be damaged by shoreline erosion, especially if the house is on a bluff. Buildings, however, are not the only resource that can be impacted. A mature forest along the shores of a lake is an important natural resource that provides important habitat. Shoreline erosion, especially man-made erosion from boat wakes, may topple trees into the lake and reduce the overall area of this resource.

Answer YES if there are features along the shore next to the wetland that will be impacted if the shoreline erodes.
Users of the rating system must make a qualitative judgment on the opportunity of the lake-fringe wetland protect resources from shoreline erosion. Generally, a lake-fringe wetland does have the opportunity if:

- There are human structures and activities along the shore behind the wetland (buildings, fields) that can be damaged by erosion.
- There are natural resources along the shore (e.g. mature forests) behind the wetland than can be damaged by shoreline erosion

The rating form has space to note observations of resources along the shore that do no meet the criteria above. If you observe or know of other resources, note this on the form.

5.3.6 Questions Starting with "S" (for Slope Wetlands)

Water Quality and Hydrologic Functions in Slope Wetlands

S 1.0 Does the Slope Wetland have the Potential to Improve Water Quality?

NOTE: Slope wetlands have a maximum score of only 18 points for the water quality functions instead of 32. The technical review team concluded that lake-fringe wetlands do not improve water quality to the same extent as riverine or depressional wetlands because slope wetlands will tend to release water rather than trap it relative to other wetlands. The can be expected to be less effective at trapping sediment and all the pollutants associated with sediment.

Comment [53]: Typographic error. Should read "slope."

***S 1.1** Characteristics of average slope of wetland:*

Rationale for indicator: Water velocity decreases with decreasing slope. This increases the retention time of surface water in the wetland and the potential for retaining sediments and associated toxic pollutants. The potential for sediment deposition and retention of toxic by burial increases as the slope decreases (review in Adamus et al. 1991).

For this question you will need to estimate the average slope of the wetland. Slope is measured either in degrees or as a percent (%). In this rating system we use the latter measurement, (%), which is calculated as the ratio of the vertical change between two points and the horizontal distance between the same two points [vertical drop in feet (or meters) / horizontal distance in feet (or meters)]. For example, a 1 foot drop in elevation between two points that are 100 ft. apart is a 1% slope, and a 2 foot drop in the same distance is a 2% slope.

For large wetlands the slope can be estimated from USGS topographic maps of the area. The change in contour lines can be used to calculate the vertical drop between the top and bottom edges of the wetland. The horizontal distance can be estimated using the appropriate scale (printed at the bottom of the map). Local jurisdictions sometimes have assessor's maps that are contoured at 2 ft intervals. These can be very useful in estimating the slope.

For small wetlands it will be necessary to estimate the vertical drop visually and the horizontal distance by pacing or using a tape measure. Visual estimates of the vertical drop are more accurate if you can find a point of reference near the bottom edge of the wetland. Stand at the upper edge of the wetland and visualize a horizontal line to a tree, telephone pole, or another person at the lower edge of the slope wetland. The point at which the "imaginary" horizontal line intersects the object at the lower edge can be used to estimate the vertical drop between the upper and lower edges of the wetland (see Figure 27).

Comment [54]: If the slope of a wetland changes the best way to estimate the average is to calculate the slope between the upper most wetland boundary and the lowest point on the boundary. This will average out all the variations.

NOTE: If you are standing at the upper edge of the wetland looking for a visual marker at the lower edge, do not forget to subtract your height from the total.

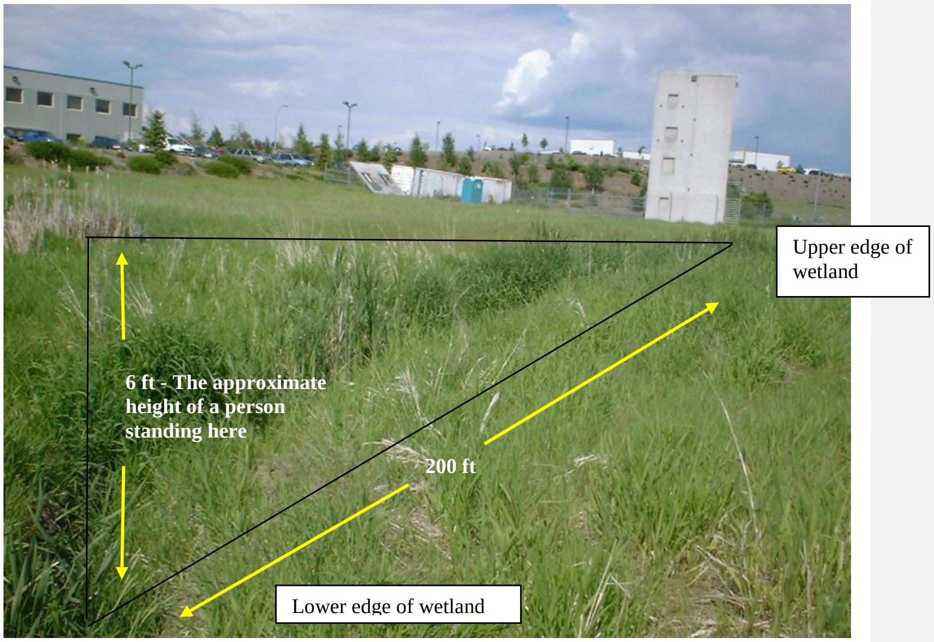


Figure 27. Estimating the slope of a small "slope" wetland. The top of a six foot person is about level with the upper edge of the wetland. The average slope is approximately 6/200 = 0.03 or 3%.

***S 1.2** The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).*

Comment [55]: If the unit is found within an area that is mapped as an organic or clay soils by the NRCS in their county soil maps you do not need to do any further investigations. Consider the unit to have clay or organic soils. See p. 34 (D 1.2) for more discussion on organic and clay soils.

Rationale for indicator: Clay soils, organic soils, and periods of anoxia in the soils are good indicators that a wetland can remove a wide range of pollutants from surface water. The uptake of dissolved phosphorus and toxic compounds through adsorption to soil particles is highest when soils are high in clay or organic content (Mitsch and Gosselink 1993). Anoxic conditions (oxygen absent), on the other hand, are needed to remove nitrogen from the aquatic system. This process, called denitrification, is done by bacteria that live only in the absence of oxygen (Mitsch and Gosselink 1993).

To look at the soil, dig a small hole within the wetland boundary. Pick up a sample from a location that is about 2 inches below the surface. Usually it is best to sample the soil toward the middle of the wetland rather than at the edge. Avoid picking up any of the "duff" or recent plant material that lies on the surface. First smell the soil and determine if it has a smell or hydrogen sulfide (rotten eggs). If so, you have answered the question. If the soil is not anoxic, determine if the soil is organic or clay. If you are unfamiliar with the methods for doing this, a key is provided in Appendix B.

Comment [56]: During additional field work and training sessions we have found that the smell of hydrogen sulfide is not necessarily a good indicator of the presence of an organic soil. Do not use the smell as the sole indicator for determining the presence of an organic soil. Use the NRCS indicators that are in Appendix C.

S 1.3 Characteristics of the vegetation that trap sediments and pollutants:

Rationale for indicator: The intent of this question is to characterize how much of the wetland is covered with plants that are more effective at improving water quality in a slope environment. Herbaceous species have, in general, been found to sequester metals and remove oils and other organics better than other plant species (Hammer 1989, and Horner 1992). Furthermore, dense herbaceous vegetation presents the greatest resistance to the surface flow often found on slope wetlands. Water in this environment tends to flow very close to the surface and be shallow (not more than a few inches). Trees and shrubs tend to be widely spaced relative to herbaceous plants and don't provide as much resistance to this type of surface flow.

For this question you will need to group the vegetation found within the wetland into only two groups: dense, ungrazed, herbaceous vegetation and all other types. **NOTE: The Cowardin vegetation types are not used for this question.** For this question the herbaceous vegetation includes the areas of "emergent" vegetation as classified by Cowardin and the herbaceous understory in a shrub or forest. To qualify for "dense" the herbaceous plants must cover at least ¾ (75%) of the ground (as opposed to the 30% requirement in the Cowardin vegetation types).

Comment [57]: Technically the best information is provided by basal cross-section. This however, is not an easily determined measure. The best indicator we were able to find is an estimate of the cover from a person's height. Generally, if less than 25% of the ground is visible at 5-6ft., then there will be a fairly high stem density and basal cross section to trap sediments and reduce flows. In S 1.3 we differentiate between herbaceous and non-herbaceous vegetation while in S 3.1 it is between rigid, dense, vegetation and other types

S 2.0 Does the Slope Wetland Have the <u>Opportunity</u> to Improve Water Quality?

Rationale for indicator: The opportunity for wetlands to improve water quality in a watershed is related to the amount of pollutants that come into the wetland. Qualitatively, the level of pollutants can be correlated with the level of disturbance, development, and intensity of agriculture in the landscape. The opportunity that a slope wetland has to remove sediment and nutrients is, therefore, linked to the amount of development, agriculture, or logging present in the areas that might contribute surface water or groundwater to the wetland. For example, cattle in the wetland or in a pasture uphill of the wetland will introduce nutrients and coliform bacteria to surface runoff going through the wetland. Cattle in a field downslope from the wetland, however, will not introduce pollutants that the wetland can remove.

Answer YES if there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland.

Users of the rating system must make a qualitative judgment on the opportunity of the depressional wetland to actually improve water quality by asking the question. Are there any sediments, nutrients, or toxic chemicals coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Pollutants can come into a wetland both through groundwater and surface runoff. The question on the rating form lists several examples of conditions that result in pollutants reaching a wetland and therefore provide the opportunity for the wetland to improve water quality.

You are asked to note which of the following conditions provide the sources of pollutants.

- Grazing in the wetland or within 150ft. The issue here is nutrients coming into the wetland from animal droppings, from domesticated animals. The wetland has the opportunity to improve water quality if you can see recent droppings from domesticated animals, and you judge that nutrients and bacteria from these can be washed into the wetland.

- Wetland intercepts groundwater within the Reclamation Area. Groundwater within the reclamation area is polluted with pesticides and high levels of nutrients (Williamson et al. 1998). Many slope wetlands are found in the Columbia Basin along the slopes of the coulees and canyons. These are maintained by the high groundwater that has resulted from irrigation.
- Tilled fields or orchards within 150 feet of wetland. Agriculture is a source of pesticides, nutrients, and sediments. The input of these pollutants to the wetland can be either by surface runoff or windblown dust.
- Land uses within 150 ft upslope of the wetland that generate pollutants (residential areas having more than 1 house per acre, urban areas, commercial areas, and golf courses). These areas potential source of pollutants from lawn care, driveways, pets, and parking lots.

The rating form has space to note potential sources of pollutants coming into the wetland from sources not mentioned above. If you observe or know of other sources, note this on the form.

S 3.0 Does the Slope Wetland Have the Potential to Reduce Flooding and Stream Erosion?

NOTE: Slope wetlands have a maximum score of only 16 points for the hydrologic functions instead of 32. The technical review team concluded that slope wetlands may provide some velocity reduction but do not provide flood storage. Thus they should be scored less than wetlands that can perform both aspects of the function.

S 3.1 *Characteristics of vegetation that reduce the velocity of surface flows.*

Rationale for indicator: The intent of this question is to characterize how much of the wetland is covered with plants that provide a physical barrier to sheetflow coming down the slope. Vegetation on slopes will reduce peak flows and the velocity of water during a storm event (U.S. Geologic Service, http://ga.water.usgs.gov/edu/urbaneffects.html , accessed July 31, 2003). The importance of vegetation on slopes in reducing flows has been well documented in studies of logging (Lewis et al. 2001) though not specifically for slope wetlands. The assumption is that vegetation in slope wetlands plays the same role as vegetation in forested areas in reducing peak flows.

For this question you will need to estimate the area of two categories of vegetation found within the wetland: dense, uncut, rigid vegetation and all other vegetation. This indicator of vegetation is **not** related to any of the Cowardin classes. **Dense** means that individual plants are spaced closely enough that the soil is barely, if at all, (> 75% cover of plants) visible when looking at it from the height of an average person. **Uncut,** means that the height of the vegetation has not been reduced significantly by grazing or mowing. "Significantly reduced" means that the height is less than 6 inches. **Rigid** is defined as having stems thick enough (usually > 1/8 in.) to remain erect during surface flows.

Comment [58]: *Question*: *How come the question about a wetland being a headwater wetland only appears in the depressional hydrologic functions and not in the slope wetland questions?*

Answer: The reason that the headwater depressional wetlands are given extra points and not headwater slope wetlands is that the former provide flood desynchronization by processes that are not adequately represented in question D3.2. They perform their de-synchronization function by being in a specific landscape position rather than by their storage capacity. For this reason they are called out separately in this question only. Slope wetlands function about the same relative to flood desynchronization regardless of their position in the landscape. For this reason they are not called out separately.

Comment [59]: This description is not species specific because one species may be rigid in one environment and not rigid in another. For example , reed canarygrass (P. *arundinaceae*) can grow very thick and rigid stems in areas with high nutrients. In other situations, however, it can be very thin (e.g. shady environment) and would easily be bent to the ground by runoff.

There are three size thresholds used to score this characteristic: dense, uncut, erect vegetation for more than 90% of the area of wetland (see Figure 28), ½ the area, and ¼ the area. The wetland in Figure 29 was grazed over much of its area, except where the *Juncus sp.* was growing. The grazed vegetation was less than 6 in. high, so the only plants that were included for this indicator were the Juncus. The wetland in Figure 29 has less than ¼ of its area with dense, ungrazed, erect vegetation.

Comment [60]: This means **rigid** to be consistent with the field form.

Figure 28: A slope wetland with dense erect, uncut, vegetation (bulrushes) over more than 90% of its area.

