

WASHINGTON STATE WETLAND RATING SYSTEM

for

EASTERN WASHINGTON

Revised

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For more information about the project or if you have special accommodation needs, contact:

Thomas Hruby
Department of Ecology
P.O. Box 47600
Olympia WA 98504
Telephone: (360) 407-7274
Email: thru461@ecy.wa.gov

Or visit our home page at www.wa.gov/ecology/sea/shorelan.html

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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. 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. 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 remaining 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 valued functions and resources. 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.

There are many ways to understand the resource value 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 some information on the functions and values of wetlands in a time- and cost-effective way. One way to accomplish this is with an analytical tool that categorizes 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 in the dictionary, and this has caused some confusion. The method does not rate the wetlands and generate a relative estimate of value (e.g. high, medium, low). Rather, it is a categorization of wetlands based on specific criteria. 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.

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. This 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 minimize further loss of their resource value. The management decisions that can be made based on the rating include the width of buffers necessary 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 will be developing recommendations for such protective standards as part of its “Best Available Science” project.

The rating method identifies a relative category for vegetated wetlands and is primarily intended for use with wetlands identified using the State of Washington delineation method (WAC 173-22-035). It is also consistent with definition of wetlands used in the

Federal Clean Water Act. Thus, it 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. We anticipate that the method will be further modified over time as we keep increasing our understanding of the wetland resource.

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.

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.

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 we have made in understanding how wetlands function and are valued. Five of the original seven criteria for categorization (sensitivity to disturbance, rarity, local significance, 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 "local significance," have been dropped. The requirements for managing and protecting T/E species in a wetland are very species specific. Categorizing a wetland as a Category I because it provides habitat for T/E species may result in recommendations that will not adequately protect the species. Management recommendations on buffers and mitigation ratios that result from the categorization are too generic to adequately protect a single species. For example, an increase in mitigation ratios that is assigned to wetlands of a "higher" category does not protect T/E species from impacts. Compensation for impacts to T/E species will probably require that the specific components of the habitat used by T/E species be replaced.

Using "local significance" to determine a wetland category was also omitted from this edition because it is rarely if ever used. This criterion in the original edition of the rating system required that a local jurisdiction establish independent criteria for categorizing wetlands as an "I, II, or III." Furthermore, these criteria needed to be consistent with the management recommendations for buffers and mitigation ratios that are derived from this rating system. The teams reviewing the rating system judged that a local jurisdiction that goes to the trouble of identifying wetlands of local significance will also establish its own 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.

Information 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 data 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 categorizing 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 these functions 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.”

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 at high levels can be rated a Category I. Conversely, wetlands performing functions at very low levels are rated as a Category IV.

The Category IV rating based on low levels of 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. The following table compares the distribution of categories in the 90 reference wetlands using the old and the revised systems.

Comparison of Ratings Between the Old and Revised Systems

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

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 rating highly 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 wetland protection programs.

3.1 CATEGORY I

Category I wetlands are those that 1) represent a unique or rare wetland type; or 2) are sensitive to disturbance; or 3) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or 4) provide a very high level of functions. We cannot afford the risk of any degradation to these wetlands. 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 placed into Category I because they cannot be reproduced through compensatory mitigation and are relatively rare in the landscape. Any impacts to alkali wetlands will result in a net loss of their functions and values.

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 a unique plants and animals that are not found anywhere else in eastern Washington. For example, the small alkali bee that is used to pollinate alfa-alfa 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, 2000). (Note: The “regular” bees used to pollinate fruits and vegetables are generally too large to pollinate the small alfa-alfa flowers).

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. 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.

Bogs - Relatively undisturbed bogs are category I wetlands because they are sensitive to disturbance and impossible to recreate through compensatory mitigation.

Bogs are low nutrient, acidic wetlands that have organic soils, and whose water regime is based on precipitation. They are rare, sensitive habitats with an irregular distribution in eastern Washington. 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. 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 recreate through compensatory mitigation. Once disturbed, the acidic water chemistry that is so characteristic of the bogs is difficult, if not impossible, to re-establish. Furthermore, bogs form extremely slowly, with organic soils forming at a rate of about one inch per 50 years in eastern Washington (Rigg, 1958).

