# Washington State Wetland Rating System for Western Washington

*Revised*

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Ecology Publication # 04-06-025

# WASHINGTON STATE WETLAND RATING SYSTEM

# for

# WESTERN WASHINGTON

## Revised

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# *PREFACE*

This document is a revision of the "Washington State Wetland Rating System for Western Washington," published by the Department of Ecology in October 1993. 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 earlier 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 of the review team for western Washington 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 (Perry Lund, Ann Boeholt, Brad Murphy, Erik Stockdale, Susan Meyer, Sarah Blake).

# *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 and second editions, the term "rating" was not used in a manner that is consistent with its definition in the dictionary, and this has caused some confusion. By 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 173-22-080). It also categorizes estuarine wetlands but does not characterize their functions. The rating system, however, does not characterize 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 western 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 122 wetlands throughout western Washington. Members of the Technical Review Team and wetland staff from the Department of Ecology visited each site during the spring of 2003 and rated the wetlands using both the old and the revised methods. A companion document, "Washington State Wetland Rating System – Eastern Washington," is also available.

# 2. DIFFERENCES BETWEEN THE SECOND 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 earlier editions, or some modified version of them, 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 federally or state listed 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.

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 earlier editions 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 make the effort to identify 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 earlier editions 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 that improve water quality (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. 1999).

In the first and second editions 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 122 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 (with one exception noted below).

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 122 reference wetlands using the old and the revised systems.

NOTE: The sum of category II and III wetlands were approximately the same using the old and the revised rating system (88 for the old rating system and 89 for the revised one). There is a difference, however, in the proportion of each category between the two versions. Sixty-eight out of the 88 wetlands scored more than 21 points using the field form in the old rating system. This meant that 77% of the wetlands rated on their habitat functions were Category II and only 23% were Category III. At the time the old rating system was developed, a decision was made to score wetlands that were connected to other aquatic resources higher than those that were not. Such wetlands almost always score a minimum of 11 points, or ½ of what is needed to become a Category II regardless of other factors. These wetlands only needed to score 11 more points out of the remaining 50 points possible to become Category II wetlands. Much of the preponderance of Category II ratings using the old method in the reference wetlands is a result of the importance assigned to these habitat characteristics. More recently, the teams of experts developing methods for assessing functions and the rating system in the state decided to reduce the importance of stream or lake connections in scoring the habitat functions based on their experience and professional judgment. The habitat functions of wetlands outside of stream corridors were considered to be as important as those in corridors, and a better balance between Category II and III wetlands was sought. For this reason the numeric threshold between Category II and Category III wetlands was set so the distribution would be more balanced. Of the 89 reference wetlands that are categorized as II's and III's using the revised method, 50 (56%) are Category II and 39 (44%) are Category III.

#### Number of Wetlands in Each Category (western Washington)

| Category | Old Rating System | Revised Rating System |
|---|---|---|
| I | 27 | 24 |
| II | 68 | 50 |
| III | 20 | 39 |
| IV | 7 | 9 |

# *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 122 wetlands used to field test the current rating system only 24 (20%) were rated as a Category I. In western Washington the following types of wetlands are Category I.

**Estuarine Wetlands** - Relatively undisturbed estuarine wetlands larger than 1 acre are Category I wetlands because they are relatively rare and provide unique natural resources that are considered to be valuable to society. These wetlands need a high level of protection to maintain their functions and the values society derives from them. Furthermore, the questions used to characterize how well a freshwater wetland functions cannot be used for estuarine wetlands. No rapid methods have been developed to date to characterize how well estuarine wetlands function.

Estuaries, the areas where freshwater and salt water mix, are among the most highly productive and complex ecosystems where tremendous quantities of sediments, nutrients and organic matter are exchanged between terrestrial, freshwater and marine communities. This availability of resources benefits an enormous variety of plants and animals. Fish, shellfish and birds and plants are the most visible. However, there is also a huge variety of other life forms in an estuarine wetland: for example, many kinds of diatoms, algae and invertebrates are found there.

Estuarine systems have substantial economic value as well as environmental value. All

Washington State estuaries have been modified to some degree, bearing the brunt of development pressures through filling, drainage, port development and disposal of urban and industrial wastes. The over-harvest of certain selected economic species has also modified the natural functioning of estuarine systems. Many Puget Sound estuaries such as the Duwamish, Puyallup, Snohomish and Skagit have been extensively modified. Up to 99% of some estuarine wetland areas in the state have been lost.

Estuaries, of which estuarine wetlands are a part, are a "priority habitat" as defined by the state department of Fish and Wildlife. Estuaries have a high fish and wildlife density and species richness, important breeding habitat, important fish and wildlife seasonal ranges and movement corridors, limited availability, and high vulnerability to alteration of their habitat (Washington State Department of Fish and Wildlife (WDFW), http://www.wa.gov/wdfw/hab/phslist.htm, accessed October 15, 2003).

**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 listed threatened or endangered plants are Category I wetlands.

High quality, relatively undisturbed examples of wetlands are uncommon in western Washington. By categorizing these wetlands as Category I, we are trying to provide 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.wa.gov/dnr/htdocs/fr/nhp/wanhp.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 (Bolscher 1995, 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 40 years in western 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** – Mature and old-growth forested wetlands over 1 acre in size are "rated" as Category I because these wetlands cannot be easily replaced through compensatory mitigation. A mature forest 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://www.wa.gov/wdfw/hab/phslist.htm, accessed October 15, 2002). NOTE: All wetlands are categorized as a priority habitat by the WDFW. Mature and forested wetlands, therefore, represent two priority habitats that coincide.

**Wetlands in Coastal Lagoons** – Coastal lagoons are shallow bodies of water, like a pond, partly or completely separated from the sea by a barrier beach. They may, or may not, be connected to the sea by an inlet, but they all receive periodic influxes of salt water. This can be either through storm surges overtopping the barrier beach, or by flow through the porous sediments of the beach.

Wetlands in coastal lagoons are placed into Category I because they probably cannot be reproduced through compensatory mitigation, and because they are relatively rare in the landscape. No information was found on any attempts to create or restore coastal lagoons in Washington that would suggest this type of compensatory mitigation is possible. Any impacts to lagoons will, therefore, probably result in a net loss of their functions and values.

In addition, coastal lagoons and their associated wetlands are proving to be very important habitat for salmonids. Unpublished reports of ongoing research in the Puget Sound (Hirschi et al. 2003, Beamer et al. 2003) suggests coastal lagoons are heavily used by juvenile salmonids.

**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 (improving water quality, hydrologic functions, and habitat) are also relatively rare. Of the 122 wetlands used to calibrate the rating system in western Washington, only 18 (15%) scored 70 points or higher based on their functions.

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 western Washington include:

**Estuarine Wetlands** - Any estuarine wetland smaller than an acre, or those that are disturbed and larger than 1 acre are category II wetlands. Although disturbed, these wetlands still provide unique natural resources that are considered to be valuable to society. Furthermore, the questions used to characterize how well a wetland functions cannot be used for estuarine wetlands.

**Interdunal Wetlands** - Interdunal wetlands greater than 1 acre are Category II because they provide critical habitat in this ecosystem (Wiedemann 1984). This resource is important but constitutes only a small part of the total dune system (Wiedemann 1984). No methods have been developed to characterize how well interdunal wetlands function, so these wetlands cannot be rated by a score.

Interdunal wetlands form in the "deflation plains" and "swales" that are geomorphic features in areas of coastal dunes. These dune forms are the result of the interaction between sand, wind, water and plants. The dune system immediately behind the ocean beach (the primary dune system) is very dynamic and can change from storm to storm (Wiedemann 1984). For the purpose of rating, any wetlands that are located to the west of the 1889 line (western boundary of upland ownership) are considered to be interdunal.

**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 perform most functions relatively well, or performed one group of functions very well and the other two moderately well.

## 3.3 CATEGORY III

Category III wetlands are 1) wetlands with a moderate level of functions (scores between 30 -50 points) and 2) interdunal wetlands between 0.1 and 1 acre in size. Wetlands scoring between 30 -50 points generally have been disturbed in some ways, and are often less diverse 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 western Washington and one for eastern. 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

### Land-owner's Permission

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

### Time Involved

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. In some cases, however, it may be necessary to visit the wetland more than once. Some of the questions cannot be answered if the ground is covered with snow or the surface water is frozen. If this is the case at the time a wetland is being rated, it may be necessary to revisit the site later.

## 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. This will help ensure that results are repeatable.

## 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 or the size becomes an issue in determining the category (e.g. >1 acre estuarine or > 1 acre mature or old-growth forest). 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.

**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 (hydrogeomorphic [HGM] classes (see p. 24) 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.