S 3.2 *Characteristics of slope wetlands that hold back small amounts of flood flows:*

Rationale for indicator: The intent of this question is to characterize how much of the wetland is covered by small depressions that can hold back surface flows. Depressions are an important indicator of the ability to retain flood-waters (review in Adamus et al. 1991). Slope wetlands usually do not have large depressions within their boundaries, but several slope wetlands in eastern Washington were found with small depressions that were judged to be large enough to provide some water retention (3 ft across and 6-10 inches deep).

To answer this question you will have to walk throughout the wetland and note the topography of the surface. If the slope wetland has depressions they will usually be dispersed throughout most of the wetland area. Depressions may be found near clumps of different vegetation, boulders, or in swales where the slope changes (Figure 29). Heavily grazed slope wetlands often have small depressions created by the cattle. For this question you will need to estimate if the depressions cover more or less than 10% of the total wetland area.

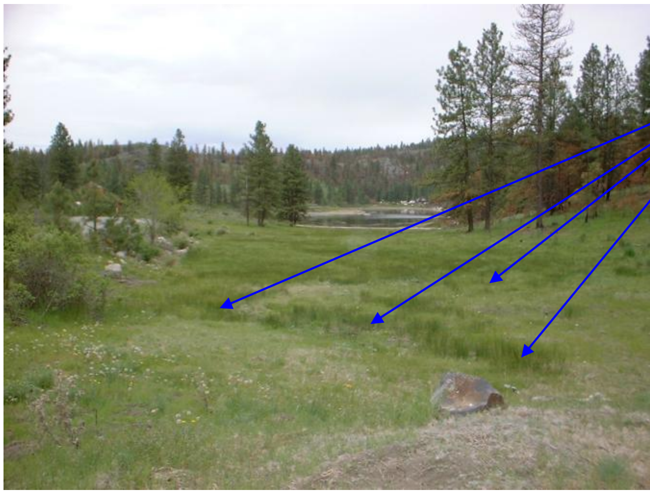


Figure 29: Slope wetland with numerous small depressions created by changes in slope and heavy grazing. The depressions in the wetland covered about 15-20% of the wetland and met the criterion of >10% of the area.

S 4.0 Does the Slope Wetland Have the <u>Opportunity</u> to Reduce Flooding and Erosion?

Rationale for indicator: At first glance, it may be difficult to understand how slope wetlands even perform the hydrologic functions, and thus have an opportunity. Consider, however, a case where the slope wetland is covered with a parking lot. Surface runoff will leave the parking lot much faster than if the area is covered with a dense growth of emergent plants. It is the physical structure provided by plants and small depressions that act to retard surface flows. These physical structures in turn protect resources that are downhill or downstream of the wetland. Slope wetlands have the opportunity to perform the hydrologic functions if there are resources downgradient that can be impacted by water coming from the slope wetland.

Answer YES if the wetland is in a landscape position where the reduction in water velocity it provides can reduce damage to downstream property and aquatic resources.

Users of the rating system must make a qualitative judgment on the opportunity of the slope wetland has to protect resources from flooding and erosive flows. Generally, a slope wetland does have the opportunity if:

- Wetland has surface runoff that drains to a river or stream that floods
- There are resources downhill of the wetland that might be damaged by excessive flows

NOTE: Slope wetlands **do not** have the opportunity if the following conditions are present:

- The major source of water is a groundwater seep fed or created by high groundwater resulting from irrigation practices.
- The major source of water is a groundwater seep controlled by a reservoir (e.g. a seep that is on the downstream side of a dam)

5.3.7 Questions Starting with "H" (for Habitat Functions)

Functions Related to Habitat for All Classes of Wetlands

H 1.0 Does the Wetland Have the Potential to Provide Habitat?

H 1.1 *Vegetation structure:*

Rationale for indicator: This indicator addresses two types of vegetation structure, the "Cowardin" vegetation types and several size ranges within the emergent type of vegetation. First, more habitat niches are provided within a wetland as the number of vegetation types increases. The increased structural complexity provided by different vegetation types optimizes potential breeding areas, escape, cover, and food production for the greatest number of species (Hruby et al. 2000). Secondly, the team developing the methods for assessing wetland functions in the Columbia Basin judged that different guilds of species may partition the habitat based primarily on "height" differences in the emergent vegetation. Different heights of emergent vegetation provide different niches for organisms. The assessment team determined that the varying heights of emergent vegetation in the Columbia Basin played a significant role in providing structural complexity that might otherwise, in wetter environments, be provided by scrub/shrub and forested vegetation. This increased species richness arising from the increased structural diversity also supports a greater number of terrestrial species in the overall wetland food web (Hruby et al 2000).

For this question you will need to identify the "Cowardin" classes of vegetation in the wetland and whether the emergent class has areas where plants are of different heights. Vegetation classes are grouped into 6 categories.

- Aquatic bed
- Emergent plants 0-12 inches high (0 – 30 cm)
- Emergent plants >12 – 40 inches high (>30 – 100cm)
- Emergent plants > 40 inches high (> 100 cm)
- Scrub/shrub (areas where shrubs have >30% cover)
- Forested (areas where trees have >30% cover)

If you have determined there is an "emergent" type of vegetation in the wetland, you will need to estimate whether these plants can be further divided based on the heights of the plants. There are three size criteria: 0-12 inches (0-30 cm), >12-40 inches (>30 – 100 cm), and more than 40 inches (> 1m). Record the number of different categories of plant height categories in the wetland. Remember, a height category must cover at least ¼ acre, or 10% of the wetland for wetlands smaller than 2.5 acres, to be counted.

Do not count the actual vertical height of vegetation that is broken or on the ground when identifying structure categories. Use the estimated vertical height of vegetation before it was knocked down. Figure 31 shows a wetland with three concentric rings of emergent plants of different heights.

NOTE 1: Each class of vegetation or height category of emergent species has to cover more than ¼ acre, or if the wetland is smaller than 2.5 acres 10% of the wetland area. Cowardin" vegetation types are distinguished on the basis of the uppermost layer of vegetation (forest, shrub, etc.) that provides more than 30% surface cover within the area of its distribution.

NOTE 2: Aquatic bed plants do not always reach the surface and care must be taken to look beneath the water's surface. Because waterfowl can heavily graze certain species of aquatic bed early in the growing season, it can be incorrectly concluded that aquatic bed is not present if the field visit is made during this time period**. Therefore, examine the substrate in open water areas for evidence of last year's growth of aquatic bed species.** If a wetland is being rated very late in the growing season, when either the standing water is gone or very limited in extent, examine mudflats and adjacent vegetated areas for the presence of dried aquatic bed species (Figure 30).

Comment [61]: *Nuphar* is considered as aquatic bed, not emergent, where ever we find it. Water level fluctuations in western Washington are so great that it is difficult to base the classification on water levels. The intent of the question was to highlight habitat functions, and *Nuphar* generally has the habitat characteristics of aquatic bed rather than emergent regardless of whether it sticks out above the water or is below it. See page 30 for a description on how to identify aquatic bed vegetation.

NOTE 3: If a vegetation type is distributed in several patches, the patches can be added together if the patches are large enough. Large enough means that 10 or fewer patches are needed to meet the size threshold (average patch size is greater than 10% of threshold).

Figure 30. Aquatic bed plants that have been bleached by the sun and left stranded as the water levels receded during the summer.

NOTE 4: You cannot assume that a plant species will always be of the same height category. Reed canary grass is a good example. This species will grow to be 6 ft. tall in nutrient rich wetlands, but it will be less than 40" tall if it is stressed by too much water. The same can be said for *Juncus effusus* which is usually 12-40" tall but can reach 5 feet in some wetlands.

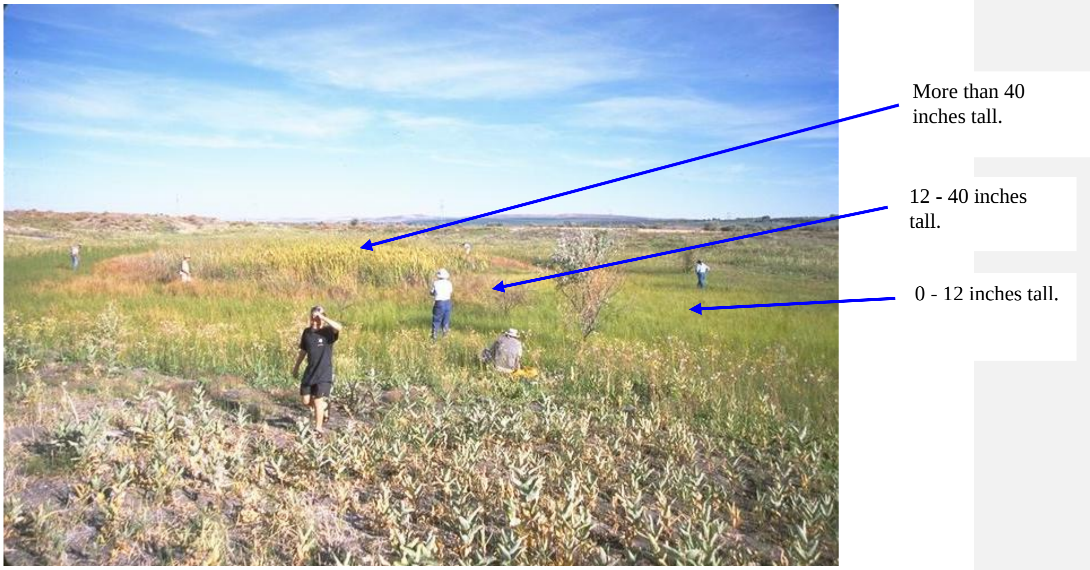


Figure 31: A depressional wetland with three height classes of emergent plants.

H 1.2 *Is one of the vegetation types "aquatic bed?"*

Rationale for indicator: Aquatic bed plants were judged to be more important than the other vegetation types as a habitat feature in eastern Washington. The increased structural complexity provided by aquatic bed species increases habitat niches for a number of invertebrate and vertebrate species. The team developing function assessment methods for eastern Washington observed an increase in the number of invertebrate species when aquatic bed plants were present (unpublished data from validation of methods for assessing functions).

Add one point to the habitat score if the wetland was identified as having aquatic bed vegetation in 3.1 above.

H 1.3 *Surface Water:*

H 1.3.1 *Does the wetland have areas of ponded surface water without emergent or shrub plants over at least 10% of its area during the spring (March to early June) OR in early fall (August to end of September)?* ***Note: answer YES for Lake-fringe wetlands.***

Rationale for indicator: This indicator attempts to capture several different habitat features that are important for birds, bats, and amphibians. It represents a simplification of several habitat indicators used in the methods for assessing functions (Hruby et al. 2000) that are too complex for this rating system. Generally, open water provides an area for waterfowl access to the wetland. It also is an indicator of potentially greater underwater structural heterogeneity that supports a greater variety of invertebrate food sources for different species of waterfowl. The presence of open water is also an indicator that the wetland may hold water long enough to provide for the successful incubation of amphibian eggs (Hruby et al. 2000). Open water also provides space for flying insectivores such as bats and some birds to forage near the wetland surface. The time periods for open water specified in the question (March – June, or August – September) coincide with the peak of the waterfowl migrations. The question is divided into two parts to avoid ambiguity. Some riverine wetlands have "open" water in the form of a stream. Streams play a similar role in riverine wetlands that open water does in depressional wetlands. Lacustrine wetlands, by definition, have to have open water adjacent to them, and thus, are answered "yes" in all cases.

To answer this question you will have to determine if the wetland has surface water present during the specified seasons without any persistent emergent, shrub, or forest species poking up through the water. You are trying to judge if the wetland has open water on which waterfowl can land or if flying insectivores can forage near the surface. Aquatic bed species are not a detriment for this indicator because they do not cover the open water all the time. There is a period during the early part of the growing season when the water is open, before the aquatic bed species grow to the surface.

It may sometimes be hard to determine if a wetland has open water if you do your field work outside the times specified (March – June and August – September). There are however, some indicators that can be used to determine if surface water was present.

- If the **entire** central (or deepest) part of the wetland is covered with large species such as cattails and bulrushes (see Figure 31), you can assume the wetland **does not** have open water.
- If the wetland still has standing water outside the zone of emergent plants in July or October, you can assume the wetland **does** have open water during the spring and late summer (see Figure 30).
- If the wetland has exposed areas of "mudflats" without any vegetation (Figure 32), you can assume the wetland **does** have open water.

Figure 32: A mudflat indicates the presence of open water earlier in the season.

The size threshold for this indicator is ¼ acre, or 10% of the area of the wetland if the wetland is smaller than 2.5 acres. This may require you to make a rough sketch of the wetland, and on it superimpose an outline of the area of open water.

H 1.3.2 *Does the wetland have an intermittent or permanent stream within its boundaries or along one side with an unvegetated bottom (answer only if H 1.3.1 is NO)?*

Consider this question only if the wetland does not have any open water as defined in H 1.3.1. Some riverine wetlands or depressional wetlands without "open" water may have a stream or river adjacent or within it. The open water provided by the stream plays a similar ecological role as the "open" water defined above. If you answered NO to H 1.3.1 you will need to determine if there is a permanently or seasonally flowing stream or river in the wetland. To answer "yes" for this question the stream or river needs to have defined banks with a bottom that is not vegetated and cover at least 10% of the wetland area. Also answer "yes" if the wetland is along the side of a stream or river with an unvegetated area that is at least 16 ft (5m) wide.

H 1.4 *Richness of Plant Species:*

Rationale for indicator: The number of plant species present in a wetland reflects the potential number of niches available for invertebrates, birds, and mammals. The total number of animal species in a wetland is expected to increase as the number of plant species increases (Hruby, et al. 2000). For example, the number of invertebrate species is directly linked to the number of plant species (Knops et al. 1999). This indicator includes both native and non-native plant species (with the exceptions noted below) because both provide habitat for invertebrate and vertebrate species. The six non-native species excluded from the count tend to form large mono-cultures that exclude other species and reduce the structural richness of the habitat.

As you walk through the wetland, or do your delineation, keep a list of the patches of different plant species you find. You do not have to record individual plants, only species that form patches that cover at least 10 square feet. Different patches of the same species can be combined to meet the size threshold.