The majority of the bogs/fens observed in Washington have been degraded through modification of their water regime and reductions in species diversity and integrity. All remaining relatively undisturbed bogs need a high level of protection. 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. They are, therefore, more important than would be accounted for using a simple assessment of wetland functions. (Moore et al. 1989).

Natural Heritage Wetlands – Natural Heritage Wetlands are rated a Category I because of the special plants or animals that are found there and their sensitivity to disturbance. Extremely high quality, relatively undisturbed examples of wetlands are rare. By categorizing Natural Heritage wetlands as Category I, we are trying to provide a high level of protection to the undisturbed character of these remaining high quality wetlands in eastern Washington.

The Department of Natural Resources has identified important natural plant and animal communities 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.wa.gov/dnr/htdocs/fr/nhp/wanhp.html>, accessed October 1, 2002)

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.

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://www.wa.gov/wdfw/hab/phslist.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 tree 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*), and Englemann Spruce (*Picea engelmannii*).

Wetlands That Perform Many Functions 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, and needing the protection provided by a Category I status. 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.

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

3.2 CATEGORY II

Category II wetlands are 1) forested wetlands in the channel migration zone of rivers, or 2) mature forested wetlands containing fast growing trees, or 3) vernal pools present within a mosaic of other wetlands, or 4) wetlands with a moderately high level of functions. These 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 high level of protection. Thirty-six out of 90 wetlands were categorized as II's during the field testing and calibration of this rating system.

Forested Wetlands in the Channel Migration Zone of Rivers

Forested wetlands are an important resource in the floodplains of rivers, especially in the areas through which the river may flow (channel migration zone - CMZ). 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 CMZ are critical to the proper functioning and the dynamic natural processes of rivers. Please note, however, that many forested wetlands in the CMZ with a high habitat heterogeneity may actually be a Category I based on the functions.

Trees in the CMZ “are the source of large in-stream woody debris that is 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 or Old-growth Forested Wetlands of Fast-growing Trees –

Mature and old-growth forested wetlands over ¼ acre in size 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 wetland trees include: the Alders – Red (*Alnus rubra*), Thin-leaf (*A. tenuifolia*); Cottonwoods – Narrow-leaf (*Populus angustifolia*), Black (*P. balsamifera*); Willows- Peach-leaf (*Salix amygdaloides*), Hooker’s (*S. hookeriana*), Sitka (*S. sitchensis*), Pacific (*S. lasiandra*); and Aspen - (*Populus tremuloides*)

Vernal Pools – Vernal pools or “rainpools” located in a landscape with other wetlands 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. Frieze, WDFW, personal communications). 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 vernal pools in a mosaic of other wetlands are Category II, and isolated vernal pools are Category III.

Wetlands with High Levels of Function - 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 high levels of function, and needing the

protection provided a Category II status.

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 in the landscape than Category II wetlands. They may not need as much protection as Category I and 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 do provide some important functions, and should to some degree 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 values present in a wetland; it only helps to identify the levels of protection needed.

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, and it may therefore be necessary to expand the type of wetlands categorized based on special characteristics. Developing the concept of “wetlands of local significance” is recommended where local governments need to provide a level of protection to local wetlands 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 “field” form. The information that was incorporated in the “office” form is now included on the first page of the “field” form.

The Wetlands Rating Field Data 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 data 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 FIELD DATA FORM

Land-owner’s Permission

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

Time Involved

The field-time necessary to rate wetlands will vary from as little as fifteen minutes to many hours, or possibly days. 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 field method 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. The more experience one has in wetland field work the quicker and more accurate the result will be. We recommend that qualified wetland consultants be used for most sites, particularly the larger and more complex ones.

Identifying the Boundaries of Wetlands for Rating

Determine the location and approximate boundaries of the wetland during the site visit. A precise delineation of wetlands 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 before going into the field. 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.

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 system, like the methods for assessing wetland functions (Hruby et al. 2000), 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.

Identifying Boundaries of Large Contiguous Wetlands

Wetlands can often form large contiguous areas extend over hundreds of acres. This is especially true in river valleys where there is 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 wetland into different units is changes in the water regime of the wetland. Boundaries between wetland 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.