## 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 is some surface water connection between all areas of the floodplain. 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 abruptly, 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)

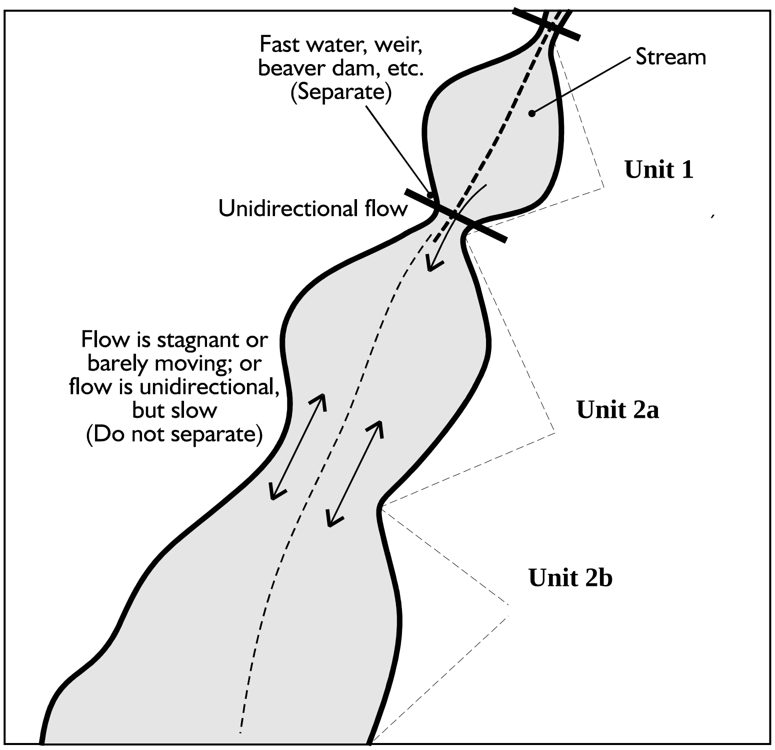
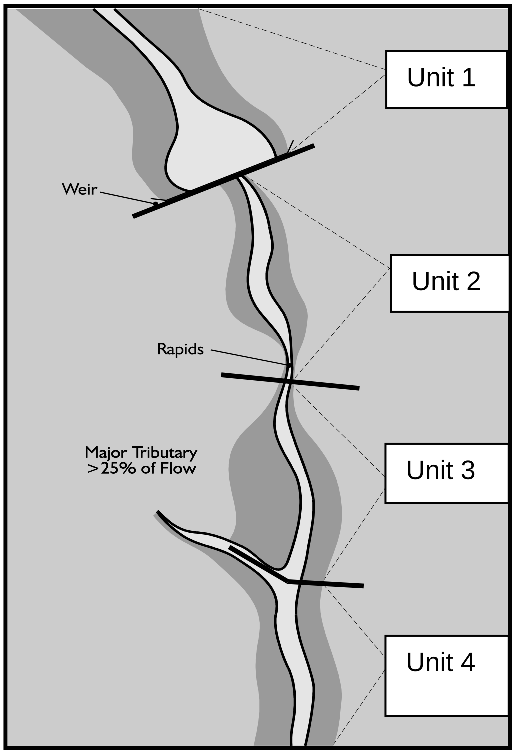



Figure 1. Determining wetland units along a stream corridor with constrictions. Units 2a and 2b should be rated as one unit.

## Wetlands Associated with Streams or Rivers




In western Washington, linear wetlands contiguous with a stream or river may be broken into units using criteria based on hydrologic factors or vegetation. Figure 2 presents a diagram of how wetland units might be separated along a stream corridor based on change in the water regime. Three changes in water regime are illustrated: 1) a weir or dam, 2) a series of rapids, and 3) a tributary coming into the main stream that increases the flow significantly (generally > 25%). Figure 3 illustrates how a unit for rating can be separated when the wetland vegetation: 1) disappears and is replaced with unvegetated bars or banks for at least 50 ft along the stream, and 2) becomes narrow for at least 100 feet. A narrow band of vegetation is defined as one that is less than 30 feet in width.

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

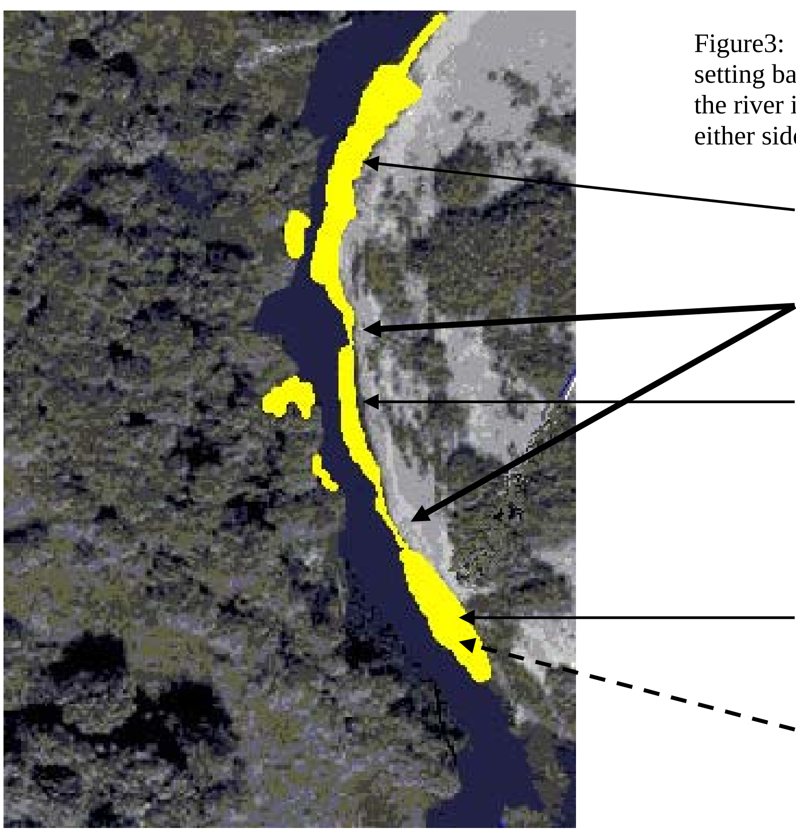



Figure3: Determining wetland units in a riverine setting based on breaks in vegetation. In this case the river is wider than 50ft., and the wetlands on either side are rated separately.

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, **do not** include the river as a characteristic of the wetland unit for rating.

*Wetland on both sides of a wide stream or river* — If the river or stream has an unvegetated channel that is more than 50 ft (15 m) wide, and there is a contiguous wetland area on both sides, treat **each side as a separate unit** for rating. **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 50 feet (15 m) wide, and there is are contiguous vegetated wetlands on both sides, treat **both sides together** as one unit, and **include** the river 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 wetland are more than 50% of the total area of the wetlands and the uplands together, 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).

## Identifying Boundaries of Estuarine Wetlands

Vegetation in estuarine wetlands is often found in patches that are interspersed among mud flats and tidal channels. The salt tolerant vegetation can also be found as long narrow bands along the shores of Puget Sound or in sloughs (see Figure 9). All these estuarine wetlands are to some degree interconnected because they are flushed by the same tidal waters, and thus to some degree also function together.

The criteria listed below for separating estuarine wetlands into separate units for rating are based more on practical issues, such as ease of use, rather than any scientific justification because no data exist to establish thresholds for separation. Patches of vegetation that are 10 ft apart will be more closely linked ecologically than those 50 ft apart, and even more so than patches 100 ft apart. There is no scientific information available to suggest that there are thresholds in distance at which the ecological interaction between two patches of vegetation changes significantly.

**Estuarine wetlands should be rated as one unit when:**

- Patches of salt tolerant vegetation are separated along a shore by less than 100 ft of cobble or sand beaches

- Patches of salt tolerant vegetation are separated by less than 300 ft of mudflats that go dry on a Mean Low Tide.
- Patches of salt tolerant vegetation are separated by less than 100 ft of a tidal channel that has water at Mean Low Tide.

**Estuarine wetlands in sloughs may be separated** into different units for rating when the patches of salt tolerant vegetation in sloughs are separated by bridges, dikes, or bulkheads for more than 30 ft. Both sides of a slough, however, should be rated as one wetland.

**NOTE: Kelp beds and eel grass beds are not considered as estuarine wetlands for the purpose of rating. They are important aquatic resources but cannot be characterized using this method.**

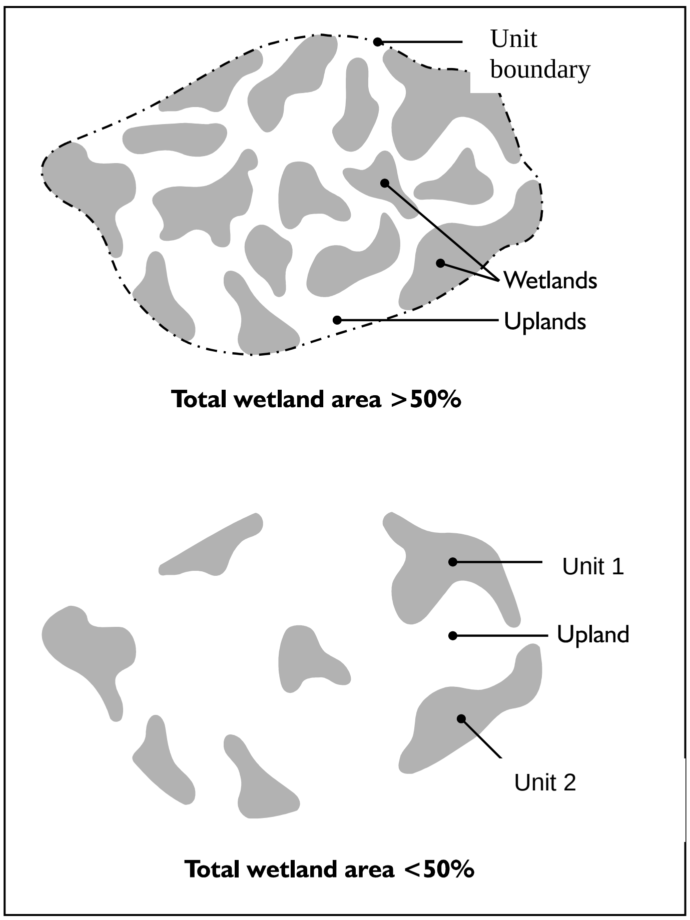



Figure 4: Determining unit boundaries when wetlands are in small patches.

## 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 within areas of vegetation is considered to be part of the wetland, but open water that separates patches of vegetation along a shore are not considered to be part of the wetland (Figure 5).
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 6)


Figure 5: Lake-fringe wetland showing open water that is included within the wetland boundary.