Comment [62]: This threshold was established to reduce the variability among users with different levels of expertise in identifying plants.

You should try to identify plants, but keying them out is not necessary. All you need to track is the total number, so you can identify species as Species 1, Species 2, etc. In order to capture the full range of plant species present during the year, record any species that are "dead" and recognizably different from other species present.

For this question the following species are **NOT TO BE INCLUDED** in the total: Eurasian water-milfoil (*Myriophyllum spicatum*), reed canarygrass (*Phalaris arundinaceae*), Russian olive (*Elaeagnus angustifolia*), Canadian thistle (*Circium arvense*), salt cedar (*Tamarix pentandra*), and "yellow-flag" iris (*Iris pseudacorus*).

H 1.5 *Interspersion of Habitats:*

Rationale for indicator: In general, interspersion among different physical structures (e.g. open water) and types of vegetation (e.g. aquatic bed, emergent vegetation of different heights) increases the suitability for some wildlife guilds by increasing the number of ecological niches (Hruby et al. 2000). For example, a higher diversity of plant forms is likely to support a higher diversity of macro-invertebrates (Chapman 1966, Dvorak and Best 1982, Lodge 1985).

In question H.1.1 you determined how many different vegetation types are present in the wetland being rated and in question H 1.3 you determined if there was any open water present. This question uses the information from both questions and asks you to rate the "interspersion" between these structural characteristics of the wetland. The diagrams on the rating form show what is meant by ratings of High, Medium, Low, or None. Each area with a different shading represents a different habitat structure, either a vegetation type or open water.

Comment [63]: In this question vegetation types or categories refer to the Cowardin classes determined in H 1.1. The question about the number of layers in the forest does not qualify as a "vegetation type."

Comment [64]: Cowardin class

To answer this question first consider if the interspersion falls into the two "default" ratings. If the wetland has only one vegetation category present (question H 1.1) and no open water, it will always be rated as NONE (see Figures 6, 7). If the wetland has four vegetation types (from question H 1.1), or three types and open water (from questions H1.1 and H 1.3) it will always be rated as HIGH. The only time you will have to make a decision is when the wetland has two or three types of structure.

Comment [65]: In scoring units with **two types of structure** the difference between LOW and MODERATE interspersion is the amount of edge habitat between the structures. Units with convoluted edges are scored moderate. Those with relatively straight edges are scored "low." For units with three types of structure the same criterion is used to differentiate between a MODERATE and HIGH scoring.

For example, the wetland in Figure 31 has three concentric rings of different size emergent plants and no open water. This wetland is rated as Moderate for interspersion (see the fourth diagram on the rating form). The wetland in Figure 33 has one vegetation type and open water in a concentric system. It is rated as LOW (see the second diagram on the rating form).

Additional notes for determining the interspersion are:

- Lake-fringe wetlands will always have <u>at least</u> two categories of structure (open water and one type of vegetation).
- A wetland with a meandering, unvegetated, stream (seasonal or permanent) should be rated MODERATE if it has only one vegetation category, or HIGH if it has two or more.

- Several isolated patches of one structural category (e.g. patches of open water) should be considered the same as one "patch" with many lobes.

Figure 33: A depressional wetland with one height category of emergent plants and open water. The interspersion is rated as LOW.

H 1.6 *Special Habitat Features:*

Rationale for indicator: There are certain habitat features in a wetland that provide refuge and resources for many different species. The presence of these features increases the potential that the wetland will provide a wide range of habitats (Hruby et al. 2000). These special features include: 1) rocks within the area of surface ponding or large downed woody debris in the wetland, 2) cattails or bulrushes as indicators of long periods of ponding, 3) snags, 5) emergent or shrub vegetation in areas permanently ponded, and 6) steep banks of fine material that might be used by aquatic mammals for denning.

In many instances rocks mimic the function of large woody debris typically found in western Washington, but rarely found in the Columbia Basin. Rocks provide refuge, habitat, and structure for a number of different species. Woody debris, snags, and erect vegetation, where present, provide major niches for decomposers (i.e. bacteria and fungi) and invertebrates. They also provide refuge for some amphibians and other vertebrates. Downed woody material and the duration of ponding are important structural elements of habitat for many other species. (review in Hruby et al. 2000).

Record on the rating form the presence of any the following special habitat features within the wetland:

- Rocks > 4 inches (10cm) in diameter <u>or</u> large woody debris that is more than 4 inches in diameter within the area that is seasonally or permanently ponded (Figure 34, Figure 35).
- Presence of cattails (*Typha* sp.) or bulrushes (*Scirpus acutus*).
- Snags present in the wetland, or in the first 30 ft of the buffer, that are more than 4 inches in diameter at breast height.
- Emergent or shrub vegetation is found in areas that are permanently ponded. The presence of "yellow flag" Iris is a good indicator of vegetation in areas that are permanently ponded.
- Steep banks of fine material for denning, or evidence of use of the wetland by

beaver or muskrat. Look for banks that are at least 33 ft long, 2 ft. high within or immediately adjacent to the wetland and determine if they have the following characteristics: steep bank of at least 45 degrees slope, with at least a 3 foot depth of fine soil such as sand, silt, or clay. This criterion can also be met if there is evidence of recent use of the area by beaver. Recently cut trees and shrubs, where the cuts are conical, are good evidence of beaver use (Figure 36).

- Invasive plants cover less than 20% of the wetland area in each vertical stratum of plants present in the wetland (i.e. canopy, understory, herbaceous ground-cover). For example, a forested wetland with a 100% canopy of native species but with an understory of reed canary grass that covered 70% of the ground would not quality for this characteristic. The species that are considered "invasive" for answering this question are as follows:
  - *Circium arvense* (Canadian thistle)
  - *Rubus laciniatus* (evergreen blackberry)
  - *Rubus discolor* (Himalayan blackberry)
  - *Polygonum cuspidatum* (Japanese knotweed)
  - *Polygonum sachalinense* (giant knotweed)
  - *Polygonum cuspidatum x sachalinense* (hybrid of Japanese and giant knotweeds)
  - *Lysimachia vulgaris* (garden loosestrife)
  - *Lythrum salicaria* (purple loosestrife)
  - *Myriophyllum spicatum* (European milfoil)
  - *Phalaris arundinaceae* (reed canarygrass)
  - *Phragmites australis* (common reed)
  - *Tamarix spp*.(either *Tamarix ramosissima* and/or *T. parviflora*, salt cedar. There is some dispute regarding the correct taxonomy of the deciduous species of tamarisk that have escaped and become invasive in western North America.)

Comment [66]: Only the species on the list count as invasive. This is the list on which the experts developing and reviewing the rating system could agree. Other species may be considered invasive by one of more botanists but we could not achieve consensus to include any others on the list.

Figure 34: Rocks within area of surface ponding.

Figure 35: Large woody debris in wetland.

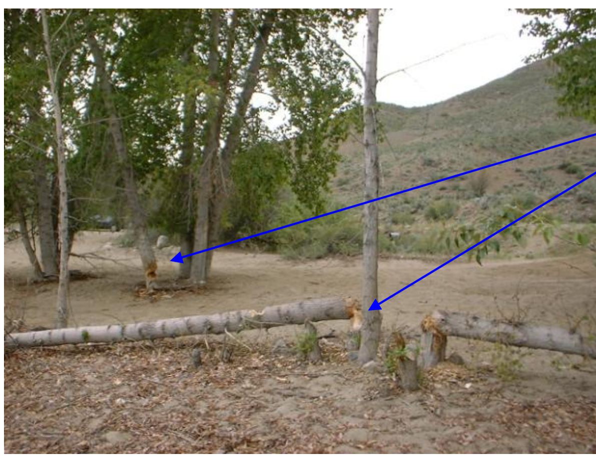


Figure 36: Evidence of beaver activity. Note the conical shape of the cut.

Make a check on the data sheet next to the description of each habitat feature. When you have checked for the presence of each, add the total that are present and record that as a score in the right-hand column.

H 2.0 Does the Wetland Have the Opportunity to Provide Habitat?

H 2.1 *Buffers:*

Rationale for indicator: The condition of the buffer affects the ability of the wetland to provide appropriate habitat for a wide range of wetland dependent and upland species. Undisturbed buffers provide access (i.e. opportunity) to the wetland, thereby increasing the suitability of the wetland itself as habitat. For a review of how buffers affect the opportunity of a wetland to provide habitat see McMillan (2000). Relatively undisturbed buffers in excess of 330 feet are needed for a wetland to provide the best habitat (see reviews in Desbonnet et al. 1994, McMillan 2000).

Determine the condition of the buffer around the wetland using the descriptive key in the rating form. If the condition of the buffer does not match the description exactly, use the description that most closely matches. The descriptions focus on the width of the relatively undisturbed buffer and its relative length along the circumference of the wetland. The buffer areas adjacent to the wetland may be wetland, deep open water, or upland areas.

First determine if the buffer consists of any relatively undisturbed areas of forest, shrub-steppe, grassland (not currently grazed or tilled), or open water. The buffer is defined as any area (land or water) within 330 ft (100 m) of the edge of the wetland.

Any heavily used paved or gravel roads, residential areas, lawns, tilled fields, parking lots, or actively grazed pastures within a zone along the edge would disqualify the buffer from being "relatively undisturbed." Bridges crossing streams or rivers within the buffer are considered as a "disturbance." Infrequently used gravel or paved roads or vegetated dikes in a relatively undisturbed buffer, however, can be ignored as a "disturbance." Open water that is not part of the wetland is considered part of the buffer. The open water can be considered undisturbed unless there is heavy boat traffic there.

NOTE: The criteria for categorizing the buffer are hierarchical. This means that you first determine if the buffer meets the first criterion. If it does, it is scored 5 points. If it does not have a relatively undisturbed area of 330 ft (100 m) or more for more than 95% of its circumference, you determine if it matches the criterion for a buffer with a score of 4. If none of these criteria can be met, go to the criteria for the third category and assign 3 points if they are met, etc.

Comment [67]: relatively undisturbed."

1. Areas dominated by invasive species are not considered disturbed unless you also have other evidence of disturbance still present. The invasive species could be a result of some past disturbance that is no longer present.

2. Logged areas that have been undisturbed for at least 5 years can qualify as "relatively undisturbed." This includes hybrid poplar plantations that are more than 5 years old.

3. Buffers that are regularly accessible to dogs, either from residential areas or from people walking their dog should be treated as disturbed. Dogs and other pets cause stress among the animals using a wetland.

We were not able to describe all possible conditions in a wetland. If you are rating a wetlands and you disagree with some of the definitions of undisturbed you may wish to record your different judgment and the rationale for why the buffer should be rated as "disturbed" or "undisturbed."

Comment [68]: Heavy boat traffic means daily motor activity during the summer that may flush bird species, add oil based pollutants, and create loud noise. Some professional judgment should be used to answer this question because we cannot specify all possible conditions.

Figure 37: A wetland with no vegetated buffer. It scores a [0] on the buffer question.

H 2.2 *Wet Corridors:*

Answer these questions in sequence. If you answer YES for any question starting with H2.2.1 record the appropriate points and go to question H 2.3. You only get one score for this question, even if more than one of the indicators are present in the wetland.

Rationale for indicator: Creeks and other drainages, especially in the drier portions of eastern Washington, have been shown to be important dispersal and foraging areas for both terrestrial and aquatic species including amphibians, mammals, and birds. Corridors provide areas for hibernation, foraging, and migration and dispersal for some amphibians (Nussbaum and others 1983, Seaburn 1997, W. Leonard, personal communications). The presence of natural corridors with water in them increases a wetland's opportunity to provide habitat because there is a larger pool of species that can use the wetland (Hruby et al. 2000). In the absence of corridors with water in them, a wetland still has a better opportunity to provide habitat if there are other aquatic resources nearby. Reasons include: 1) a variety of upland habitat niches interspersed with different water sources results in greater habitat partitioning; 2) more opportunities for refuge, food and migration; and 3) more opportunity for re-colonization by wildlife species in years of drought (Hruby et al. 2000).

H 2.2.1 *Is the wetland part of a relatively undisturbed and unbroken vegetated corridor at least 1/4 mile long with surface water or flowing water throughout most of the year (> 9 months/yr)?*

Start by looking for streams or channels coming into the wetland or leaving it. In riverine wetlands the stream or channel may be along one side. Man-made ditches with flowing water can count as "wet" corridors. Generally, this is the same as a "riparian" corridor, but this term is not being used because of its many definitions. The term "wet" is used rather than "riparian" to avoid confusion with the many definitions of the latter term.

The next question is to determine if the water flows, or is present, for most of the year or only seasonally. If you visit the wetland during the summer and fall (dry season) and find flowing water you can assume the flow occurs throughout most of the year (unless the primary source of water is irrigation). If, however, you find water in the channel or stream during the spring, it may be harder to determine whether flow continues throughout most of the year. Ask local residents to determine if the flow is only seasonal. This may be the easiest way to determine the question. If this is not possible, you will have to use your judgment and base your answer on your interpretation of the landscape, size of watershed, annual rainfall, presence of irrigation, etc.

NOTE 1: The wet corridors must be relatively undisturbed, unbroken, vegetated (at least 30% cover of any vegetation), and at least 50ft wide to score points. Potential breaks in a wet corridor include road grades without box culverts, paved roads, dams, heavily used gravel roads, fields tilled to the edge of stream, or pasture to edge of stream. Disturbances include residential areas within 100 ft of the stream, or heavy to moderate grazing. Gravel roads that are not often used can be considered as "relatively undisturbed." If, however, the gravel road crosses the corridor on a dike or berm without any culvert it should be considered as a "break" in the wet corridor.

Comment [69]: A heavily used path in a city park is considered to be a break in the corridor.