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 with Constrictions

Wetlands in depressions 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 into units 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)

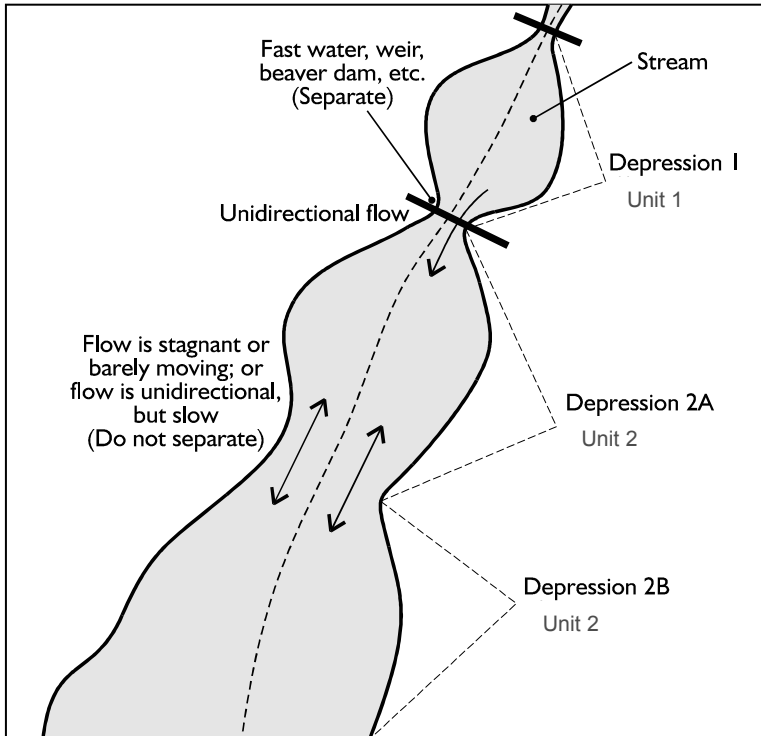
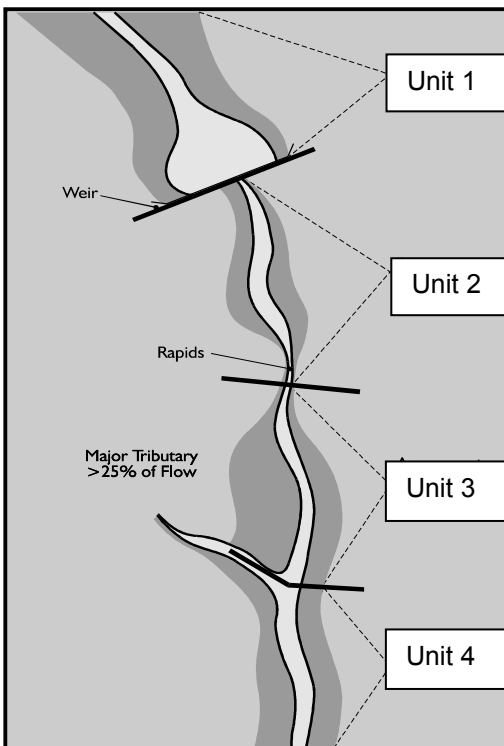


Figure 1. Determining wetland units in depressions with constrictions.