Another common situation in western Washington is a lake-fringe wetland that is contiguous with a large wetland that extends far from the edge of the lake (Figure 7). These wetlands are usually classified as depressional or riverine. The entire unit of riverine and lake-fringe wetlands should be rated as one unit unless the connection between them is long and narrow (more than 100 ft long and less than 50f t wide).

Figure 6: Break in wetland vegetation along the shore of a lake that separates the wetlands into two units for rating.

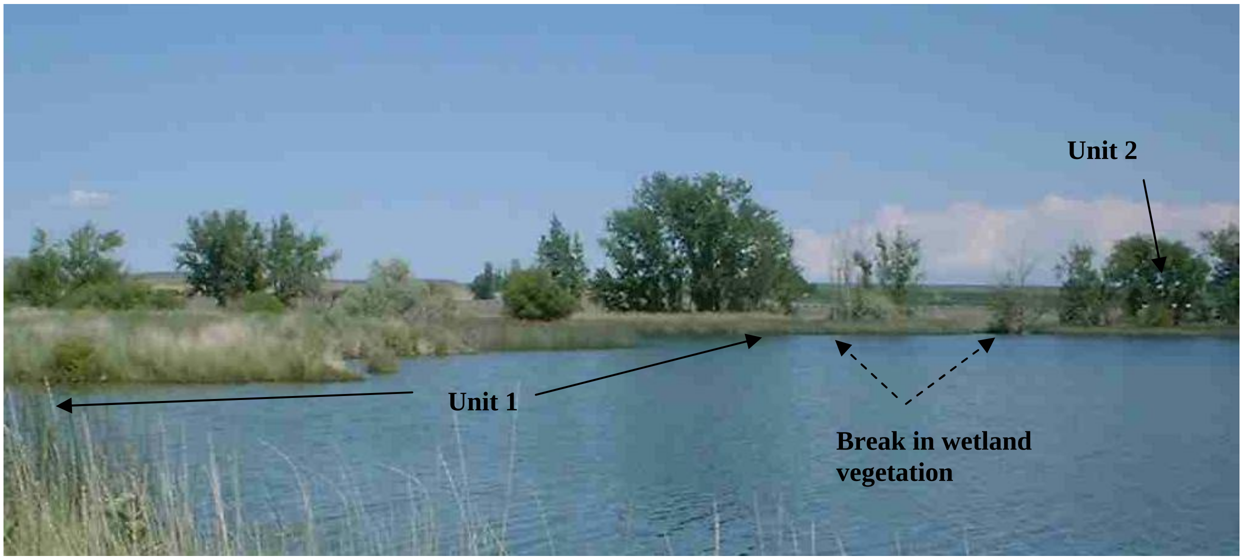
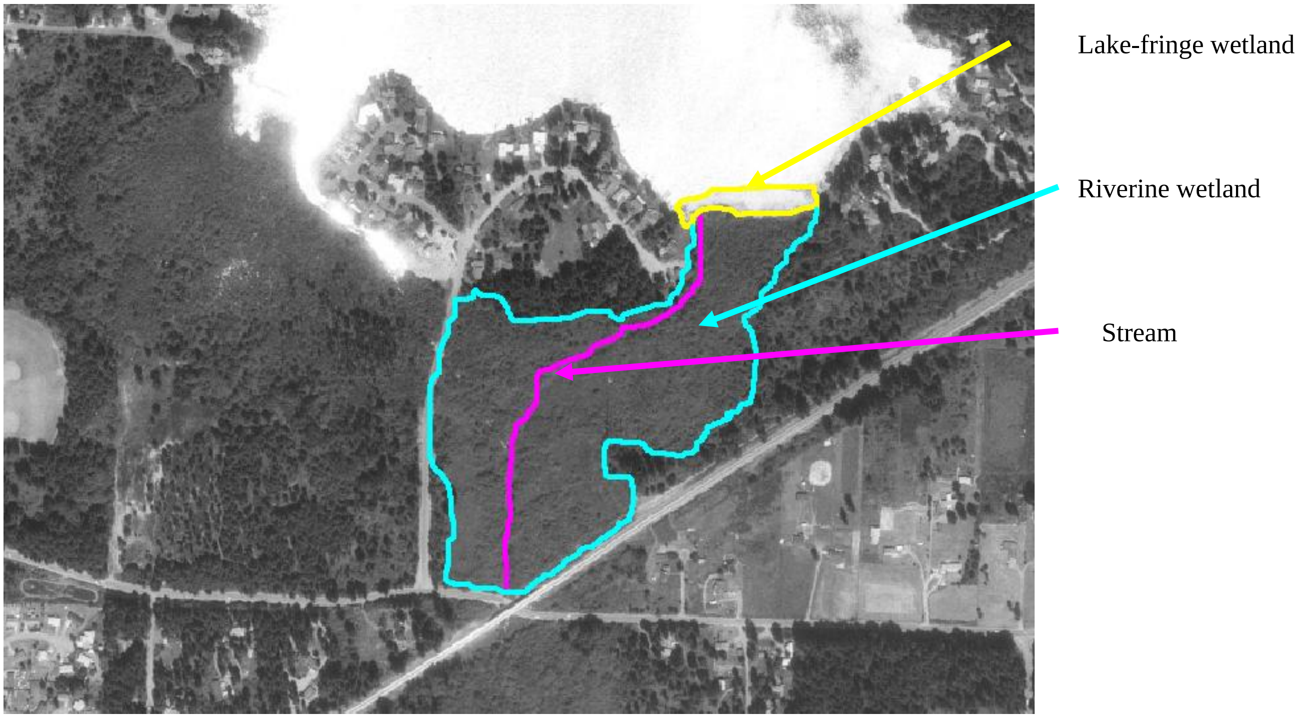



Figure 7: Aerial photograph of a lake-fringe wetland connecting to a riverine wetland without any topographic or hydrologic breaks between them. Both types of wetlands are rated as one using the questions for Riverine wetlands.




Another scenario that may occur in a lake-fringe wetland is one where open water is found between the wetland plants along the shore and patches in deeper water. One can usually assume that the water depth in this area of open water is shallower than the depth in the area of the plants further offshore. In this situation the open water is considered a part of one wetland that encompasses both the rooted submerged plants offshore and the shore-side plants. The absence of plants in the area of open water may only be temporary, or the submerged plants are present but not visible because they do not grow to the surface. The vegetation may also be absent due to wave action, physical removal, or herbicide applications.

## Wetlands Bisected by Human-Made Features

When a wetland is divided by a human-made feature, such as 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 or a road with a culvert connecting the two, and both sides of the culvert are partially or completely underwater for most of the year, 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. Figure 8 shows a wetland that is a pasture along one side and relatively undisturbed on the other side. In this case the entire wetland should be rated as one unit.

Figure 8: A wetland with two different levels of disturbance and separated by a fence. The entire wetland should be rated; not just the mowed part.

## Freshwater Wetlands Where Only Part of the Wetland is a Forest or a Bog

Freshwater wetlands may be rated as Category I because they contain a smaller area of bogs or mature or old-growth forest. If the entire wetland (including the bog and forested areas) scores between 30 and 69 points for its functions, it may be possible to assign a dual rating to the wetland (Category I/II, Category I/III).

**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 |

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. 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.

<u>Dual ratings are acceptable only when a wetland contains a small area of bog or forest, or in certain estuarine cases (see below).</u> **Wetlands that are a Category I Natural Heritage sites Category I coastal lagoons, or Category II interdunal wetlands cannot be split.**

The criteria to be used in establishing the boundary between the Category I part 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 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 more common wetland species) and/or where the organic soils become shallow (less than 16 inches).

## Category I Estuarine Wetlands With a Fringe of *Spartina* spp.

A dual rating is also possible when an estuarine wetland that meets the criteria for a Category I estuarine wetland has a fringe along the seaward edge of the invasive *Spartina* spp. The area that has more than 10% cover of *Spartina,* but no other invasive species, meets the criteria for a Category II estuarine wetland. The entire vegetated system can be categorized as an estuarine I/II. The boundary between the two categories is the zone where the cover of *Spartina* spp. becomes 10%. The area of *Spartina* would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I.

## 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 9 for an 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.

Figure 9: A slope wetland near Padilla Bay that is approximately 1/10 acre in size. It rated as a Category IV 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 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 size of the wetland impacted is ¼ acre, 10 acres, or 100 acres.

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).

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 additional questions 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 SP1-SP4 will help you identify whether the wetland being rated also needs to be protected using information that is outside the scope of this rating system.

### Questions SP1 - SP4. Check List for Wetlands That Need Special Protection, and That Are Not Included in the Rating

SP1. *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 Washington State Department of Fish and Wildlife for this information.

SP2. *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.

SP3. *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://wdfw.wa.gov/hab/phspage.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.

SP4. *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, lake-fringe, tidal fringe or flats. The key contains eight questions that need to be answered sequentially starting with first. The following section describes the criteria for identifying classes in more detail than found on the key.

### Question 1: Tidal Fringe Wetlands

Tidal fringe wetlands are found along the coasts and in river mouths to the extent of tidal influence. The dominant source of water is from the ocean or river. The unifying characteristic of this class is the hydrodynamics. All tidal fringe wetlands have water flows dominated by tidal influences, and water depths controlled by tidal cycles in the adjacent ocean.

Tidal fringe wetlands in which the water has a salinity higher than 0.5 parts per thousand, are classified as "Estuarine" for the purposes of rating them. Tidal fringe wetlands in which the waters are tidal, but freshwater (salinities below 0.5 parts per thousand), are rated with riverine freshwater wetlands.