Comment [70]: Power line corridors can be considered as vegetated corridors only if they have at least a 30% cover of plants that have not been disturbed (i.e. mowed, cut, etc.) within the last five years

NOTE 2: The lake adjacent to a lake-fringe wetland is not considered a "wet" corridor because it is not vegetated. If your wetland is a lake-fringe wetland, answer question H 2.2.2 as YES and add 2 points to the score rather than 4.

NOTE 3: The status of some riverine wetlands may be hard to determine. If the riverine wetland has a surface water connection to the main river, or one side of the wetland is adjacent to the river, answer YES for question H 2.2.1. If, however, the wetland lies in the floodplain and is "connected" to the river only during floods answer NO to question H 2.2.1 and YES to question H 2.2.2.

H 2.2.2 *Is the wetland part of a relatively undisturbed and unbroken, vegetated corridor, at least ¼ mile long with water flowing seasonally* ***OR*** *a Lake-fringe wetland without a "wet" corridor,* ***OR*** *a riverine wetland without a surface channel connecting to the stream?*

If there is a stream or channel connecting the wetland to other aquatic resources and you know the surface water there is only seasonal, answer YES to this question. The other case where you answer YES is if the wetland is classified as a lake-fringe wetland or a riverine wetland without direct water connection to the river except during floods.

H 2.2.3 *Is the wetland within a 1/2 mile of any permanent stream, seasonal stream, or lake (do not include man-made ditches)?*

If there are no "wet" corridors connecting to the wetland, determine if there are streams, rivers, or lakes nearby within ½ mile. A wetland with a broken, unvegetated, or disturbed wet corridor should be scored YES for this question.

H ***2.3*** *Near or adjacent to other priority habitats listed by WDFW:*

> **Rationale for indicator**: The Washington State Department of Fish and Wildlife has identified special habitats with unique or significant value to a diverse assemblage of species. The presence of these habitats increase a wetland's opportunity to provide important habitat resources because the unique species found in these priority habitats will use the wetland for foraging and water. The importance of a wetland as a habitat resource in the landscape increases if it can be used by the unique, critical, or rare species associated with the priority habitats.

You are asked to determine if any habitats that meet the WDF definitions of priority habitats are within 330 ft of the wetland (100m). The descriptions of the habitats are copied directly from WDFW (as of April 1, 2003) and any updates are available on the department's web page http://wdfw.wa.gov/hab/phshabs.htm.

Aspen Stands: Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

Cliffs: Greater than 25 ft (7.6 m) high and occurring below 5000 (ft1524 m).

> WDFW has changed the descriptions of priority habitats in 2008. Please access the latest list that should be used to answer this question at http://www.ecy.wa.gov/programs/sea/wetlands/ratingsystems/index.html
>
> The link to the updated form is on this page as well as the WDFW definitions currently in use.

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m) diameter

30-35 cm),

o slight as to

not affect the ecosystem's essential structures and functions.

Mature forests: Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; Oldest trees are 80 - 160 years old east of the Cascade crest.

Prairies and Steppe: Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community.

Shrub-steppe:

Shrub-steppe Large Tracts: Tracts of land > 640 acres (259 ha) consisting of plant communities with one or more layers of perennial grasses and a conspicuous but discontinuous layer of shrubs. Large tracts of shrub-steppe contribute to the overall continuity of the habitat type throughout the region because they are relatively unfragmented, contain a substantial amount of interior habitat, and are in close proximity to other tracts of shrub-steppe. These tracts should contain a variety of habitat features (e.g., variety of topography, riparian areas, canyons, habitat edges, plant communities). Another important component is habitat quality based on the degree with which a tract resembles a site potential natural community, which may include factors such as soil

Comment [71]: The WDFW maps of priority habitats are not all inclusive, so one should not rely on them in cases where priority habitats are not mapped. If the areas are identified on the WDFW database then you can assume it is correct. Its absence from the database, however, is not proof that it is NOT a priority habitat.

Comment [72]: This connection does not have to be undisturbed.

Comment [73]: Wetlands are specifically excluded from the list of priority habitats because all wetlands fall into this category. Adjacent wetlands are addressed in question 2.4. Giving additional points to all wetlands because they are all priority habitats would be meaningless in determining a relative level of functioning.

Comment [74]: There is no size threshold for establishing a forested priority habitat: The following citation is from DFW - Stephen Penland, Environmental Services Division Manager and Eric Larsen, (formerly PHS Coordinator)

"Wildlife functions of a patch of forest usually decrease as the patch size of the forest becomes smaller, especially if it becomes surrounded by urban development. At the same time, there is no doubt that such a forest patch, even if it is quite small, will support more wildlife species than an urbanized area of the same size. Ultimately, it is up to the local jurisdiction to determine if it will incorporate undeveloped lands (including small remnants of old growth forest) into an urban park system or an open space network for the sake of the area's wildlife, or whether it wants to sacrifice such areas (and the wildlife that use them) in order to increase urban densities. That is strictly a political call on the part of the local jurisdiction that is trying to balance multiple GMA goals that may be mutually exclusive at any one site. Therefore, there is no size threshold for defining or delineating an old growth or mature forest. Bigger is better, but even very small remnants of forests will contribute to local biodiversity within cities and towns."

condition and degree of erosion; and distribution, coverage, and vigor of native shrubs, forbs, grasses, and cryptogams.

Shrub Steppe Small Tracts: Tracts of land <640 acres (259 ha) with a habitat type consisting of plant communities with one or more layers of perennial grasses and a conspicuous but discontinuous layer of shrubs. Although smaller in size and possibly more isolated from other tracts of shrub-steppe these areas are still important to shrub-steppe obligate and other state-listed wildlife species. Also important are the variety of habitat features and habitat quality aspects as listed above.

Talus: Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

Caves: A naturally occurring cavity, recess, void, or system of interconnected passages (including associated dendritic tubes, cracks, and fissures) which occurs under the earth in soils, rock, ice, or other geological formations, and is large enough to contain a human. Mine shafts may mimic caves, and those abandoned mine shafts with actual or suspected occurrences of priority species should be treated in a manner similar to caves. A mine is a man-made excavation in the earth usually used to extract minerals.

Oregon White Oak: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%; or where total canopy coverage of the stand is <25%, but oak accounts for at least 50% of the canopy coverage present. The latter is often referred to as oak savanna. East of the Cascades, priority oak habitat consists of stands 2 ha (5 ac) in size. In urban or urbanizing areas, single oaks or stands < 0.4 ha (1 ac) may also be considered a priority when found to be particularly valuable to fish and wildlife.

Urban Natural Open Space: A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats*, especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development.

Aspen Stands: Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

Riparian: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. Riparian habitat encompasses the area beginning at the ordinary high water mark and extends to that portion of the terrestrial landscape that is influenced by, or that directly influences, the aquatic ecosystem. Riparian habitat includes the entire extent of the floodplain and riparian areas of wetlands that are directly connected to stream courses.

Comment [75]: Generally an urban open space can be counted as a priority habitat only once for question H2.3 even if it meets the criteria for more than one priority habitat. An area that is riparian as well as urban open space would still count only as one priority habitat within 100m. This, however, applies only to urban open spaces because the boundaries of this habitat are determined by property lines, not by habitat features. If a parcel of land has several priority habitats in different areas, all within 100 m of the wetland, they are all counted.

Comment [76]: The definition of urban open space is from WDFW, and we have found its interpretation may differ among jurisdictions. If there is any question I suggest you contact your local WDFW biologist.

H 2.4 *Position in Landscape:*

Rationale for indicator: This indicator addresses two aspects of a wetland's position in the landscape that affect its opportunity to provide habitat. The first is rainfall. Wetlands in areas of the state with low rainfall are an oasis for birds, amphibians and terrestrial wildlife. The importance and suitability of a wetland within the overall ecosystem increases with a decrease in annual precipitation since wetlands play a relatively more important role in maintaining habitat for all species (Stein and Ambrose 2001). The opportunity is reduced, however, in an arid landscape where there is a significant input of water through irrigation or dams. Wetlands in arid areas, where the amount of surface water is increased through human activities, are not considered as important because the lack of rainfall is augmented by human sources.

The second factor in the landscape is proximity to other wetlands (often called a wetland mosaic). The presence of adjacent wetlands increases the opportunity that the wetland can provide suitable habitat for a large number of species. Reasons include: 1) a variety of upland habitat niches interspersed with different water sources results in greater habitat partitioning; and 2) more opportunities for refuge, food and migration; and 3) more opportunity for re-colonization by wetland-dependent wildlife species in years of drought

For this question you will need to choose the description of the landscape around the wetland that best fits. If several descriptions apply, use the one that gives the most points.

Comment [77]: This is the wetland unit you are rating. If the unit is part of a larger wetland complex, the surrounding wetlands count as other wetlands within ½ mile.

The wetland is in an area where annual rainfall is less than 12 inches, and its water regime is not controlled by irrigation practices, dams, or water control structures.

If you do not know the average annual rainfall at or near the wetland you can access this information on the Internet. The USGS maintain rain gauges throughout the state, and the agency summarizes the annual rainfall data for over 100 sites on their web site (http://www.wrcc.dri.edu/summary/climsmwa.html). To determine if the rainfall at the wetland being rated is more or less than 12 inches per year, access the data for the gauge that is closest to the wetland.

If you determine that the wetland is in an area that receives less than 12 inches of rain a year, you will have to determine that the water regime is **NOT dominated** by water from the following activities before the wetland can be scored the 5 points for this question:

- Irrigation practices - irrigation return flows on the surface or shallow subsurface
- Dams - the wetland is in a backwater of a dam or reservoir

Generally, this means the wetland is outside the boundaries of reclamation areas, irrigation district, or reservoirs.

There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore are OK, but connections should NOT be bisected by paved roads, fill, fields, or other development).

Comment [78]: This would include removal of the larger natural vegetation such as occurs in powerline right of ways. See Comment 70.

Aerial photographs, NWI maps, or local wetland inventory maps can be useful in answering this question. If these data are not available, a visual survey of the surrounding countryside may be necessary. For this question you are looking only for vegetated wetlands. Other aquatic resources (e.g. streams, unvegetated lakes, etc.) are not to be counted.

"Relatively undisturbed" is used in the same way as in question H 2.1. It means that the connections between the wetlands are naturally vegetated (does not, however, have to be native species), and free of regular disturbances such as:

- Tilling and cropping
- Residential and urban development
- Moderate to heavy grazing
- Paved roads or frequently used gravel roads
- Mowing

There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed.

In this case the wetland only needs to be within ½ mile of three other wetlands. The connections between the wetland being rated and the others are disturbed.

There is at least 1 wetland within ½ mile

In this case the wetland only needs to be within ½ mile of only one wetland, and the connections can be either disturbed or undisturbed.

H 3.0 Does the wetland have indicators that its ability to provide habitat are reduced?

H 3.1 *Indicator of reduced habitat functions – Do the areas of open water in or next to the wetland have a resident population of carp?*

> **Rationale for indicator**: The carp's foraging behavior disturbs the submerged bottom to such an extent that emergent and aquatic bed vegetation is reduced. This in turn limits the number of habitat niches for invertebrates and reduces the food available for aquatic birds. The constant disturbance also re-suspends sediment and reduces water quality. The carp's foraging behavior disturbs the submerged bottom to such an extent that emergent and aquatic bed vegetation are reduced and this further reduces habitat structure (Hruby et al. 2000, Adamus et al. 2001). This indicator, however, does not apply to wetlands fringing reservoirs formed behind dams. Observations made by the field team during the calibration of the rating system suggest that most reservoirs have large water level fluctuations. It was not possible to determine if the reductions in the habitat structure and reduced vegetation cover were a result of the water level fluctuations or a result of activity by the carp. Furthermore, the vegetated borders along these reservoirs are often dry and inaccessible to carp. The score for Lake-fringe wetlands along reservoirs should not be reduced if carp are present.

Indicators for the presence of carp include shallow open water areas devoid of emergent vegetation, suspended sediment in water column, carp scales and bones along the edge of the wetland, and direct observation of carp in the water or jumping. Also use interviews with local fisheries biologists and fishermen to determine if fish are present.

If carp are present, the overall score for the habitat functions is reduced by five points.

Calculating the Score and Category Based on Functions

Add the points for the habitat questions and record them on the first page of the rating form. Add all three scores together and determine the category for the wetland. Wetlands that are Category I based on functions need to score more than 70 points. Total scores between 51-69 are Category II; 30-50 are Category III, and less than 30 are Category IV.

5.4 CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

This rating system was designed to differentiate between wetlands based on their sensitivity to disturbance, their significance, their rarity, our ability to replace them, and the functions they provide. The first four criteria can be considered as values that are somewhat independent of the functions provided by a wetland. Questions SC 1 to SC 5 provide the information needed to identify and rate the wetlands with these special characteristics. These types of wetlands have an importance or value that may supercede their functions. **You should determine whether the wetland being rated meets any of the conditions described below as well as answering the questions about functions.**

SC 1.0. Vernal pools

Vernal pools are precipitation-based, seasonal wetlands. For the purposes of this rating system they include only "scabrock" and "rainpool" vernals. Pools where surface water ponds for short periods that are found in forested areas, or surrounded by trees and shrubs, are not considered vernal pools in the context of this rating system. Figures 38 and 39 show typical vernal pools in the scabland area.

> <u>Relatively undisturbed vernal pools are either a category II or III, depending on their location in the landscape.</u>

Figure 38: A scabrock vernal pool above Lake Lenore. Photo taken 7/14/99.

Figure 39: A scabrock vernal pool with water still in it. The pool is in a grazed pasture but undisturbed in early spring.

To be classified as a vernal pool the wetland should be less than 4000 ft^2, and meet **at least two** of the following criteria:

— *Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input.* The wetland will typically lie in areas where the basalt has been exposed by the ice age floods. It has formed in a small surface depression in the basalt and does not have an outlet.

— *Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals.* The water is present in the wetland for only short periods of time, usually less than 120 days. Wetland plants will be found only during the time of standing water or immediately afterwards. NOTE: If you find perennial, "obligate," wetland plants the wetland is probably NOT a vernal pool.