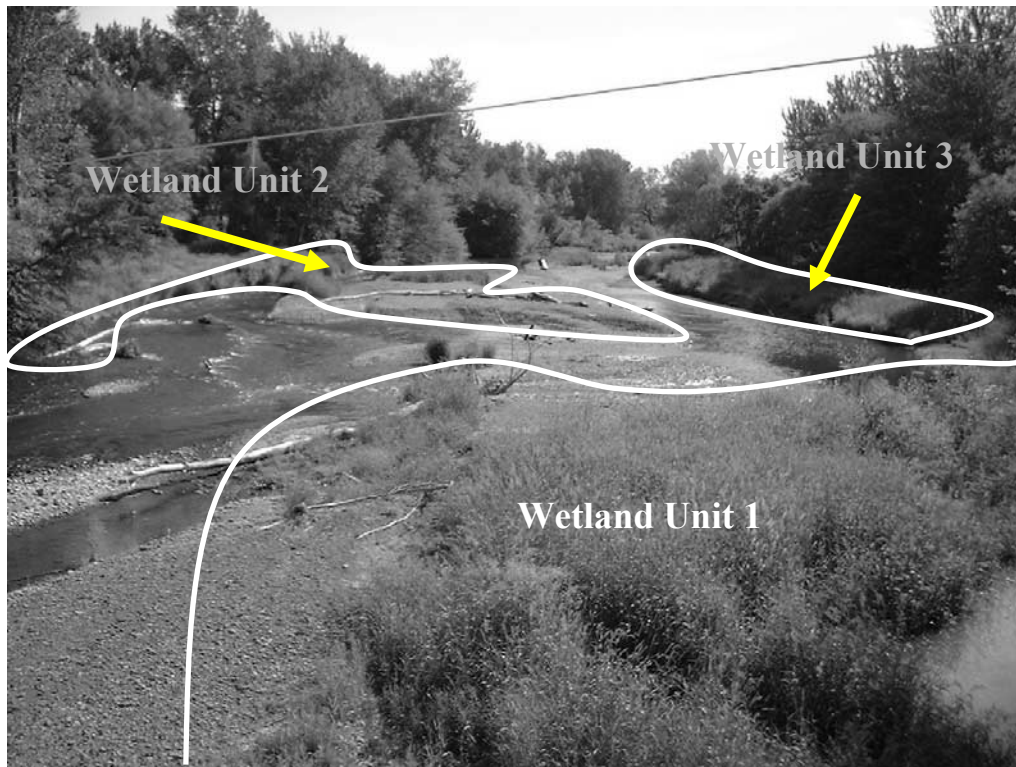
Wetlands Associated with Streams or Rivers



Linear wetlands contiguous with a stream or river may be broken into units at the point where the wetland vegetation becomes narrow for at least 100 feet (40 m), or 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 unit in a riverine setting based on width of vegetation and 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 in the unit 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 separate units*. (see Figure 3 above)

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.

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 0.4 hectares (1 acre); and
- Each patch is less than 30 m (100 feet) apart, on the average; and
- The areas delineated as vegetated wetland 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 (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 three criteria in the delineation manual (vegetation, soils, and water regime) are greater than 50% of the total area. In this landscape the cottonwoods growing on outside the wetland patches should be included as features of the wetland.

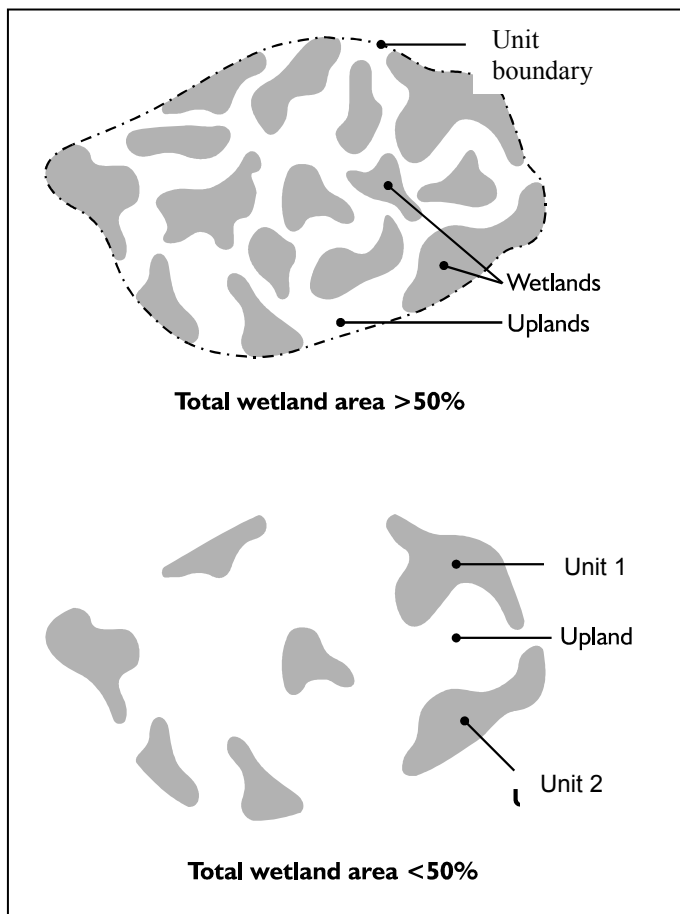


Figure 4: Determining unit boundaries when wetlands are small patches.