There are numerous tidal fringe wetlands in the estuaries and tidal sloughs in the Puget Sound region as well as in Willapa Bay and Grays Harbor. The difficulty is in identifying the boundary between fresh and brackish waters. In the absence of local information (e.g. the salt wedge in the Snohomish River extends upstream to the Route 2 bridge), the users of the rating system will have to rely on vegetation to identify the boundaries between fresh and salt water. Appendix B lists the sensitivity of common wetland plants to salt (from Hutchinson 1991). If the dominant plants in the community are those listed as "Tolerant" or "Very Tolerant," it can be assumed that the waters in the slough or river at that point are saline. If, on the other hand, most of the plants are in the list for "Very Sensitive" and "Sensitive," the assumption is that the wetland is a freshwater one.

Figure 10 shows Edison Slough which has a fringe of *Triglochin* sp. and *Carex lyngbyei* along the edge of the mudflat.  On this basis the wetland was classified as “estuarine.”

Figure 10: An estuarine slough at low tide with salt tolerant vegetation along the edges.

## Question  2: Flats Wetlands

“Flats” wetlands occur in topographically flat areas that are hydrologically isolated from surrounding groundwater or surface water.  The main source of water in these wetlands is precipitation directly on the wetland itself. They receive virtually no groundwater discharge or surface runoff from the surrounding landscape.  This characteristic distinguishes them from depressional and slope wetlands.

Wetlands that should be classified as flats may be hard to distinguish from flat depressional wetlands that are fed by groundwater.  This need not be a concern, however, for users of the rating system because both depressional and flats wetlands use the same questions in the rating form.

## Question 3: Lake-fringe (Lacustrine-fringe) Wetlands

Lake-fringe wetlands are separated from other wetlands based on the area and depth of open water adjacent to them.  If the area of open water next to a vegetated wetland is larger than 20 acres (8 hectares), and more than 6.6 feet deep (2m) 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 western Washington (Hruby et al. 2000), and differ slightly from the criteria of lacustrine wetlands in the Cowardin classification (Cowardin et al. 1979).   Figure 11 shows a lake-fringe wetland in Snohomish County with aquatic bed plants and a fringe of wetland shrubs.

Wetlands found along the shores of large reservoirs such as those found behind the dams along the major rivers are also 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.

Figure 11: Lake-fringe wetland with an area of aquatic bed vegetation and a narrow band of wetland shrubs along the shore.

## Question 4: 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 12 shows a slope wetland that formed where the slope of the hillside changed and caused groundwater to come to the surface.

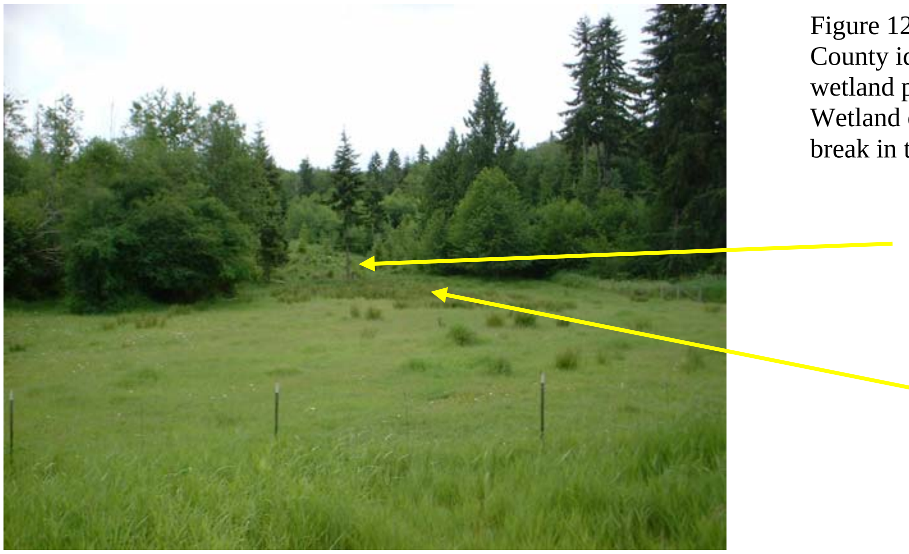



Figure 12: Slope wetland in Lewis County identified by the presence of wetland plants (*Carex sp*. *Juncus sp*.) Wetland occurs where there is a major break in this slope of the hillside.

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 wetland.

## Question 5: Riverine Wetlands

Riverine wetlands occur in valleys associated with stream or river channels. They lie in the active floodplain of a river, and have important hydrologic 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 floodwater is a major environmental factor that structures the ecosystem in these wetlands. Riverine wetlands may also receive significant amounts of water from other sources such as groundwater and slope discharges. Wetlands, however, that lie in floodplains but are not frequently flooded are not classified as riverine.

Many riverine wetlands are associated with rivers that are very dynamic. Their proximity to the river facilitates the rapid transfer of floodwaters in and out of the wetland, and the import and export of sediments. Riverine wetlands are often replaced by depressional or slope wetlands near the headwaters of streams and rivers, where the channel (bed) and bank disappear, and overbank flooding grades into surface or groundwater inundation. In headwaters, the dominant source of water becomes surface runoff or groundwater seepage. For the purposes of classification, wetlands that show evidence of frequent overbank flooding, even if from an intermittent stream, are considered riverine.

Riverine wetlands normally merge with tidal fringe wetlands near the mouths of rivers. The interface with tidal fringe occurs where the dominant hydrodynamics change to tidal flows (Brinson et al 1995). This interface has been significantly modified in western Washington by diking. Many wetlands that were once freshwater tidal are now either riverine or depressional (depending on the frequency of flooding).

The operative characteristic of riverine wetlands in Washington is that of being “frequently flooded” by overbank flows (Figure 13).

Figure 13: A riverine wetland being inundated by flood waters from North Creek. The creek is in the background.

In western Washington the technical committees developing assessment methods decided that the frequency of overbank flooding needed to call a wetland “riverine” is at least once in two years (2 yr. “return” frequency). This characteristic, however, cannot be measured in the field and needs to be established from field indicators. The water regimes of wetlands in Washington have enough variability between dry and wet years that a frequency of flooding (e.g. flooded at least once every two years) could not be used. The following are some field indicators that are to be used to classify a wetland as riverine:

- Scour marks are common
- Recent sediment deposits
- Vegetation is bent in one direction or damaged
- Soils with layered deposits of sediment
- Flood marks on vegetation along the edge of the bank

## Question 6: 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 (Figure 14).

Figure 14: A category III depressional wetland. Note the surface ponding in the low point of the wetland with the cattails. This wetland functions relatively well to remove pollutants and store floodwaters, but does not provide much habitat.

## Question 7: Flat Areas Maintained by High Groundwater

Many wetlands are found in the areas south and east of Olympia that have developed on the outwash plains left by the glaciers. These are maintained by high levels of groundwater in the region and do not easily fit into either the depressional, riverine, or flats class. These wetlands are fairly flat, are often ditched, and do not seem to have an identifiable natural outlet (Figure 15). If they pond water it is usually only because groundwater levels are high in the entire region and the water has nowhere to drain. These wetlands are classified as “depressional” for the purpose of rating them.

Figure 15: Wetland maintained by high levels of groundwater and is not in an easily identified topographic depression.

## Question 8: 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 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 wetland area, 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.

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 |
| Salt Water Tidal fringe and any other class of wetland | Treat as ESTUARINE under "wetlands with special characteristics" |

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 western 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 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 lowlands of western Washington (Hruby et al. 1999), however, are divided into 15 different functions. The level of detail regarding functions found in these assessment methods, however, is not needed for the simpler categorization done in this rating system.

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 western Washington and during field visits 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.

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 at the state and federal level don't specify that any function should be given more, or less importance, than another in protecting the wetland.

### <u>5.3.1 Potential and Opportunity for Performing Functions</u>

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 functions called "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.

<u>Example of Differences in Potential and Opportunity Among Wetlands</u>

We have defined the functions related to water quality improvement as "removing pollutants." 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 this method. 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 functions. 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 of functions 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. with 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.

The technical teams reviewing the rating system for the State 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 western 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 (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 the canopy 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 partially 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 western Washington wetlands include the native rose, young alder, young cottonwoods, hardhack (*Spiraea)*, willows, 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). Most species 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.

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 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 of Flats, R = Riverine or Freshwater Tidal Fringe, 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 or Flats Wetlands)

## Water Quality and Hydrologic Functions of Wetlands in the Depressional or Flats Class

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

***D 1.1*** *Characteristics of surface water outflows 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, are scored the highest for this indicator. An outlet that flows only seasonally is usually better at trapping particulates 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 down-gradient. The question is relatively easy to answer if you find a channel.

You are asked to characterize the surface outlet in one of four 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 16).

Figure 16: A small depressional wetland with no outlet.

- 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 storms. 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 an unconstricted or only slightly constricted outlet that allows water to flow out of the wetland across a wide distance. The outlet does not provide much hindrance to flood waters flowing through the wetland. In general, the distance between the low point of the outlet and average height of inundation will be less than three feet. Beaver dams are considered to be unconstricted unless they are anchored to a steep bank on either side. In general, they do not hold back flood-waters because the water level is maintained at the crest of the dam.
- Wetland is flat and has no obvious outlet or the outlet is a ditch. This is a characteristic commonly found in the wetlands described on page 29. Flat, depressional, wetlands that are maintained by high groundwater often do not have an obvious outlet or they are drained by ditches. These wetlands generally do not collect much surface water from the surrounding uplands but rather are connected to groundwater.
- 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.

***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 C.

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

**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. 34. 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 vegetation in terms of how much area within the wetland boundary is covered by persistent, ungrazed, vegetation. 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 1/2 is covered; or more than 95% 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 not grazed or mowed** (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 17 shows a depressional wetland in which persistent vegetation is between 1/2 and 95% of the area of the wetland. The remainder is open water.