— *The soils in the wetland are shallow (< 30 cm or 1ft deep) and are underlain by an impermeable layer such as basalt or clay.* You can determine the depth of the soil by digging a small hole with a tile spade. Determining if the impermeable layer is basalt should be easy (can't dig any further), but identifying a clay layer is harder. You may have to take some of the soil between your fingers, add water, and feel if it is "greasy" and smooth (without grit). If in doubt, use the "ribbon test" for clay (Appendix B).

— *Surface water is present for less than 120 days during the "wet" season.* Estimating the duration of surface water in a vernal pool wetland is difficult unless one visits the wetland several times and notes the time at which the wetland fills and the time it dries out. Information about the drying and wetting cycles in the wetland may sometimes be obtained from local residents or frequent visitors to the wetland.

SC 1.1 *Is the vernal pool relatively undisturbed in February and March?*

To meet the criterion for "**relatively undisturbed**" a vernal pool has no disturbance within 200 ft during the months of February and March. Disturbance includes grazing, pets, urban or residential noise and human activity including road traffic. If the pool is grazed during the late spring and summer or fall, but not the early spring it can be considered "not disturbed."

SC 1.2 *Is the wetland a relatively undisturbed vernal pool in an area where* ***there are at least*** *3 other separate aquatic resources (other wetlands, rivers, streams, lakes, etc.), within 0.5 miles?*

If the wetland being rated meets the criteria for undisturbed vernal pools described in the section above, determine if there are any other wetlands or aquatic resources within ½ mile. Aquatic resources include lakes, reservoirs, wasteways with open water, rivers, and other wetlands. Use an aerial photograph or topographic map to answer this question if you cannot visit or see the area around the wetland.

<u>If there are at least 3 other aquatic resources nearby the vernal pool is rated as a Category II wetland.</u>

<u>If the wetland is a relatively undisturbed vernal pool with fewer than three aquatic resources within ½ mile it is rated a Category III wetland.</u>

SC 2.0 Alkali wetlands –Alkali wetlands are wetlands with high concentrations of salt. They have formed where groundwater comes to the surface and evaporates. The evaporation over many years has concentrated the salts that were present in the groundwater. These wetlands cannot be replicated through compensatory mitigation to our knowledge, and are rare on the landscape.

<u>All alkali wetlands are Category I wetlands.</u> A wetland is alkali if it meets **one** of the following four criteria.

- *The wetland has conductivity greater than 3.0 mS*. Conductivity is measured with a "conductivity" meter, and the units are "Siemens" or "Mhos". The units of measures are equivalent. For example, 3.0 milliSiemens is the same as 3.0 millimhos. Measure the conductivity at least 1-2 feet from the edge of surface water. If the weather is hot the conductivity at the immediate edge may be much higher because of local evaporation. If you do not have a conductivity meter, you will have to determine if the wetland is alkali using the other criteria listed below.
- *The wetland has a conductivity between 2.0 - 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as "alkali" species (see Table 2 for list of plants found in alkali systems).* The plant list in Table 2 is not exclusive, and the criterion can be met by any plant species known to be salt tolerant.

> Conductivity measures the ability of a solution to conduct an electric current between two electrodes. With an increasing amount of ions (i.e. salts) present in the liquid, the liquid will have a higher conductivity.
> Normal units of measurement are:
> 1 micromho (µmho) = 1 microSiemen (µS),
> 1 millimho (mmho) = 1 milliSiemens (mS) = 1,000 µS

- *If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt.* (Figure 40)

Figure 40: An alkali wetland where surface is covered with salt encrustations. In this wetland the salt was 4-6 inches deep.

Table 2: Plants species that are tolerant of high salt concentration and are often dominant in alkali wetlands.

Latin Name	**Common Name**
Scirpus maritimus	bulrush
Juncus balticus	Baltic rush
Distichls spicata	saltgrass
Potentilla gracilis, P. anserina	Cinquefoils
Salicornia rubra S. virginica	Glasswort, Saltwort
Puccinellia lemmonii	Alkali grass
Bassia hyssopifolia	Smother weed
Eleocharis rostellata	Beaked spike-rush

- *Wetland meets two of the following three sub-criteria.*
  - *Salt encrustations around more than 3/4 of the edge of the wetland*. Alkali wetlands will usually have a rim of salt crystals around their edge as the water in the wetland evaporates. Some freshwater wetlands have a fairly high salt content and are on the verge of being alkali. Such borderline wetlands will have an occasional patch of salt encrusted around its edge. Any wetland, however, where the encrustations are found around more than 3/4 of the edge should be alkali. The eight alkali wetlands found during the function assessment project all met this criterion and had their conductivity confirmed by the meter. Figure 41 gives an example of an alkali wetland with a salt ring around it.

- *More than ¾ of the plant cover consists of species listed on Table 2.*
- *A pH above 9.0.* All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands. The pH can be measured using a pH meter or paper tabs with indicators on them (pH paper).

Figure 41: Salt encrustations around an alkali wetland.

SC 3.0: Natural Heritage wetlands – *Is the wetland a natural heritage wetland?* Wetlands that are Natural Heritage sites have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. To answer this question you first need to determine if the Section, Township, and Range within which the wetland is found contains a Natural Heritage site (Question SC 3.1 on the rating form). Appendix D lists this information for eastern Washington at the time of printing (March 2003). More up-to-date information may be available on the Natural Heritage internet site at (http://www.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf).

If, however, the wetland being rated falls within one of the Section/Township/Ranges listed, you will need to contact the Natural Heritage Program directly to find out if the wetland is a heritage site (Questions SC 2.2 and SC 2.3). Procedures for requesting this information are available on their web site http://www.dnr.wa.gov/nhp/refdesk/index.html (as of July 2004). Another option is to contact the Natural Heritage Program by calling 360-902-1667. You should ask whether the wetland has been identified as a heritage wetland. The Natural Heritage Program will provide information on whether the site contains a Natural Heritage plant community, sensitive species or T/E plant species. If it does it is a Category I wetland.

SC 4.0. Bogs –If the wetland meets the criteria for bogs described below, it is a Category I wetland. Bogs cannot be replicated through compensatory mitigation and are very sensitive to disturbance.

Comment [79]: *DNR has mapped a "wetland system" polygon with a couple of different Natural Heritage wetland types (i.e., bog, riparian, etc.) contained within the system. However, our field investigation revealed that not all of the wetlands contained within the mapped polygon match the wetland descriptions provided in the WDNR database, and some of the wetlands are not hydrologically connected to the wetlands that match the database descriptions. One of the wetlands is in a different drainage sub-basin than the wetlands that match the database descriptions. The wetlands in the mapped polygon are not close enough to each other to be considered a mosaic, per the manual's definition. How does one deal with this situation when trying to rate each wetland separately?*
A. My first suggestion would be to contact DNR and determine from them the exact location of the wetland from their paper files. If they cannot help you I would suggest you include the DNR wetland description on your field form and then describe your wetland in similar terms to show that they are different. This will then be your justification for not categorizing the wetland as Cat. I. This will work, however, only if the descriptions are sufficiently different to be clear to most lay people.

Comment [80]: The presence of T/E/S plant species has to be verified by DNR and officially included in the database before the wetland can be categorized as Category I or the site has to be on the current database. This is an important quality control issue.

Comment [81]: The criterion for bog is met if any area within the unit being rated can meet the criteria for bogs. There are no size thresholds for the size of bogs needed in a wetland to categorize it as a [1].

The terms associated with bogs are complex and often confusing (e.g. bogs, fens, mires, peat bogs, Sphagnum bogs, heath). Bogs occupy one end of a gradient of wetlands dominated by organic soils, low nutrients, and low pH (3.5 – 5.0). Bogs are generally acidic, and have low levels of nutrients available for plants due to receiving water primarily from precipitation. Plants growing in these sensitive wetlands are specifically adapted to such conditions, and are usually not found, or uncommonly found, elsewhere. Relatively minor changes in the water regime or nutrient levels in bogs may cause major changes in the plant community. Bogs, and their associated acidic peat environment, provide a habitat for unique species of plants and animals.

Bogs in Washington State may or may not contain tree species. Most bogs are dominated by shrub and herbaceous vegetation that rarely exceeds three feet in eastern Washington. The ground is usually very spongy and covered with mosses (often of the genus *Sphagnum*). Some bogs will actually float on top of a lake or pond. Many bogs contain highly stunted individual trees of sitka spruce, western red cedar, western hemlock, lodgepole pine, western white pine, Engelmann's spruce, subalpine fir, aspen, or crab apple. However, some bogs contain mature forest species.

Forested bogs are more difficult to identify. They may contain mature, full-sized trees of sitka spruce, western red cedar, western hemlock, lodgepole pine, western white pine, Engelmann's spruce, or aspen. The trees grow very slowly and may take many centuries to reach sizes common in much younger forests. The characteristics that typically identify these forests as bogs are organic soils and, frequently, the presence of shrub or herbaceous bog species such as Sphagnum moss. Sphagnum or other bog species may only cover a small portion of the ground, especially if there are pools of standing water in the forest or if there is substantial litter.

Identifying bogs can be challenging, particularly in a forested setting. It is necessary to confirm the presence of organic soils by digging soil pits, and it further requires the identification of particular plant species. It may also be difficult to determine the boundaries of a bog. The following key was developed as a guide to help in the identification of bogs and is the one used on the Forest Practices Manual.

Key for Identifying Category I Bogs in the Rating System

1. Does the wetland have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)

Yes - go to Q. 3 No - go to Q. 2

The following description of organic soils is from the Natural Resources Conservation Service (formerly the Soil Conservation Service). Soils with an organic carbon content of 18% or more (excluding live roots) if the mineral fraction contains more than 60% clay; 2) soils with an organic carbon content of 12% if the mineral fraction contains no clay; or 3) soils with an organic carbon content between 12-18% based on the percentage of clay present (multiply the actual percentage of clay by 0.1 and add to 12%). It is not usually necessary, however, to do a chemical analysis of the soil to determine if a soil is organic. Organic soils are easy to recognize as black- colored mucks or as black or dark brown peats. Mucks feel greasy and stain fingers when rubbed between the fingers. Peats have plant fragments visible throughout the soil and feel fibrous. Many organic soils, both peats and mucks, may smell of hydrogen sulfide (rotten eggs).

2. Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?

Yes - go to Q. 3 No - **Is not** a bog for purpose of rating

3. Does the wetland have more than 70% cover of mosses at ground level, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)?

Yes – **Is a bog** for purpose of rating (Category I) No - go to Q. 4

NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species are present in Table 3, the wetland is a bog.

4. Is the wetland forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover (> 30% coverage of the total shrub/herbaceous cover)?

Yes – **Is a bog** for purpose of rating (Category I)

No - **Is not** a bog for purpose of rating

NOTE: Total cover is estimated by assessing the area of wetland covered by the shadow of plants if the sun were directly overhead. You are trying to determine whether 30% of the total "footprint" of plants on the site consists of plant species listed in Table 3.

Table 3
Characteristic bog species in Washington State

Andromeda polifolia	Bog rosemary
Betula glandulosa	Bog birch
Carex aquatilis	

Carex atherodes	Awned sedge
Carex brunescens	Brownish sedge
Carex buxbaumii	Brown bog sedge
Carex canescens	Hoary sedge
Carex chordorhiza	Creeping sedge
Carex comosa	Bearded sedge
Carex echinata var phyllomania	
Carex lasiocarpa	Woolly-fruit sedge
Carex leptalea	Bristly-stalk sedge
Carex limosa	Mud sedge
Carex livida	Livid sedge
Carex paupercula	Poor sedge
Carex rostrata	Beaked sedge
Carex saxatilis	Russet sedge
Carex sitchensis	Sitka sedge
Carex interior	Inland sedge
Carex pauciflora	Few-flower sedge
Carex utriculata	Bladder sedge
*Cladina ran*gifera	Reindeer lichen
Drosera rotundifolia	Sundew
Eleocharis pauciflora	Few-flower spike rush
Empetrum nigrum	Black crowberry
Eriophorum chamissonis	Cottongrass
Eriophorum polystachion	Coldswamp cottongrass
Fauria crista-galli	Deer-cabbage
Gentiana douglasiana	Swamp gentian
Juncus supiniformis	Hairy leaf rush
Kalmia occidentalis	Bog laurel
Ledum groenlandicum	Labrador tea
Menyanthes trifoliata	Bog bean
Myrica gale	Sweet gale
Pedicularis groenlandica	Elephant's-head lousewort
Platanthera dilatata	Leafy white orchid
Potentilla palustris	Marsh cinquefoil
Rhynchospora alba	White beakrush
Salix commutata	Under-green willow
Salix eastwoodiae	Mountain willow
Salix farriae	Farr willow
Salix myrtillifolia	Blue-berry willow
*Salix planifoli*a	Diamond leaf willow
Sanguisorba officinalis	Great burnet
Sphagnum spp.	Sphagnum mosses
Spiranthes romanzofianna	Hooded ladies'-tresses
Tofieldia glutinosa	Sticky false-asphodel
Vaccinium oxycoccus	Bog cranberry

NOTE: Latin names and spelling are based on the U.S. Fish and Wildlife Service, "National List of Plant Species that Occur in Wetlands: Washington". Biological Report May 1988.NERC-88/18.47.

If in doubt, it is important to consult someone with expertise in identifying bogs. The intent of the criteria is to include in Category I those bogs that have relatively undisturbed native plant communities.

Comment [82]: *Spiraea* is not included in the list because it is often found in peat systems that no longer have the low pH and other special characteristics. It is not considered to be an indicator species for the bogs dominated by mosses at the ground level.