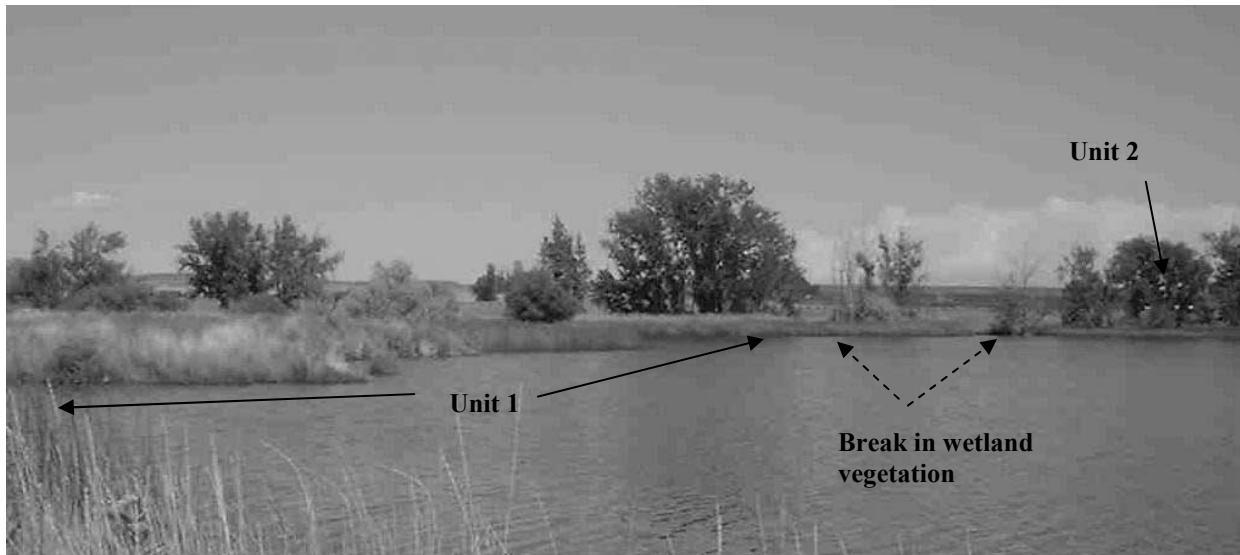
Wetlands Along the Shores of Lakes

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

1. 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 not a lake-fringe wetland.
2. Only the vegetated areas along the lake shore are considered as part of the wetland unit for the rating system.
3. If only 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 two wetland 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 to flow equally well between the two areas. For example, if there is a wetland on either side of 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 area 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.

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

Large wetlands may contain areas that would 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 area, would otherwise be rated as Category II or III based on its functions it may be possible to assign a dual rating. In such cases the options are:

1. Rate the entire wetland as a Category I wetland, or
2. Give the wetland a dual rating as a I/II, or a I/III.

To develop a dual rating you will need to establish a boundary within the wetland being rated that clearly establishes the area that is the Category I bog or forest. This will be difficult, and in some cases may not be possible.

Dual ratings are acceptable only in the case a wetland contains a small area of bog or slow-growing forest. Wetlands that are a category I for other reasons cannot be split.

The criteria to be used in establishing the boundary between a Category I area of a wetland and those that are 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 mature 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 and fens are replaced with the more common wetland species) and where the organic soils become shallow (less than 16 inches).

5. DETAILED GUIDANCE FOR THE DATA 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 using the rules or guidance outside the scope of this rating system.

Questions A1-A4. Check List for Wetlands That Need Special Protection, and That Are Not Included in the Rating

A1. Is the wetland in an area (e.g. GIS polygon) that has been documented as a habitat for any State or 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 Washington State Department of Fish and Wildlife for this information.