Figure 17: A depressional wetland in which persistent, ungrazed, vegetation cover between ½ and 95% of the area of the wetland.

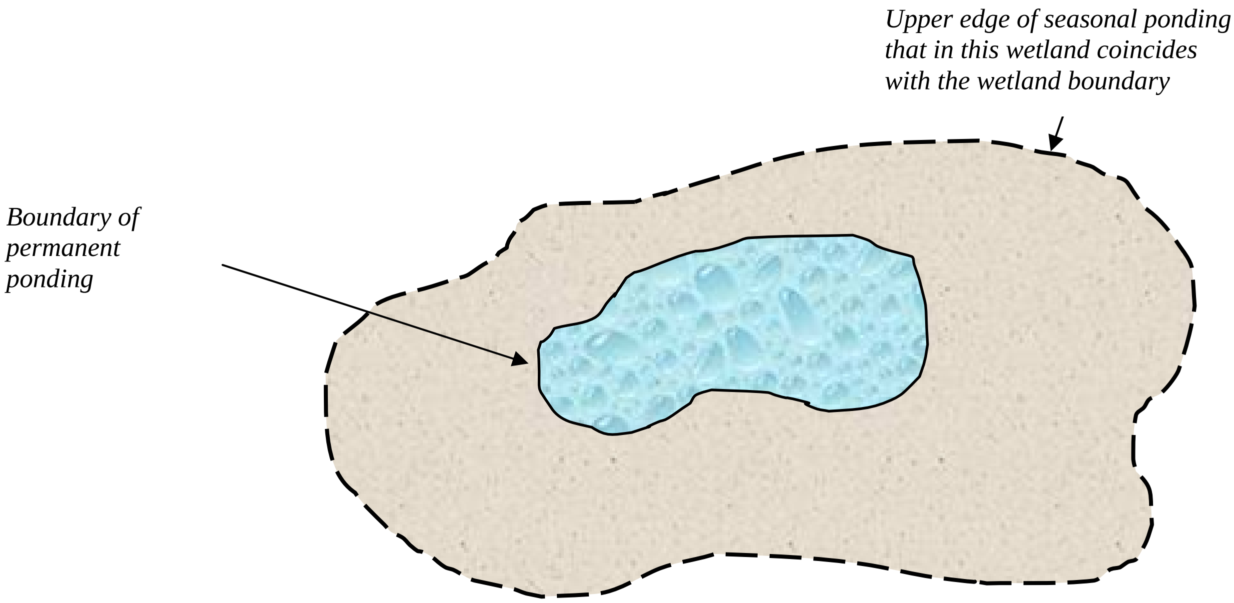
***D 1.4*** *Characteristics of seasonal ponding or inundation.*

**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 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.

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 18).

Figure 18: 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.




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 19). 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 appearance of leaves on the surface).
- Dried algae left on the stems of emergent vegetation and shrubs and on the wetland surface (Figures 20, 21).

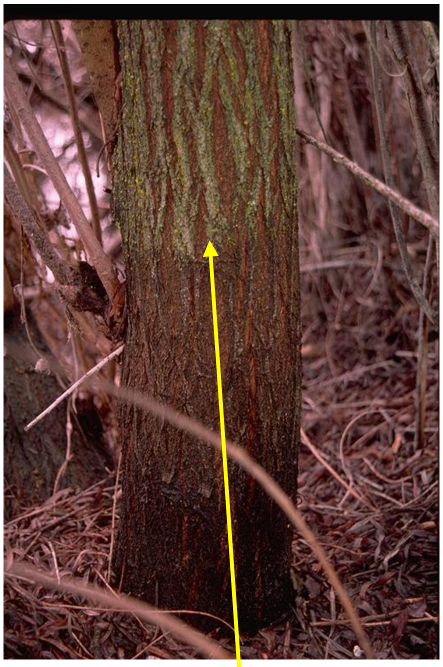
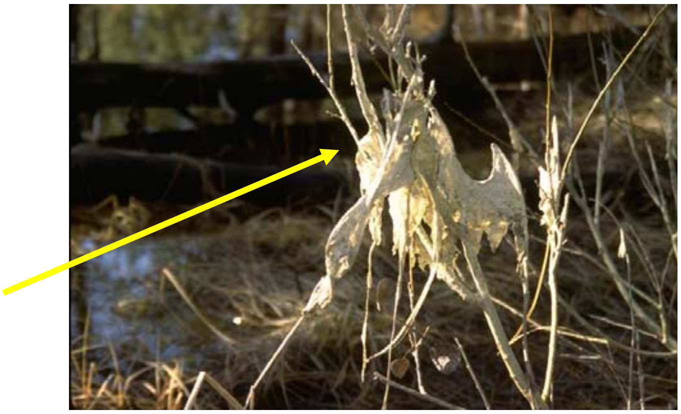


Figure 20: Small depressional wetland covered with algae. The edge of the algae marks the area that is seasonally ponded.

Figure 19: Water mark on tree showing vertical extent of seasonal ponding.

Figure 21: 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 are much more accurate tools 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 to the question 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 down-gradient 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 down-gradient 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 from human activities and therefore provide the opportunity for the wetland to improve water quality. You are asked to note which of the following conditions are present. These are common 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.

- 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 provide a 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. Figure 15 shows a small depressional wetland in a heavily grazed pasture. This wetland has the opportunity to improve water quality before the water enters 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 <u>Potential</u> to Reduce Flooding and Stream Erosion?**

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

| |
|---|
| **Rationale for indicator**: 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 not enter any streams or rivers. Constricted outlets will hold back flood waters and release them slowly to reduce flooding downstream. |

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 to the hydrologic functions.

***D 3.2*** *Depth of storage during wet periods (estimating "live storage"):*

| |
|---|
| **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, therefore, we use an estimate of the maximum depth of the "live" 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.<br><br>Live storage is a measure of the volume of storage available during major rainfall events that cause flooding in western Washington. This indicator recognizes that some wetlands, particularly those with groundwater connections, have water present all year around, or have some storage below the elevation of the outlet that does not contribute to reductions in peak flows (so called "dead storage"). In most depressional wetlands in western Washington the depressions have filled to the edge of the outlet by the time the peak flooding occurs (Hruby et al. 1999). |

Locate the outlet of the wetland and identify the lowest point of the outlet (Figures 22, 23). In wetlands without outlets identify the deepest "hole" if the wetland is dry (Figure 24), or the level of the areas that are permanently flooded. Estimate the difference in elevation between these low points and the marks of seasonal inundation in D 1.4. This will provide an estimate of the depth of live-storage during the seasonal high water. Try to find water marks as close to the outlet, or low point, as possible so you can make visual estimates of the height from the outlet. Figures 22, 23 show water marks directly on the culverts. Estimate the difference in elevation between the lowest point of the outlet and the level at which you noted marks of inundation. There are four thresholds of concern: 1) more than 3 ft of storage, 2) between 2-3 ft of storage, 3) between 6 inches and 2 ft of storage, and 4) less than 6 inches of storage. These thresholds can usually be estimated without needing to use special equipment.

NOTE 1: If the outlet is a beaver dam or weir, treat the top of the dam or weir as the lowest point. If water is flowing over the dam then the water surface anywhere in the wetland can be used to establish the low point.
NOTE 2: If the wetland has multiple outlets, try to find the one that has the lowest topographic elevation.
NOTE 3: Sometimes the lowest point of the outlet is flooded or flowing. In these cases, measure from the bottom of the outlet to the level of marks of average seasonal flooding. A common mistake is to measure from the current water level in the outlet to the marks of flooding.
NOTE 4: It can be difficult to extrapolate the height of flooding above the lowest point of the outlet in large wetlands where the flood marks are distant from the outlet.

Figure 22: A box culvert that is the outlet of a depressional wetland. The live-storage is measured as the distance between the bottom of the culvert and the water marks on the side. The distance is approximately 15 inches.

Water Marks of seasonal ponding (live storage)

Bottom of culvert


Figure 23: A round culvert with water still present. Measure the distance from the bottom of the culvert, not the present water level. The depth of storage is approximately 5 inches.

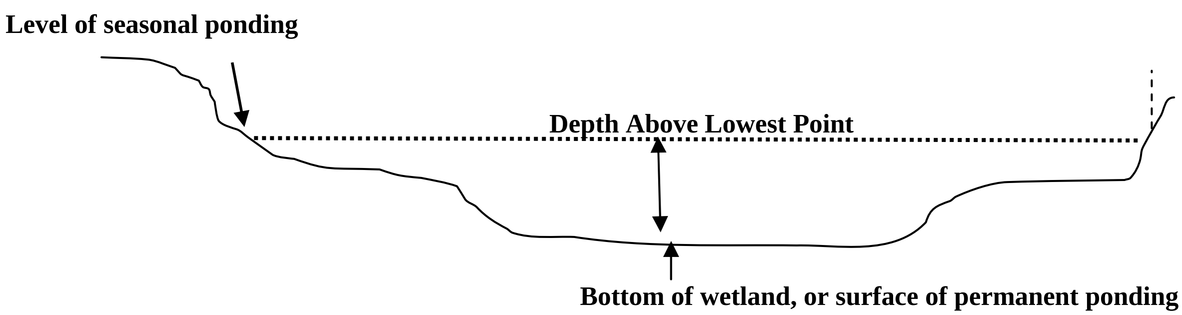



Figure 24 – Measuring maximum depth of seasonal ponding in a wetland without an outlet.

<u>Headwater wetlands</u>: 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 5 points, out of 7 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 <u>NO</u> 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. Depressional wetlands at the base of dams or edge of irrigation canals are not headwater wetlands, even if they have surface water that flows out of them without an inflow.