SC 5.0 Forested Wetlands - *Does the wetland have an area of forest (you should have identified a forested class, if present, in question H 1.1) rooted within its boundary that meet at least one of the following three criteria?*

- The wetland is within the "100-year" floodplain of a river or stream.
- Aspen (*Populus tremuloides*) are a dominant or co-dominant of the "woody" vegetation. (Dominants means it represents at least 50% of the cover of woody species, co-dominant means it represents at least 20% of the total cover of woody species).
- There is at least ¼ acre of trees (even in wetlands smaller than 2.5 acres) that are "mature" or "old-growth" according to the definitions for these priority habitats developed by WDFW, and listed below. The descriptions of these forests are copied from WDFW (as of April 1, 2003) and any updates are available on the department's web page -http://wdfw.wa.gov/hab/phshabs.htm

> Forested wetlands, for the purpose of this rating system, are defined as wetlands that have trees rooted within their boundaries where:
>
> - The trees provide a canopy over at least 30% of the ground within the extent of their distribution (at least ¼ acre, or 10% of the wetland if it is smaller than 2.5 acres), AND
> - The trees are at least 20 ft. tall.

Old-growth east of Cascade crest: Stands are highly variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. In general, stands will be >150 years of age, with 25 trees/ha (10 trees/acre) that are greater than 53 cm (21 in) diameter at breast height (dbh), and 2.5-7.5 snags/ha (1 - 3 snags/acre) > 30-35 cm (12-14 in) diameter. Downed logs may vary from abundant to absent. Canopies may be single or multi-layered. Evidence of human-caused alterations to the stand will be absent or so slight as to not affect the ecosystem's essential structures and functions.

Mature forests: Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; Oldest trees are 80 - 160 years old east of the Cascade crest.

Comment [83]: Either deciduous or coniferous. Also there is no number requirement in this definition, but we suggest you use the number of at least 8 trees/acre found in the definition of old-growth forests.

SC 5.1 *Does the wetland have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees?*

Slow growing forests include those where more than 50% of the tree species (by cover) that provide the canopy are slow growing as listed in Table 4.

YES = Category I NO = go to SC 5.2

SC 5.2 *Does the wetland have aspen (Populus tremuloides) as a dominant or co-dominant species in the category of woody species?*

YES = Category I NO = go to SC 5.3

SC 5.3 *Does the wetland have at least ¼ acre of a fast growing forest?*

Fast growing forests include those where more than 50% of the tree species (by cover) that provide the canopy are fast growing as listed in Table 4.

YES = Category II NO = go to SC 5.3

SC 5.3 *Is the forested component of the wetland within the "100 year floodplain" of a river or stream?*

YES = Category II NO categorize based on functions

All forested wetlands in the 100-year floodplain are Category II wetlands based on their location. These wetlands, however, may often be a Category I based on functions. The "100-year floodplain" is mapped by FEMA (Federal Emergency Management Agency). Generally, local planning departments or departments of pubic works have this information available.

Table 4: List of slow growing and fast growing native trees found in eastern Washington wetlands.

SLOW GROWING WETLAND TREES	FAST GROWING WETLAND TREES
Cedar – western red (*Thuja plicata*) Alaska yellow (*Chamaecyparis nootkatensis*)	Alders – red (*Alnus rubra*) thin-leaf (*A. tenuifolia*)
Pine spp. mostly "white" pine (*Pinus monticola*)	Cottonwoods – narrow-leaf (*Populus angustifolia*) black (*P. balsamifera*)
Hemlock – western (*Tsuga heterophylla*)	Willows- peach-leaf (*Salix amygdaloides*) Sitka (*S. sitchensis*) Pacific (*S. lasiandra*)
Englemann spruce (*Picea engelmannii*)	Aspen (*Populus tremuloides*)
	Water Birch (*Betula occidentalis*)

If only part of the wetland is forested, and the category based on functions is II or III, the wetland may be assigned a dual rating as described in Section 4.3.

5.5 RATING THE WETLAND

Each wetland can have several ratings: one resulting from its score for the functions and one resulting from special characteristics it may have. The first page of the rating form contains a box for recording each rating. This box should be filled out after completing the form. Pick the "highest" category (i.e. the lowest number) when assigning an overall category for the wetland being rated.

The first page of the rating form also contains a table in which you can summarize the hydrogeomorphic class of the wetland and whether it falls into one of the "special" types of wetlands.

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APPENDIX A

Members of the technical review team for revising the Washington State Wetland Rating System for Eastern Washington.

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CATHY REED	DEPT. OF ECOLOGY
MARK SCHUPPE	DEPT. OF ECOLOGY
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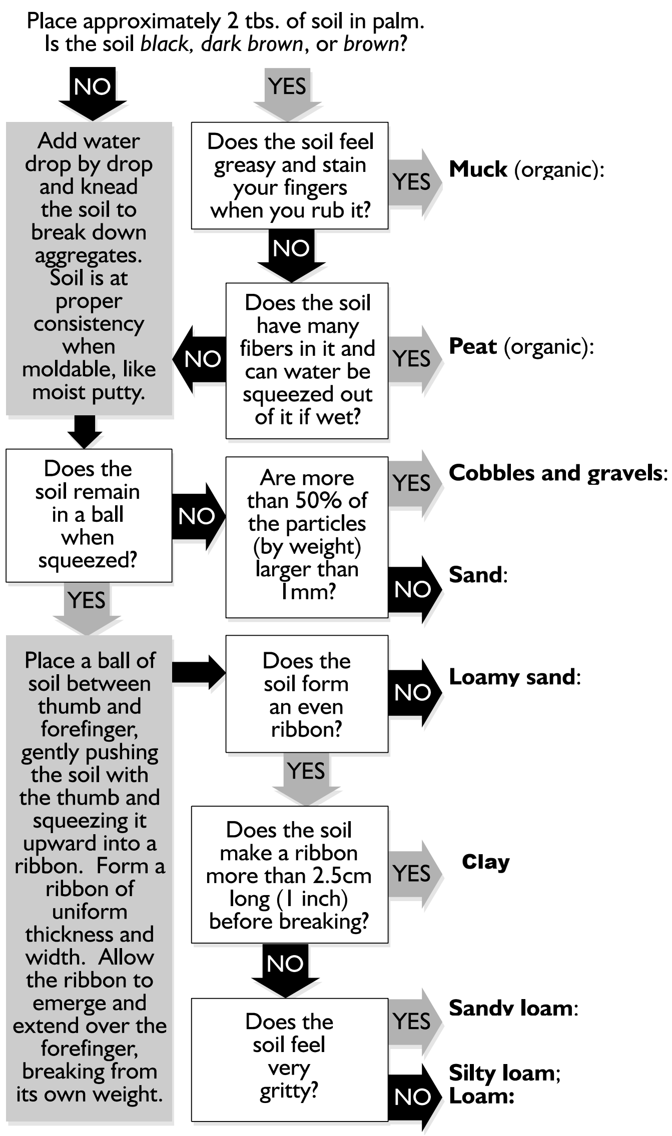
APPENDIX B

Analyzing the type of soil present in the wetland.



APPENDIX C

Draft List of surveyed land sections in Eastern Washington identified by the Natural Heritage program reported to contain Natural Heritage Features associated with wetlands. This list was compiled on February 14, 2003. Contact the WA Natural Heritage Program at (360) 902-1667 for more detailed information on locations and occurrences.

TOWNSHIP/RANGE/	SECTION
002N014E	18
002N014E	19
002N014E	30
002N015E	23
003N009E	31
003N011E	15
003N011E	29
003N011E	35
003N012E	30
003N012E	32
003N012E	33
004N018E	10
005N011E	12
005N012E	04
005N012E	05
005N012E	07
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005N012E	29
005N012E	35
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005N014E	04
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005N018E	28
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006N012E	04
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006N042E	04
006N042E	09
006N044E	02
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007N041E	25
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007N042E	31
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009N019E	31
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021N036E	23

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036N042E	17	037N036E	17	038N022E	01	038N042E	32
036N042E	26	037N036E	18	038N022E	12	038N043E	05
036N042E	30	037N036E	28	038N022E	34	038N043E	08
036N042E	31	037N036E	30	038N022E	35	038N043E	20
036N043E	03	037N036E	33	038N022E	36	038N043E	25
036N043E	04	037N039E	03	038N023E	04	038N043E	29
036N043E	10	037N040E	09	038N023E	17	038N043E	31
036N043E	14	037N040E	11	038N023E	20	038N043E	32
036N043E	15	037N040E	15	038N023E	21	038N044E	18
036N043E	22	037N040E	24	038N023E	22	038N045E	24
036N043E	23	037N040E	26	038N023E	28	038N045E	26
036N043E	26	037N040E	27	038N023E	32	039N020E	28
036N043E	30	037N041E	01	038N029E	01	039N022E	01
036N043E	31	037N041E	02	038N029E	02	039N022E	13
036N043E	34	037N041E	03	038N029E	03	039N023E	12
036N044E	20	037N041E	12	038N029E	08	039N023E	13
036N045E	02	037N041E	17	038N029E	10	039N023E	18
036N045E	04	037N041E	19	038N029E	11	039N023E	19
036N045E	13	037N041E	20	038N029E	15	039N023E	20
036N045E	15	037N041E	22	038N029E	16	039N023E	22
037N021E	18	037N041E	26	038N029E	17	039N023E	23
037N021E	31	037N041E	33	038N029E	35	039N023E	24
037N021E	32	037N041E	34	038N030E	02	039N023E	25
037N022E	01	037N041E	35	038N030E	06	039N023E	26
037N022E	18	037N042E	05	038N030E	09	039N023E	27
037N022E	19	037N042E	06	038N030E	10	039N023E	28
037N022E	30	037N042E	07	038N030E	15	039N023E	34
037N022E	31	037N042E	20	038N030E	20	039N023E	35
037N023E	10	037N042E	21	038N030E	32	039N024E	09
037N023E	11	037N042E	22	038N031E	06	039N026E	11
037N023E	20	037N042E	23	038N031E	35	039N026E	12
037N023E	21	037N042E	32	038N032E	02	039N026E	14
037N023E	22	037N042E	34	038N032E	03	039N026E	32
037N023E	26	037N042E	35	038N032E	05	039N028E	02
037N023E	27	037N042E	36	038N032E	08	039N028E	10
037N023E	29	037N043E	05	038N032E	32	039N028E	11
037N023E	32	037N043E	07	038N036E	12	039N028E	13
037N023E	33	037N043E	08	038N036E	13	039N028E	14
037N024E	19	037N043E	17	038N036E	24	039N028E	23
037N024E	30	037N043E	20	038N036E	25	039N029E	35
037N029E	01	037N043E	21	038N036E	26	039N030E	01
037N029E	02	037N043E	28	038N036E	28	039N030E	17
037N029E	03	037N043E	29	038N036E	32	039N030E	20
037N029E	09	037N043E	32	038N036E	34	039N030E	21
037N029E	33	037N043E	33	038N036E	35	039N030E	22
037N030E	09	037N044E	18	038N036E	36	039N030E	25
037N030E	12	037N044E	23	038N039E	16	039N030E	27
037N031E	01	037N044E	24	038N041E	10	039N030E	30
037N031E	05	037N044E	28	038N041E	11	039N030E	31

039N030E	32
039N030E	33
039N030E	35
039N030E	36
039N031E	06
039N031E	32
039N032E	29
039N032E	32
039N032E	34
039N033E	30
039N033E	31
039N034E	06
039N035E	01
039N036E	06
039N036E	18
039N036E	29
039N037E	04
039N037E	27
039N038E	05
039N039E	06
039N041E	10
039N041E	23
039N042E	06
039N043E	02
039N045E	03
040N020E	13
040N021E	06
040N021E	08
040N021E	09
040N021E	10
040N021E	12
040N021E	18
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040N021E	20
040N021E	22
040N022E	30
040N022E	31
040N022E	34
040N023E	02
040N023E	03
040N023E	07
040N023E	10
040N023E	11
040N023E	14
040N023E	15
040N023E	16
040N023E	22
040N023E	35
040N024E	02
040N024E	07
040N024E	11
040N024E	14
040N024E	15
040N025E	03
040N030E	01
040N030E	03
040N030E	10
040N030E	12
040N030E	16
040N030E	21
040N030E	24
040N030E	25
040N030E	30
040N031E	05
040N031E	06
040N031E	07
040N031E	08
040N031E	09
040N031E	15
040N031E	17
040N031E	19
040N031E	20
040N032E	13
040N033E	19
040N033E	32
040N034E	31
040N034E	32
040N035E	04
040N035E	11
040N035E	13
040N035E	14
040N035E	15
040N035E	16
040N035E	36
040N036E	18
040N036E	25
040N036E	30
040N036E	31
040N036E	32
040N036E	34
040N037E	01
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040N037E	29
040N037E	30
040N037E	33
040N038E	04
040N038E	06
040N038E	07
040N038E	09
040N038E	15
040N038E	20
040N038E	21
040N038E	22
040N038E	23
040N038E	26
040N038E	32
040N038E	33
040N039E	02
040N039E	20
040N043E	03
040N043E	14
040N043E	22
040N043E	23
040N043E	27
040N043E	34
040N044E	07
040N044E	19
040N044E	20
040N044E	30
040N044E	31
040N045E	10
040N045E	30
040N045E	31

Wetland name or number ______

WETLAND RATING FORM – EASTERN WASHINGTON

Version 2 - Updated June 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): _________________________________ Date of site visit: _____

Rated by____________________________ Trained by Ecology? Yes__No___ Date of training______

SEC: ___ TWNSHP: ____ RNGE: ____ Is S/T/R in Appendix D? Yes___ No___

Map of wetland unit: Figure ____ Estimated size ______

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III___ IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for "Water Quality" Functions	
Score for Hydrologic Functions	
Score for Habitat Functions	
TOTAL score for functions	

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ III___ Does not Apply___

Final Category (choose the "highest" category from above) ☐

Summary of basic information about the wetland unit

Wetland Type		Wetland Class	
Vernal Pool		**Depressional**	
Alkali		**Riverine**	
Natural Heritage Wetland		**Lake-fringe**	
Bog		**Slope**	
Forest			
None of the above		Check if unit has multiple HGM classes present	

Wetland name or number ______

Does the wetland being rated meet any of the criteria below?