A2. Does the wetland contain individuals of Federal or State listed Threatened or Endangered plant or animal species? Do you have any information that a T/E species is present, or uses, the wetland that is not yet recorded on the state databases in #1 above. You may have information from local sources indicating that the wetland is being used by a T/E species.

A3. Does the wetland contain individuals of Priority species listed by the WDFW for the state? The current list of priority species can be found on the state Fish and Wildlife Department web page. <http://www.wa.gov/wdfw/hab/phslist.htm>

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.

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 CLASSIFICATION OF WETLAND

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

the rating system incorporates this new classification system as part of the questionnaire for characterizing the 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 (riverine, depressional, slope, lacustrine (lake-shore), tidal) that are relatively easy to identify. 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 the level of detail necessary in an assessment.

A classification key is provided with the data form to help you identify whether the wetland is riverine, depressional, slope, or lake-fringe (tidal is not needed in eastern Washington). The key contains five questions that need to be answered sequentially starting with #1. The following section describes the criteria used for classification in more detail than found on the key.

Question 1: Lake-shore (Lacustrine) Wetlands

Lake-shore 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-shore." 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).

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-shore. 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-shore 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.

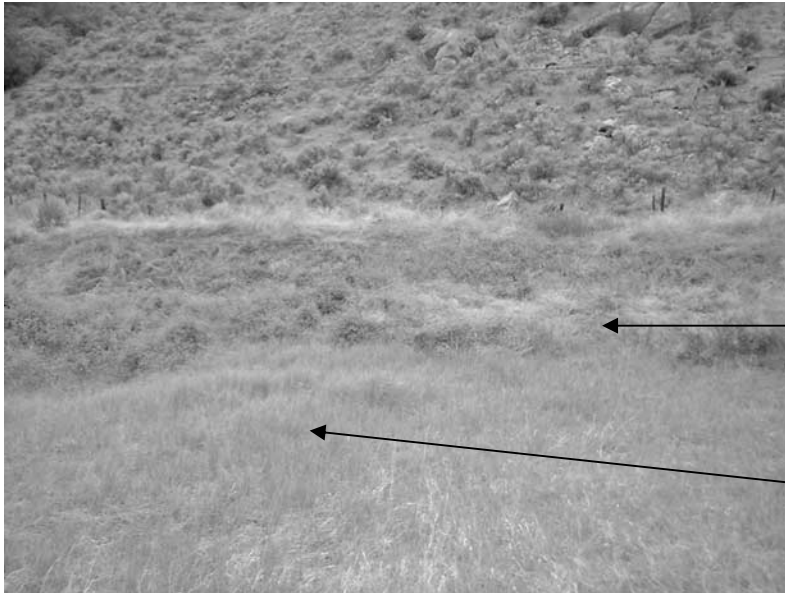


Figure 6: Slope wetland along the Columbia River identified by the presence of wetland plants (*Carex sp.*, *Juncus sp.*) Wetland occurs where there is a major break in this slope of the hillside.

Break in slope

Wetland plants

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 are 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 flooding waters are a major environmental factor that structure the ecosystem in these wetlands and control its functions.

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.

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.



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 a wetland and vegetated between the banks. 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 topographic depressions that have closed contours on three sides. Elevations within the wetland are lower than in the surrounding landscape. The shape 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 it is found is 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 lacustrine 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.

One situation that may be hypothesized is a depressional wetland 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 grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. If you have a wetland with the characteristics of several HGM classes present within its boundaries use the following table to identify the appropriate class to use for rating.

HGM Classes Within Wetland	Class to Use in Rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine	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.

5.3 CATEGORIZATION BASED ON FUNCTIONS

The functions that a wetland performs are characterized by asking 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 are divided into three groups that reflect the three major types of functions wetlands perform: improving water quality, hydrologic functions (reducing the impact of flooding and erosion), 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 categories. The level of detail regarding functions found in the assessment methods, however, is not needed for the simpler categorization done in this rating system.

NOTE TO REVIEWERS – We need your help

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. **We are looking for any information or documentation about the importance of this function in the wetlands of eastern Washington.** In the absence of such information the decision was made to include baseflow support only as a function in headwater wetlands (see p. 44).