***D 3.3*** *Contribution of the wetland to storage in the watershed:*

**Rationale for indicator**: The potential of a wetland to reduce peak flows from its contributing basin is a function of its retention time (volume coming into a unit during a storm event /the amount of storage present). The area of the contributing basin is used to estimate the relative amount of water entering it, while the area of the wetland is used to estimate the amount of storage present. Large contributing basins are expected to have larger volumes for any given storm event than smaller basins. Thus a small wetland with a large contributing basin is not expected to reduce peak flows as much as a large wetland with a small contributing basin.

This question asks you first to estimate the area of land that is found upstream of the wetland and that contributes surface water to the wetland. This is called the contributing basin or watershed to the wetland. You will then need to estimate the area of the wetland and calculate the ration of the two. You do not need to estimate these areas exactly because the scoring is based on thresholds for the ratio. If the contributing basin is less than 10 times the size of the wetland itself, the wetland will score the most points. On the other hand, if the area of the contributing basin is more than 100 times the area of the wetland the score is [0], and you will not need to make estimates.

### D 4.0 Does the Depressional 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 indicator used characterizes whether the wetland's position in the landscape protect downgradient resources 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 would runoff 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.

The landscapes in western 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 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 hydrology 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 impacted by flooding, and the wetland is often disconnected from the floodplain.

## 5.3.4 Questions Starting with "R" (for Riverine and Freshwater, Tidal Fringe Wetlands)

## Water Quality and Hydrologic Functions in Riverine and Freshwater, Tidal Wetlands

### R 1.0 Does the Wetland have the Potential 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 ¾ or more than ½ 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 25 shows a riverine wetland with depressions filled with water.

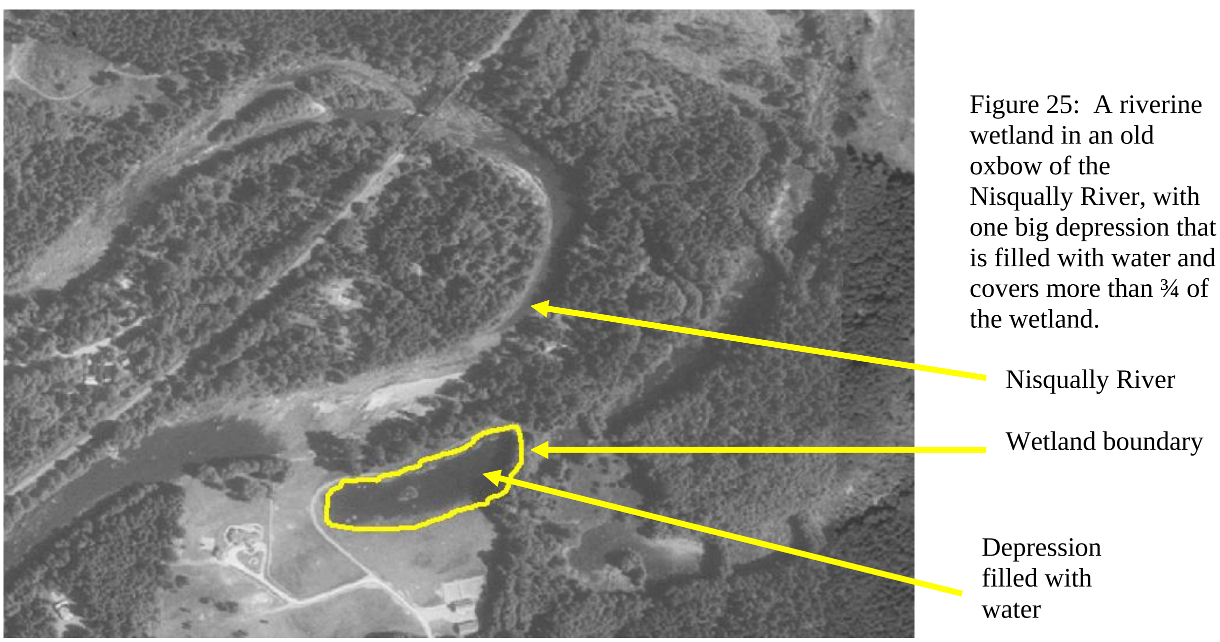



Figure 25: A riverine wetland in an old oxbow of the Nisqually River, with one big depression that is filled with water and covers more than ¾ of the wetland.

***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. The vegetation also slows the velocity of water which results in the deposition of sediments. 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 un-grazed emergents.

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.

### R 2.0 Does the 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 down-gradient 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 down-gradient 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.
- 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 a 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. Use topographic maps or aerial photos to confirm this observation.
- 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 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 standards for water quality. 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 Wetland Have the Potential to Reduce Flooding and Stream Erosion?

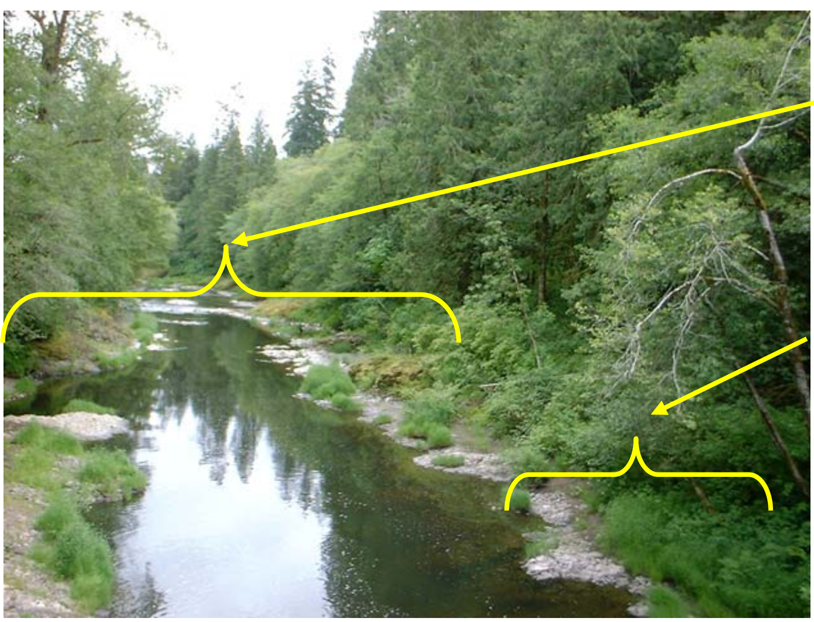
***R 3.1*** *Characteristics of the "overbank" flood storage the wetland provides, based on the ratio of the channel width to the width of the wetland:*

**Rationale for indicator**: The ratio of the width of the channel to the width of the 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 more than 20, a ratio between 10 – 20, a ratio between 5 – <10 , a ratio between 1 - <5, and a ratio < 1 .

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 26 shows a wetland where vegetation fills only a small part of the distance between the banks. In this case the ratio is < 1.



Distance between banks is approximately 100 ft.

Average width of wetland perpendicular to river flow is approximately 10 feet.

Figure 26. A riverine wetland where the width of the wetland is less than the distance between banks (< 1).

- 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 five times as wide? If not, the ratio is between 1- <5. If it is more than five times greater, is it more than 10 times, etc. Figure 27 shows a riverine wetland in an old oxbow where the ratio was judged to be between 1- <5.

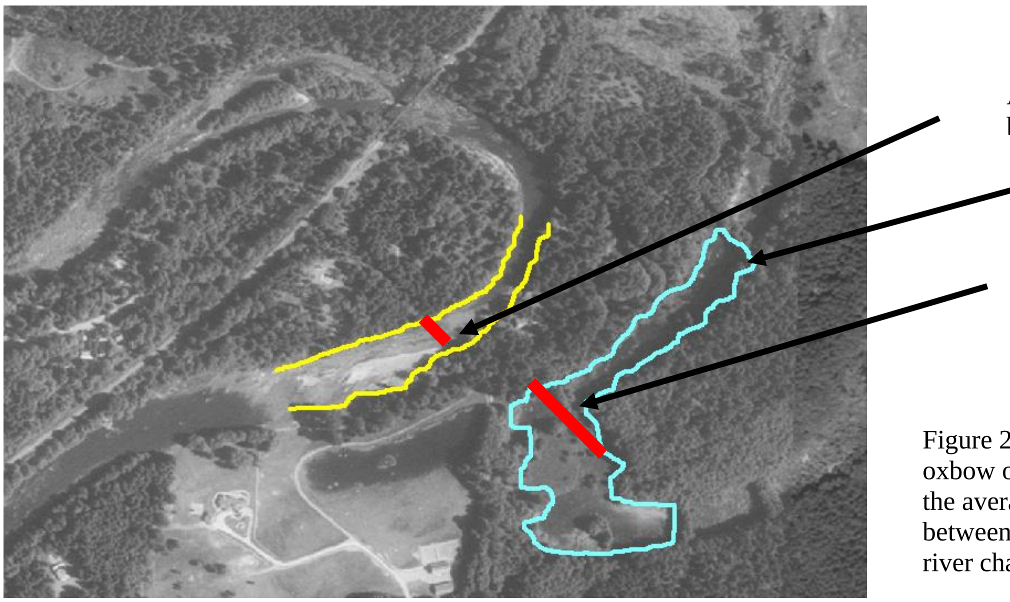



Figure 27: A riverine wetland in an old oxbow of the Nisqually River where the average width of the wetland is between 1-5 times the width of the river channel.

- 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 obstructions are rigid enough to resist water velocities during floods (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. 34).

There are four size thresholds used to score this characteristic – 1) forest or shrub for more than 1/3 the area of the wetland, 2) emergent plants > 2/3 area, 3) forest or shrub for > 1/10 area, 4) emergent plants > 1/3 area. Figure 28 shows an aerial photograph of a riverine wetland that has dense shrub vegetation over most of its area.