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands That Need Special Protection, and That Are Not Included in the Rating	**YES**	**NO**
SP1. *Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered **animal or plant** species (T/E species)?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.		
SP2. *Has the wetland unit been documented as habitat for any State listed Threatened or Endangered **animal** species?* For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category I Natural Heritage Wetlands (see p. 19 of data form).		
SP3. *Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?*		
SP4. *Does the wetland unit have a local significance in addition to its functions*? For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.		

<u>To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.</u>

The hydrogeomorphic classification groups wetlands into those that function in similar ways. Classifying the wetland first simplifies the questions needed to answer how it functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 20 for more detailed instructions on classifying wetlands.

Classification of Vegetated Wetlands for Eastern Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Does the entire wetland unit **meet both** of the following criteria?

___The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) at least 20 acres (8 ha) in size;

___At least 30% of the open water area is deeper than 3 m (10 ft)?

NO – go to Step 2 **YES –** The wetland class is **Lake-fringe (lacustrine fringe)**

2. Does the entire wetland unit **meet all** of the following criteria?

____The wetland is on a slope (*slope can be very gradual*),

____The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.

____The water leaves the wetland **without being impounded**?

NOTE: *Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3ft diameter and less than a foot deep).*

NO - go to Step 3 **YES –** The wetland class is **Slope**

3. Is the entire wetland unit in a valley or stream channel where it gets inundated by overbank flooding from that stream or river? In general, the flooding should occur at least once every ten years to answer "yes." *The wetland can contain depressions that are filled with water when the river is not flooding.*

NO - go to Step 4 **YES –** The wetland class is **Riverine**

4. Is the entire wetland unit in a topographic depression, outside areas that are inundated by overbank flooding, in which water ponds, or is saturated to the surface, at some time of the year. *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to Step 5 **YES –** The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM clases. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM Classes Within One Delineated Wetland Boundary	Class to Use for Rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine (riverine is within boundary of depression)	Depressional
Depressional + Lake-fringe	Depressional

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

D	Depressional Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland functions to improve water quality	Points (only 1 score per box)
D	**D 1.0 Does the wetland unit have the potential to improve water quality?**	*(see p. 38)*
D	D 1.1 Characteristics of surface water flows out of the wetland unit: Wetland has no surface water outlet - points = 5 Wetland has an intermittently flowing outlet points = 3 Wetland has a highly constricted permanently flowing outlet points = 3 Wetland has a permanently flowing surface outlet points = 1	
D	D 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions of soil types)* YES points = 3 NO points = 0	
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation for > 2/3 of area points = 5 Wetland has persistent, ungrazed, vegetation from 1/3 to 2/3 of area points = 3 Wetland has persistent, ungrazed vegetation from 1/10 to < 1/3 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure ___
D	D 1.4 Characteristics of seasonal ponding or inundation. *This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.* Area seasonally ponded is > ½ total area of wetland points = 3 Area seasonally ponded is ¼ - ½ total area of wetland points = 1 Area seasonally ponded is < ¼ total area of wetland points = 0 NOTE: *See text for indicators of seasonal and permanent inundation/flooding.* Map of Hydroperiods	Figure ___
D	**Total for D 1** *Add the points in the boxes above*	
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity*. — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other___________________________________ **YES** multiplier is **2** **NO** multiplier is **1**	multiplier _____
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by the multiplier in D2 ***Record score on p. 1 of field form***	

D	**Depressional Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
D	**D 3.0 Does the wetland unit have the <u>potential</u> to reduce flooding and stream erosion?**	***(see p. 39)***
D	D 3.1 Characteristics of surface water flows out of the wetland unit: Wetland has no surface water outlet points = 8 Wetland has an intermittently flowing outlet points = 4 Wetland has a highly constricted permanently flowing outlet points = 4 Wetland has a permanently flowing surface outlet points = 0	
D	D 3.2 Depth of storage during wet periods: *Estimate the height of ponding above the surface of the wetland (see text for description of measuring height). In wetlands with permanent ponding, the surface is the lowest elevation of "permanent" water)* Marks of ponding are at least 3 ft above the surface points = 8 The wetland is a "headwater" wetland" *(see p. 39)* points = 6 Marks are 2 ft to < 3 ft from surface points = 6 Marks are 1 ft to < 2 ft from surface points = 4 Marks are 6 in to < 1 ft from surface points = 2 No marks above 6 in. or wetland has only saturated soils points = 0	
D	**Total for D 3** *Add the points in the boxes above*	
D	**D 4.0 Does the wetland unit have the <u>opportunity</u> to reduce flooding and erosion?** *Answer NO if the major source of water is groundwater, irrigation return flow, or water levels in the wetland are controlled by a reservoir.* Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* — Wetland is in a headwater of a river or stream that has flooding problems — Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____________________________________ **YES** multiplier is **2** **NO** multiplier is **1**	***(see p. 42)*** multiplier ______
D	**TOTAL - Hydrologic Functions** Multiply the score from D3 by the multiplier in D4 ***Record score on p. 1 of field form***	

Comments

Wetland name or number ______

R	Riverine Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland functions to improve water quality	Points (only 1 score per box)
R	**R 1.0 Does the wetland unit have the <u>potential</u> to improve water quality?**	***(see p. 45)***
R	R 1.1 Area of surface depressions within the riverine unit that can trap sediments during a flooding event: Depressions cover >1/3 area of wetland points = 6 Depressions cover > 1/10 area of wetland points = 3 If depressions > 1/10th of area of unit draw polygons on aerial photo or map Depressions present but cover < 1/10 area of wetland points = 1 No depressions present points = 0	**Figure** ___
R	R 1.2 Characteristics (cover) of the vegetation in the unit *(area of polygons with >90% cover at person height. This is **not** Cowardin vegetation classes)*: Forest or shrub > 2/3 the area of the wetland points = 10 Forest or shrub 1/3 – 2/3 area of the wetland points = 5 Ungrazed, herbaceous plants > 2/3 area of wetland points = 5 Ungrazed herbaceous plants 1/3 – 2/3 area of wetland points = 2 Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland points = 0 Aerial photo or map showing polygons of different vegetation cover	**Figure** ___
R	**Total for R1** *Add the points in the boxes above*	
R	**R 2.0 Does the wetland have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity*. — Grazing in the wetland or within 150ft — Wetland intercepts groundwater within the Reclamation Area — Untreated stormwater flows into wetland — Tilled fields or orchards within 150 feet of wetland — Water flows into wetland from a stream or culvert that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential or urban areas are within 150 ft of wetland — The river or stream that floods the wetland has a contributing basin where human activities have raised the levels of sediment, toxic compounds or nutrients in the river water above water quality standards — Other____________________________________ **YES** multiplier is **2** **NO** multiplier is **1**	***(see p.46)*** multiplier _____
R	**<u>TOTAL</u> - Water Quality Functions** Multiply the score from R1 by the multiplier in R2 ***Record score on p. 1 of field form***	

Wetland name or number ______

R	Riverine Wetlands HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream degradation	Points (only 1 score per box)
R	**R 3.0 Does the wetland have the <u>potential</u> to reduce flooding and erosion?**	***(see p. 47)***
R	R 3.1 Amount overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow of water and the width of the stream or river channel (distance between banks).* *Calculate the ratio: width of wetland/ width of stream.* If the ratio is 2 or more — points = 10 If the ratio is between 1 and < 2 — points = 8 If the ratio is ½ to < 1 — points = 4 If the ratio is ¼ to < ½ — points = 2 If the ratio is < ¼ — points = 1 Aerial photo or map showing average widths	**Figure** ___
R	R 3.2 Characteristics of vegetation that slow down water velocities during floods: *Treat large woody debris as "forest or shrub" (area of polygons with >90% cover at person height. This is **not** Cowardin vegetation classes)*: Forest or shrub for more than 2/3 the area of the wetland. — points = 6 Forest or shrub for >1/3 area OR herbaceous plants > 2/3 area — points = 4 Forest or shrub for > 1/10 area OR herbaceous plants > 1/3 area — points = 2 Vegetation does not meet above criteria — points = 0 Aerial photo or map showing polygons of different vegetation types	**Figure** ___
R	**Total for R3** — *Add the points in the boxes above*	
R	**R 4.0 Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?** *Answer NO if the major source of water is irrigation return flow or water levels are controlled by a reservoir.* Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* — There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding. — There are natural resources downstream (e.g. salmon redds) than can be damaged by flooding — Other_____________________________________ **YES** multiplier is **2** — **NO** multiplier is **1**	***(see p. 50)*** multiplier ______
R	**TOTAL - Hydrologic Functions** — Multiply the score from R3 by the multiplier in R4 ***Record score on p. 1 of field form***	

Comments

Wetland name or number ______

L	Lake-fringe Wetlands WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	Points (only 1 score per box)
L	**L 1.0 Does the wetland have the potential to improve water quality?**	*(see p.52)*
L	L 1.1 Average width of vegetation along the lakeshore: Vegetation is more than 33ft (10m) wide points = 6 Vegetation is between 16 ft (5m) and 33ft wide points = 3 Vegetation is 6ft (2m) wide to < 16 ft wide points = 1 Map of Cowardin classes with widths marked	**Figure** ___
L	L 1.2 Characteristics of the vegetation in the wetland *choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. These are not Cowardin classes. Area of Cover is total cover in the unit, but it can be in patches. NOTE: Herbaceous does not include aquatic bed.* Herbaceous plants cover >90% of the vegetated area points = 6 Herbaceous plants cover >2/3 of the vegetated area points = 4 Herbaceous plants cover >1/3 of the vegetated area points = 3 Other vegetation that is not aquatic bed in > 2/3 vegetated area points = 3 Other vegetation that is not aquatic bed in > 1/3 vegetated area points = 1 Aquatic bed cover > 2/3 of the vegetated area points = 0 Map with polygons of different vegetation types	**Figure** ___
L	**Total for L1** *Add the points in the boxes above*	
L	**L 2.0 Does the wetland have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in the lake water, or surface water flowing through the wetland to the lake is polluted. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity*. — Wetland is along the shores of a lake or reservoir that does not meet water quality standards — Grazing in the wetland or within 150ft — Untreated stormwater flows into the wetland — Tilled fields or orchards within 150 feet of wetland — Residential or urban areas are within 150 ft of wetland — Powerboats with gasoline or diesel engines use the lake — Parks with grassy areas that are maintained, ballfields, golf courses (all within 150 ft. of shore of lake) — Other___________________________________ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p. 53)* multiplier _____
L	**TOTAL - Water Quality Functions** Multiply the score from L1 by the multiplier in L2 ***Record score on p. 1 of field form***	

L	**Lake-fringe Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce shoreline erosion	**Points** (only 1 score per box)
L	**L 3.0 Does the wetland have the <u>potential</u> to reduce shoreline erosion?**	***(see p.54)***
L	L 3.1 Average width and characteristics of vegetation along the lakeshore (**do not** include aquatic bed): *(choose the highest scoring description that matches conditions in the wetland)* > ¾ of the vegetation is shrubs or trees at least 33 ft (10m) wide — points = 6 > ¾ of the vegetation is shrubs or trees at least 6 ft. (2 m) wide — points = 4 > ¼ of the vegetation is shrubs or trees at least 33 ft (10m) wide — points = 4 Vegetation is at least 6 ft (2m) wide — points = 2 Vegetation is less than 6 ft (2m) wide — points = 0 Aerial photo or map with Cowardin vegetation classes	**Figure** ___
L	**L 4.0 Does the wetland have the <u>opportunity</u> to reduce erosion?** Are there features along the shore that will be impacted if the shoreline erodes? *Note which of the following conditions apply.* — There are human structures and activities along the shore behind the wetland (buildings, fields) that can be damaged by erosion. — There are undisturbed natural resources along the shore (e.g. mature forests, other classes of wetland) behind the wetland than can be damaged by shoreline erosion — Other_____________________________________ **YES** multiplier is **2** — **NO** multiplier is **1**	***(see p. 55)*** Multiplier ______
L	**TOTAL - Hydrologic Functions** — Multiply the score from L3 by the multiplier in L4 ***Record score on p. 1 of field form***	

Comments

Wetland name or number ______

S	Slope Wetlands WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	Points (only 1 score per box)
S	**S 1.0 Does the wetland have the <u>potential</u> to improve water quality?**	***(see p.56)***
S	S 1.1 Characteristics of average slope of wetland: Slope is1% or less *(a 1% slope has a 1 foot vertical drop in elevation for every 100 ft horizontal distance)* points = 3 Slope is between 1% and 2% points = 2 Slope is more than 2% but less than 5% points = 1 Slope is 5% or greater points = 0	
S	S 1.2 The soil 2 inches below the surface is clay or organic *(use NRCS definitions of soil types)* YES = 3 points NO = 0 points	
S	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland.* ***Dense*** *vegetation means you have trouble seeing the soil surface (>75% cover), and* ***uncut*** *means not grazed or mowed and plants are higher than 6 inches.* Dense, ungrazed, herbaceous vegetation > 90% of the wetland unit points = 6 Dense, ungrazed, herbaceous vegetation > 1/2 of unit points = 3 Dense, woody, vegetation > ½ of unit points = 2 Dense, ungrazed, herbaceous vegetation > 1/4 of unit points = 1 Does not meet any of the criteria above for herbaceous vegetation points = 0 Aerial photo or map with vegetation polygons	**Figure** ___
S	**Total for S 1** *Add the points in the boxes above*	
S	**S 2.0 Does the wetland have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity*. — Grazing in the wetland or within 150ft — Wetland is a groundwater seep within the Reclamation Area — Untreated stormwater flows through the wetland — Tilled fields or orchards within 150 feet of wetland — Residential, urban areas, or golf courses are within 150 ft upslope of wetland — Other_____________________________________ **YES** multiplier is **2** **NO** multiplier is **1**	***(see p.58)*** multiplier _____
S	**<u>TOTAL</u> - Water Quality Functions** Multiply the score from S1 by the multiplier in S2 ***Record score on p. 1 of field form***	