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. In the absence of any information or documentation, 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.
- 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 and baseflow in areas where the ET is 36 inches. A net gain to groundwater, and therefore 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 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 indicators chosen for this rating system were calibrated by using the information collected during the development of the methods in the Columbia Basin and during field visits by members of the review team. The rationale for choosing each indicator is given in a text box within the description of how to answer the field questions.

Potential and Opportunity for Performing Functions

One of the issues inherent in developing a characterization is that the indicators only

represent structural characteristics of a wetland and its landscape. They do not measure rates at which functions are performed nor ecological processes. 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.

Example of differences in potential and opportunity among wetlands

We have defined the water quality improvement function 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 pollutants removed in a wetland for this characterization. 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 5lbs. 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 function because we define functions based on the values they provide us. The key concepts in the both state and federal clean water acts is "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.

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. 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. The opportunity for a wetland to provide habitat cannot be answered simply by one question. 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.

Classifying Vegetation

There are several questions on the data sheet that ask you to classify the vegetation found within the wetland into different types. The types of vegetation used for the rating system are mostly based on the “Cowardin” classification, and the criteria for these categories are adapted from Cowardin (1979). “Cowardin” vegetation types (classes) are distinguished by the uppermost layer of vegetation (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.

A **forested area** is one where 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.13). 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) is one where woody vegetation less than 20 ft. (6 m) tall is the top layer. Examples include species such as native rose, young alder, and red-osier dogwood. To count, the shrub vegetation must provide at least 30% cover and be the uppermost layer.

An **area of persistent emergent plants** is one covered by erect, 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. Cattails and bulrushes are good examples of persistent emergent plants. To count, the emergent vegetation must provide at least 30% cover of the ground and be the upper most layer.

An area of **aquatic bed plants** is any area of seasonal or permanent open water where rooted aquatic plants such as lily pads, pondweed, etc. cover more than 30% of the “pond” bottom. *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 that can be used 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. The thresholds for scoring differ among the questions so use caution in filling out the data sheet.

Section 1: Questions Relating to the Functions of Improving Water Quality

1.1 Opportunity multiplier – Does the wetland have the opportunity to improve water quality? This question applies to wetlands of all HGM classes.

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.

Rationale for indicator: The opportunity for wetlands to improve water quality in a watershed 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 remove sediment and nutrients is, therefore, linked to the amount of development, agriculture, or logging present in the upgradient part of its contributing basin or in its immediate surroundings.

Users of the rating system must make a qualitative judgment on the opportunity of the 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 (if the wetland is a place where groundwater intercepts the surface) and surface runoff. 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 300ft. (input of coliform bacteria and nutrients)
- Wetland intercepts groundwater within the Reclamation area (groundwater in reclamation area is polluted with pesticides and high levels of nutrients – Williamson et al. 1998)
- Untreated stormwater discharges to wetland (input of sediment and toxic compounds)
- Farming within 300 feet of wetland (input of pesticides, sediment, and nutrients: input is either by surface runoff or windblown dust)
- A stream discharges into wetland that drains developed areas, residential areas, farmed fields, or clear-cut logging (input of toxic compounds, sediments, nutrients).

To complete the next part of the data 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 column on the data form identifies the wetland class for which the question is intended:

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

1.2 Questions to answer for Depressional Wetlands

1.2.1 Characteristics of surface water outflows from the wetland (this indicator applies to both the water quality and the hydrologic functions):

Rationale for indicator: Pollutants that are in the form of particulates (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 that has “Facultative” wetland vegetation in it (Figure 11).
- An area along the circumference 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 a meter 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. Small culverts (<18 in. in diameter) can usually be categorized as severely constricted.
- 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 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.”



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.

1.2.2 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 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 up 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.

1.2.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest):

Rationale for indicator: Plants enhance sedimentation by providing a medium that acts like a filter, and causes 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.

If you are familiar with the Cowardin classification of vegetation, you are looking for the areas that would be classified as “Emergent”, “Shrub/scrub,” or “Forested.” If you need help in identifying these types of vegetation review the discussion on p. 26. 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.

You are asked to characterize the persistent 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).

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.