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

Figure 28**:** A riverine wetland in Bothell that has shrub vegetation over more than 1/3 of its area. Other important characteristics are: 1) the stream is part of the wetland because it is smaller than 50 ft. and there is wetland vegetation on both sides, 2) the average ratio of width of wetland to width of stream is greater than 20 (question R 3.1). Photo by Dan Crowell, Soundview Aerial Photography, Arlington, Wa 360-691-4419.

### 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 every two 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 down-gradient 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 western 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.
- Wetlands upslope of a state highway 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.
- 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.

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.

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

## Water Quality and Hydrologic Functions in Lake-fringe Wetlands

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

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

**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) 33 ft or more (10m)
2) 16 ft - < 33 ft (5–10 m)
3) 6 ft - <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 29 gives an example of such a sketch.

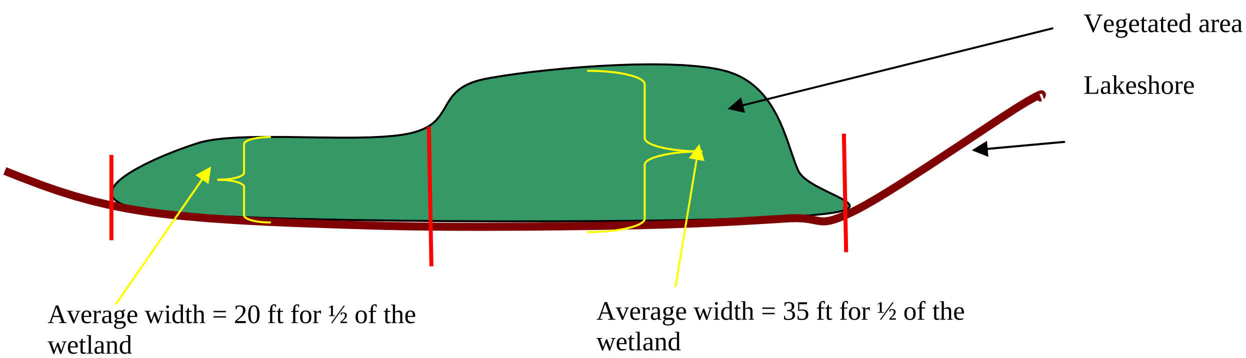



Figure 29: Estimating width of vegetation along the shores of a lake. The average width of vegetation for the entire area is: (20ft x 0.5) + (35 ft x 0.5) = 27.5 ft.

Figure 30 shows an actual lake-fringe wetland where the average width of vegetation is greater than 33 ft.

Figure 30: A lake-fringe wetlands where the vegetation is wider than 33 ft. The vegetation along the shores of this lake consists of a zone of shrubs and a zone of aquatic bed and emergent species.

***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 emergent 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).

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 plant 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 from the surrounding uplands 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 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 are 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 <u>Potential</u> 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.

***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 measuring the average width of vegetation [33 ft (10m) and 6 ft (2m)], and two thresholds based on area [3/4 and ¼ of the vegetated areas]. 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 31 gives an example of such a sketch.

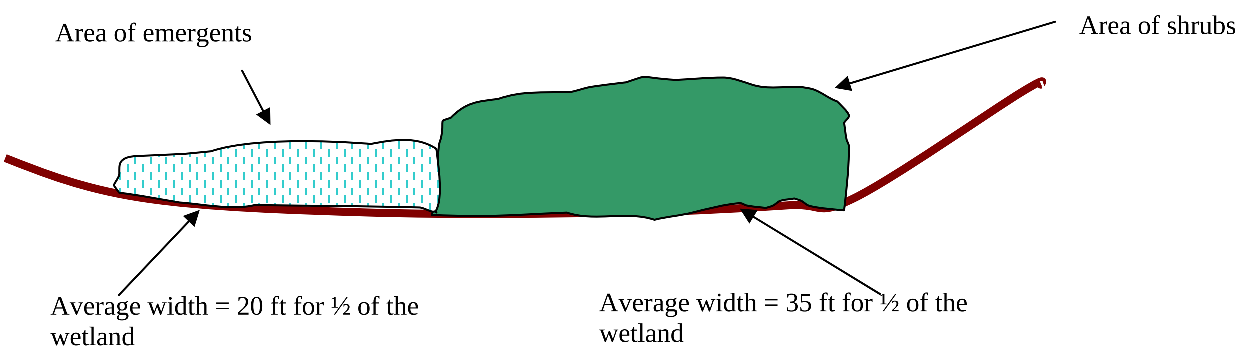



Figure 31: Estimating width of vegetation types along the shores of a lake. The average width of shrubs is 35 ft for ½ the wetland and emergents is 20 ft for ½ of the wetland. This wetland would score 4 points because more than 1/4 of the vegetation is shrubs greater than 33ft. wide.

## L 4.0 Does the Lake-fringe Wetland Have the <u>Opportunity</u> 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 other wetlands) behind the lake-shore wetland than can be damaged by shoreline erosion.

The rating form has space to note observations of resources along the shore that do not 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.

***S 1.1*** *Characteristics of the average slope of the 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 toxics 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 32).

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.

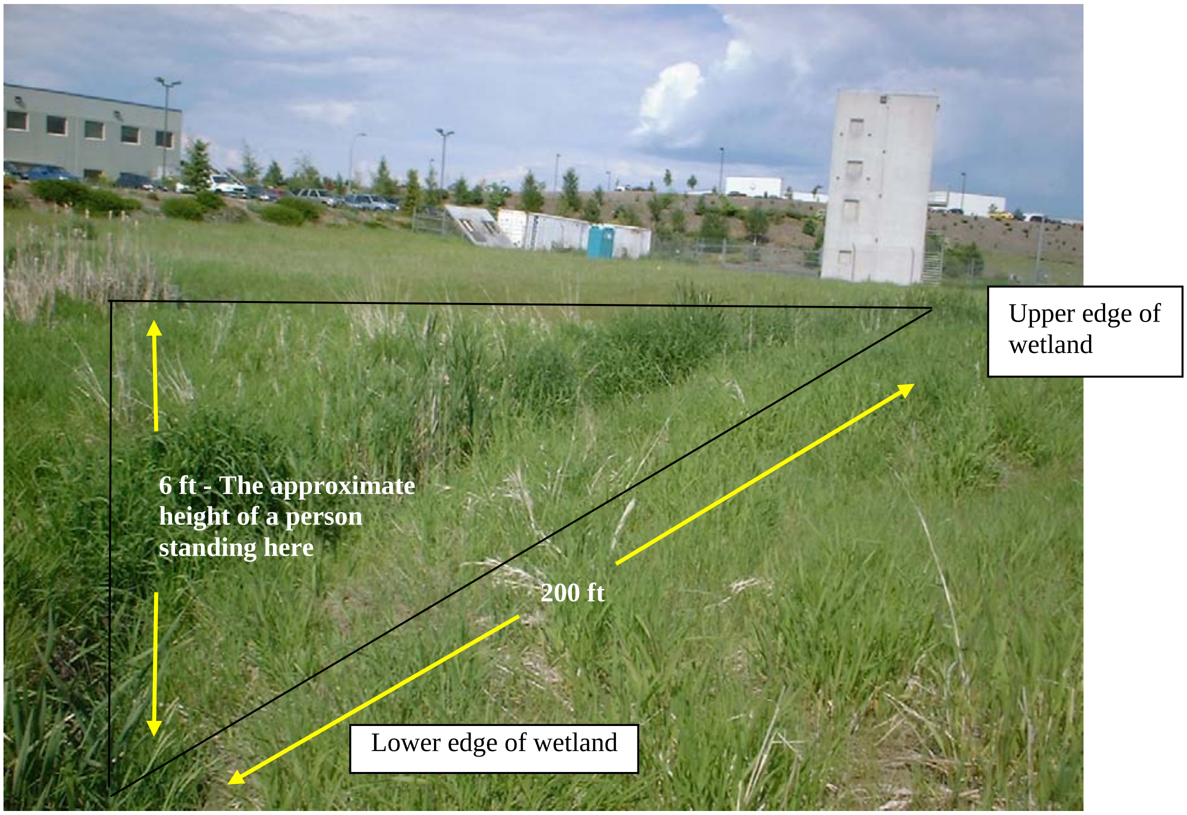



Figure 32. Estimating the slope of a small "slope" wetland. The top of a six foot person is about level with the upper edge of the wetland. The average slope is approximately 6/200 = 0.03 or 3%.

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

**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 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 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 (Figure 33). 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).

Figure 33: A slope wetland where dense unmowed, vegetation is between 1/4 and 1/2 the area of the wetland.

Unmowed part of the wetland covered by *Juncus* sp.

Mowed part of wetland.

## S 2.0 Does the Slope 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. 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.
- 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 are a 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 <u>Potential</u> 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 significantly reduced 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.

There are three size thresholds used to score this characteristic: dense, ungrazed, erect vegetation for more than 90% of the area of wetland (see Figure 34), ½ the area, and ¼ the area. The wetland in Figure 33 was mowed over much of its area, except where the *Juncus sp.* was growing. The mowed vegetation was less than 6 in. high, so the only plants that were included for this indicator were the *Juncus*. The wetland in Figure 33 has between ¼ and ½ of its area with dense, unmowed, erect vegetation.

Figure 34: A slope wetland with dense erect, ungrazed vegetation (reed canary grass and *Juncus* sp., shrubs and trees) over more than 90% of its area. The direction of the slope is from the left of the photograph to the right. The arrow points in the direction of water flow.

***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 western Washington were found with small depressions that were judged to be large enough to provide some water retention (2 ft across and 6-10 inches deep).