Wetland name or number ______

S	**Slope Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream degradation	**Points** (only 1 score per box)
S	**S 3.0 Does the wetland unit have the <u>potential</u> to reduce flooding and stream erosion?**	***(see p.59)***
S	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland. See question S 1.3 for definition of dense and uncut.* ***Rigid*** *means that the stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows.* Dense, uncut, **rigid** vegetation covers > 90% of the area of the unit points = 6 Dense, uncut, **rigid** vegetation > 1/2 – 90% area of unit points = 3 Dense, uncut, **rigid** vegetation > 1/4 – 1/2 of unit points = 1 More than 1/4 of area is grazed, mowed, tilled or vegetation is not rigid points = 0	
S	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows: The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES points = 2 NO points = 0	
S	**Total for S3** *Add the points in the boxes above*	
S	**S 4. 0 Does the wetland unit have the <u>opportunity</u> to reduce flooding and erosion?** ***(see p.61)*** *Answer NO if the major source of water is irrigation return flow (e.g. a seep that is on the downstream side of a dam or at the base of an irrigated field.* Answer YES if the wetland is in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* — Wetland has surface runoff that can cause flooding problems downgradient — Other_____________________________________ **YES** multiplier is **2** **NO** multiplier is **1**	multiplier ______
S	**TOTAL - Hydrologic Functions** Multiply the score from S3 by the multiplier in S4 ***Record score on p. 1 of field form***	

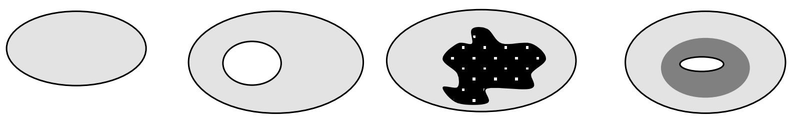
Comments

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat	**Points** (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Categories of vegetation structure ***(see p.62)*** *Check the vegetation classes (as defined by Cowardin) and heights of emergents present. Size threshold for each class or height category is ¼ acre or more than 10% of the area if unit is < 2.5 acres.* ____Aquatic bed ____Emergent plants 0-12 in. (0 – 30 cm) high are the highest layer and have > 30% cover ____Emergent plants >12 – 40 in.(>30 – 100cm) high are the highest layer with >30% cover ____Emergent plants > 40 in.(> 100cm) high are the highest layer with >30% cover ____Scrub/shrub (areas where shrubs have >30% cover) ____Forested (areas where trees have >30% cover) *Add the number of vegetation types that qualify. If you have:* 4-6 types points = 3 3 types points = 2 2 types points = 1 1 type points = 0 Map of Cowardin vegetation classes and areas with different heights of emergents	Figure ___
H 1.2. Is one of the vegetation types "aquatic bed?" ***(see p .64)*** YES = 1 point NO = 0 points	
H 1.3. Surface Water ***(see p.65)*** H 1.3.1 Does the unit have areas of "open" water (without herbaceous or shrub plants) over at least ¼ acre or 10% of its area during the spring (March – early June) OR in early fall (August – end of September)? *Note: answer YES for Lake-fringe wetlands* YES = 3 points & **go to H 1.4** NO = go to H 1.3.2 H 1.3.2 Does the unit have an intermittent or permanent stream within its boundaries, or along one side, over at least ¼ acre or 10% of its area, AND that has an unvegetated bottom (*answer yes only if H 1.3.1 is NO*)? YES = 3 points NO = 0 points Map showing areas of open water	Figure ___
H 1.4. Richness of Plant Species ***(see p. 66)*** Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasean Milfoil, reed canarygrass, purple loosestrife, Russian Olive, Phragmites ,Canadian Thistle, Yellow-flag Iris, and Salt Cedar (Tamarisk)* If you counted: > 9 species points = 2 4-9 species points = 1 # of species ____ < 4 species points = 0 points *List species below if you wish*	

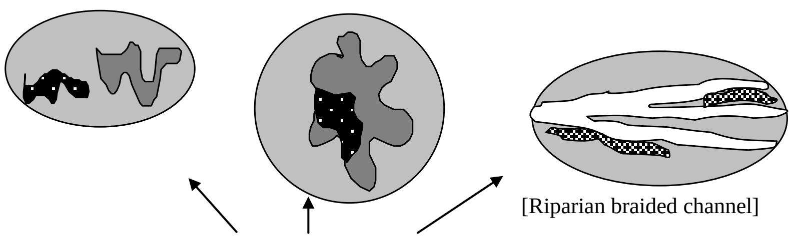
H 1.5. <u>Interspersion of habitats</u> ***(see p. 67)***

Figure ___

Decided from the diagrams below whether interspersion between categories of vegetation (described in H 1.1), or categories and un-vegetated areas (can include open water or mudflats) is high, medium, low, or none.



None = 0 points   Low = 1 point   Moderate = 2 points



[Riparian braided channel]

High = 3 points

NOTE: If you have four or more vegetation categories or three vegetation categories and open water the rating is always "high". Use maps from H1.1 and H1.3

H 1.6. <u>Special Habitat Features:</u> ***(see p. 68)***

Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.

____Loose rocks larger than 4" **<u>or</u>** large, downed, woody debris (>4in. diameter) within the area of surface ponding or in stream.

____Cattails or bulrushes are present within the unit.

____Standing snags (diameter at the bottom > 4 inches) in the wetland unit or within 30 m (100ft) of the edge.

____Emergent or shrub vegetation in areas that are permanently inundated/ponded. *The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.*

____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>45 degree slope) OR signs of recent beaver activity

____ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*

Maximum score possible = 6

TOTAL Potential to provide habitat
Add the scores in the column above

Comments

H 2.0 Does the wetland have the opportunity to provide habitat for many species?	
H 2.1 Buffers *(see p. 71)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed." Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.* — 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference **Points = 5** — 330 ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 80ft (25 m) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 170ft (50m) of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <6.6ft wide (2m) for more than 95% of the circumference (e.g . tilled fields, paving, basalt bedrock extend to edge of wetland). **Points = 0** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	**Figure** ___
H 2.2 Wet Corridors *(see p. 72)* H 2.2.1 Is the wetland unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor at least ¼ mile long with surface water or flowing water throughout most of the year (> 9 months/yr)? (*dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor*). YES = 4 points (go to H 2.3) NO = go to H 2.2.2 H 2.2.2 Is the unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor, at least ¼ mile long with water flowing seasonally, **OR** a lake-fringe wetland without a "wet" corridor, **OR** a riverine wetland without a surface channel connecting to the stream? YES = 2 points (go to H 2.3) NO go to H 2.2.3 H 2.2.3 Is the wetland within a 1/2 mile of any permanent stream, seasonal stream, or lake (*do not include man-made ditches*)? YES = 1 point NO = 0 points	

Wetland name or number ______

H 2.3 Near or adjacent to other priority habitats listed by WDFW ***(see p. 74)***
Which of the following priority habitats are within 330ft (100m) of the wetland unit?
NOTE: the connections ***do not*** *have to be relatively undisturbed. These are DFW definitions. Check with your local DFW biologist if there are any questions.*

____**Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

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WDFW has changed the descriptions of priority habitats in 2008. Please access the latest list that should be used to answer this question at http://www.ecy.wa.gov/programs/sea/wetlands/ratingsystems/index.html

The link to the updated form is on this page as well as the WDFW definitions currently in use.

____**Urban Natural Open Space**: A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats*, especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development.

____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

If wetland has **2 or more** Priority Habitats **= 4 points**
If wetland has **1** Priority Habitat **= 2 points**
No Priority habitats = **0 points**

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)

Comments

H 2.4 <u>Landscape</u> *(choose the* ***one*** *description of the landscape around the wetland that best fits*) ***(see p. 76)*** — The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (*Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs*) **points = 5** — There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development) **points = 5** — There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed? **points = 2** — There is at least 1 wetland within ½ mile**.** **points = 1** — Does not meet any of the four criteria above **points = 0**	
H 2. TOTAL Score - opportunity for providing habitat *Add the scores in the column above*	
H 3.0 Does the wetland unit have indicators that its ability to provide habitat is reduced?	
H 3.<u>1 Indicator of reduced habitat functions</u> ***(see p. 75)*** Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? *(NOTE: This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers)* YES = **- 5 points** NO = 0 points	*Points will be subtracted*
Total Score for Habitat Functions – *add the points for H 1, H 2, and H 3 and record the result on p. 1*	

Comments

Wetland name or number ______

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Please determine if the wetland unit meets the attributes described below and circle the appropriate Category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All units should also be characterized based on their functions.

<table>
<tr><th>Wetland Type
Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.</th><th>Category</th></tr>
<tr><td>SC 1.0 Vernal pools (see p. 79)
Is the wetland unit less than 4000 ft², and does it meet at least two of the following criteria?
— Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input
— Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. NOTE: If you find perennial, “obligate”, wetland plants the wetland is probably NOT a vernal pool
— The soil in the wetland are shallow (<1ft deep (30 cm)) and is underlain by an impermeable layer such as basalt or clay.
— Surface water is present for less than 120 days during the “wet” season.
YES = Go to SC 1.1 NO - not a vernal pool
SC 1.1 Is the vernal pool relatively undisturbed in February and March?
YES = Go to SC 1.2 NO – not a vernal pool with special characteristics</td><td></td></tr>
<tr><td>SC 1.2 Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 miles (other wetlands, rivers, lakes etc.)?
YES = Category II NO = Category III</td><td>Cat. II
Cat. III</td></tr>
<tr><td></td><td></td></tr>
<tr><td>SC 2.0 Alkali wetlands (see p. 81)
Does the wetland unit meets one of the following two criteria?
— The wetland has a conductivity > 3.0 mS/cm.
— The wetland has a conductivity between 2.0 - 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as “alkali” species (see Table 2 for list of plants found in alkali systems).
— If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt.
OR does the wetland unit meets two of the following three sub-criteria?
— Salt encrustations around more than 80% of the edge of the wetland
— More than ¾ of the plant cover consists of species listed on Table 2
— A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands.
YES = Category I NO – not an alkali wetland</td><td>Cat. I</td></tr>
</table>

SC 3.0 Natural Heritage Wetlands ***(see p. 81)*** Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species. SC 3.1 Is the wetland unit being rated in a Section/Township/Range that contains a Natural Heritage wetland? *(this question is used to screen out most sites before you need to contact WNHP/DNR)* S/T/R information from Appendix D ___ or accessed from WNHP/DNR database ___ YES____ – contact WNHP/DNR (see p. 79) and go to SC 3.2 NO ___ SC 3.2 Has DNR identified the wetland unit as a high quality undisturbed wetland or as or as a site with state threatened, endangered, or sensitive plant species? YES = Category I NO –*not a natural heritage wetland*	**Cat. I**
SC 4.0 Bogs ***(see p. 82)*** Does the wetland unit **(or any part of the wetland unit)** meet both the criteria for soils and vegetation in bogs. *Use the key below to identify if the wetland is a bog. If you answer yes you will still need to rate the wetland based on its functions.* SC 4.1. Does the wetland unit have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils)? Yes - go to SC 4.3 No - go to SC 4.2 SC 4.2. Does the unit have organic soils, either peats or mucks that are less than 16 inches deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?? Yes - go to SC 4.3 No - *Is not a bog for rating* SC 4.3. Does the wetland unit have more than 70% cover of mosses at ground level in any area within its boundaries, AND other plants, if present, consist of the "bog" species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)? Yes – Category I bog No - go to Q. 4.4 *NOTE: If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16" deep. If the pH is less than 5.0 and the "bog" plant species in Table 3 are present, the wetland is a bog.* SC 4.4. Is the unit, or any part of it, forested (> 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann's spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover *(> 30% coverage of the total shrub/herbaceous cover)?* Yes – Category I bog NO	**Cat. I** **Cat. I**

<table>
<tr><td>SC 5.0 Forested Wetlands (see p. 85)
Does the wetland unit have an area of forest (you should have identified a forested class, if present, in question H 1.1) rooted within its boundary that meet at least one of the following three criteria?
— The wetland is within the "100 year" floodplain of a river or stream
— aspen (Populus tremuloides) are a dominant or co-dominant of the "woody" vegetation. (Dominants means it represents at least 50% of the cover of woody species, co-dominant means it represents at least 20% of the total cover of woody species)
— There is at least ¼ acre of trees (even in wetlands smaller than 2.5 acres) that are "mature" or "old-growth" according to the definitions for these priority habitats developed by WDFW (see p. 83)
YES = go to SC 5.1 NO –not a forested wetland with special characteristics</td><td></td></tr>
<tr><td>SC 5.1 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees
Slow growing trees are: western red cedar (Thuja plicata), Alaska yellow cedar (Chamaecyparis nootkatensis), pine spp. mostly "white" pine (Pinus monticola), western hemlock (Tsuga heterophylla), Englemann spruce (Picea engelmannii).
YES = Category I NO = go to SC 5.2

SC 5.2 Does the unit have areas where aspen (Populus tremuloides) are a dominant or co-dominant species?
YES = Category I NO = go to SC 5.3

SC 5.3 Does the wetland unit have areas with a forest canopy where more than 50% of the tree species (by cover) are fast growing species.
Fast growing species are:
Alders – red (Alnus rubra), thin-leaf (A. tenuifolia)
Cottonwoods – narrow-leaf (Populus angustifolia), black (P. balsamifera)
Willows- peach-leaf (Salix amygdaloides), Sitka (S. sitchensis), Pacific (S. lasiandra), Aspen - (Populus tremuloides), Water Birch (Betula occidentalis)
YES = Category II NO = go to SC 5.5

SC 5.5 Is the forested component of the wetland within the "100 year floodplain" of a river or stream?
YES = Category II</td><td>Cat. I

Cat. I

Cat. II

Cat. II</td></tr>
<tr><td>Category of wetland based on Special Characteristics
Choose the "highest" rating if wetland falls into several categories.
If you answered NO for all types enter "Not Applicable" on p.1</td><td></td></tr>
</table>