To answer this question you will have to walk throughout the wetland and note the micro-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 35). 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 35: Slope wetland with numerous small depressions created by changes in slope and hummocks of plants. 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 Opportunity 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 plants. It is the physical structure provided by plants and small depressions that act to retard surface flows. These physical structures in turn protects 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 flooding or erosive flows.

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 has problems with 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 because the wetland receives very little surface water:

- 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**: More habitat niches are provided within a wetland as the number of types of vegetation structure increase. 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. 1999). 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 1999). The "Cowardin" vegetation classes are used as indicators of different types of structure in the plant community. In addition, the presence of vertical structure in forested communities is considered a characteristic that increases habitat complexity and niches.

For this question you will need to identify the "Cowardin" classes of vegetation in the wetland and whether the forested class has different strata present under the canopy. The classes are:

- Aquatic bed
- Emergent
- Scrub/shrub (areas where shrubs have >30% cover)
- Forested (areas where trees have >30% cover) AND
- Do forested areas have 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover)

**NOTE 1:** Each vegetation class has to cover more than ¼ acre, or if the wetland is smaller than 2.5 acres, the threshold is 10% of the area of the wetland. "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 (see p. 35).

**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.

**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 in Note 1 above).

**NOTE 4:** Count how many strata (i.e. canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) are present in forested areas of the wetland. If three or more of the five strata are present, record this on the field form.

***H 1.2*** *Hydroperiods*

> **Rationale:** Many aquatic species have their life cycles keyed to different water regimes of permanent, seasonal, or saturated conditions. A number of different water regimes in a wetland will, therefore, support more species than a wetland with fewer water regimes. For example, some species are tolerant of permanent pools, while others can live in pools that are temporary (Wiggins et al. 1980).

For this question you will need to identify areas in the wetland with different water regimes. You are looking for areas with different patterns of flooding or saturation. For example, does part of the wetland have surface ponding only for a very short time (we call this occasionally flooded) or are there areas that have surface water all year (permanently flooded). The purpose is to identify the wettest water regime within different areas of the wetland. Thus, an area that is seasonally flooded, but only saturated during the field visit in the summer, would still be categorized as "seasonally flooded." To count, the water regime has to cover more than 10% of the wetland or ¼ acre. The five water regimes that you need to identify are:

**Permanently Flooded or Inundated —** Surface water covers the land surface throughout the year, in most years.

NOTE: During high water in the winter and spring, it may be difficult to determine the area that would be permanently flooded during the summer dry period. One indicator of permanent water is an area of open water without vegetation inside the zone of seasonal inundation. Aerial photos taken during the summer may also show areas of permanent water.

**Seasonally Flooded or Inundated —** Surface water is present for extended periods (for more than 2 months during a year), especially early in the growing season, but is absent by the end of the season in most years. During the summer dry season it may be difficult to determine the area that is seasonally inundated. Use the indicators described in D1.4 (p. 41) to help you determine areas that are seasonally flooded or inundated.

**Occasionally Flooded or Inundated —** Surface water is present for brief periods of less than one month during the growing season, but the water table usually lies below the soil surface for most of the season. Plants that grow in both uplands and wetlands are characteristic of this water regime (facultative).

**Saturated —** The soil is saturated near the surface for long enough to create a wetland, but surface water is seldom present. The latter criterion separates saturated areas from inundated areas. In this case, there will be no signs of inundation on plant stems or surface depressions.

**Permanently Flowing Stream —** The wetland contains a river, stream, channel, or ditch with water flowing in it throughout the year within its boundaries or along one edge (in a riverine situation).

**Intermittently Flowing Stream** — The wetland contains a river, stream, channel, or ditch in which water flow is intermittent or seasonal within its boundaries or along one edge.

Figure 18 shows a hypothetical wetland with two water regimes – permanently flooded and seasonally flooded. Figure 36 shows a photograph of a slope wetland, also with two water regimes, - some areas are **occasionally flooded** from sheet flow during storms and the rest is **saturated** from subsurface flows. Figure 37 shows a depressional wetland with three water regimes.

**NOTE**: Wetlands that are classified as **Lake-fringe or Freshwater Tidal Fringe are scored 2 points for this question**. The water regimes in these two types of wetlands do not fit the descriptions above or are too difficult to determine in the field.

Areas that have no surface water present but are "saturated" during most of the year.

Small depressions that fill with surface water after storms. These areas are "occasionally flooded," and cover at least 10% of the wetland

Figure 36: Slope wetland with two water regimes

Figure 37: A large depressional wetland with three water regimes: permanently flooded, seasonally flooded, occasionally flooded. The areas that are seasonally and occasionally flooded are found around the outer edge of the wetland.

***H 1.3** 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. 1999). 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 three 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.

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. There are 3 thresholds to keep in mind: 20 or more species, 5-19, and less than 5 species. If you count more than 19 you do not need to continue identifying plants.

For this question the following species are **NOT TO BE INCLUDED** in the total: Eurasian water-milfoil (*Myriophyllum spicatum*), reed canarygrass (*Phalaris arundinaceae*), Canadian thistle (*Circium arvense*)

***H 1.4*** *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, shrubs) increases the suitability for some wildlife guilds by increasing the number of ecological niches (Hruby et al. 1999). 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. This question uses this information and also asks you to identify if there are any areas of open water in the wetland (open meaning without vegetation on or above the water surface during the spring, summer, or fall). You are asked 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.

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 Figure 38, also Figs. 8, 15, 32, 33). If the wetland has four vegetation types (from question H 1.1), or three vegetation types and open water it will always be rated as HIGH. Figure 37 shows a depressional wetland with open water, emergents, aquatic bed, shrubs and forest classes. Thus, it automatically rates a HIGH. The only time you will have to make a decision is when the wetland has two or three types of structure that provide habitat.

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 38: A depressional wetland with only one class of plants and no open water. The interspersion is rated as NONE.

***H 1.5*** *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. 1999). These special features include:

1) large downed woody debris in the wetland that provide major niches for decomposers (i.e. bacteria and fungi) and invertebrates,

2) snags that provide perches and cavities for birds and other animals,

3) undercut banks that provide protection for fish and amphibians,

4) stable, steep banks of fine material that might be used by aquatic mammals for denning,

5) thin-stemmed vegetation that provide structure on which amphibians can lay their eggs, and

6) vegetation dominated by non-invasive species that indicates the community is relatively undisturbed.

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

- Large woody debris within the wetland that is more than 4 inches in diameter at the base and more than 6 ft. long (Figure 39).
- Snags present in the wetland that are more than 4 inches in diameter at breast height (Figure 39).
- 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 30 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 40).

- At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated.(structures for egg-laying by amphibians)
- Invasive plants cover less than 25% 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.)

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.

Figure 39: Large woody debris and snags in wetland.

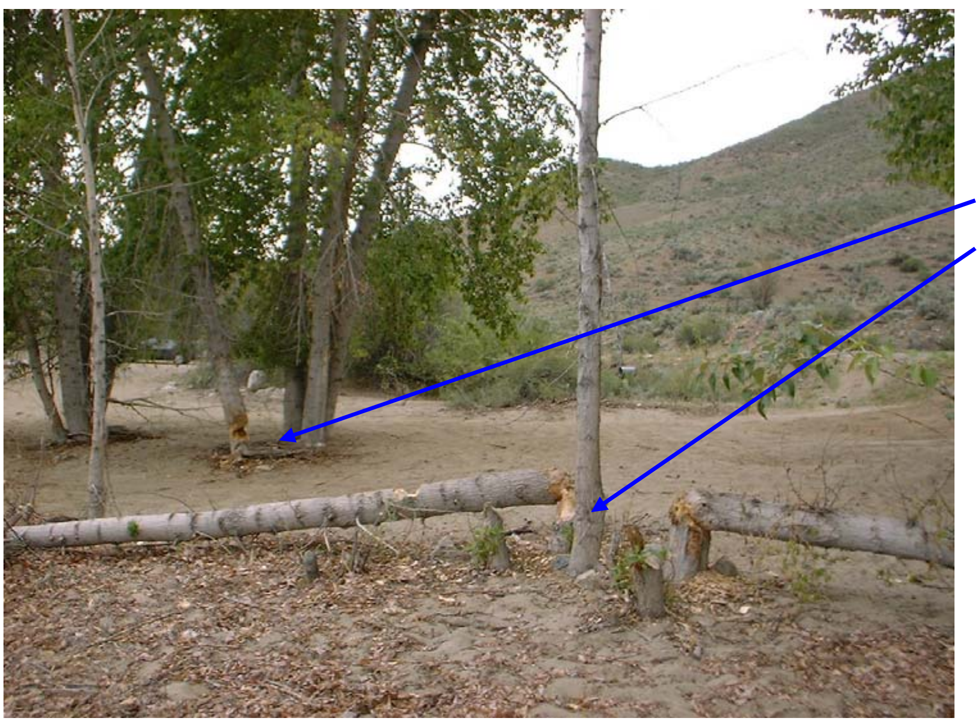


Figure 40: Evidence of beaver activity. Note the conical shape of the cut.

**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 wetland-associated 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 buffer that is relatively undisturbed, and the relative length of that buffer around 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 the wetland 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.

Figure 41: A wetland with no vegetated buffer.  It scores a [0] on the buffer question.

***H 2.2*** *Corridors and Connections:*

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 characteristics are present in the wetland.

**Rationale for indicator**:  Corridors and undisturbed connections have been shown to be important dispersal and foraging areas for both terrestrial and aquatic species including amphibians, mammals, and birds (review in Adamus et al. 2001).  Corridors provide areas for hibernation, foraging, and migration and dispersal for some amphibians (Nussbaum et al. 1983, Seaburn 1997).  The presence of natural corridors 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, 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.   This variable characterizes the connection of the wetland to other relatively undisturbed areas capable of providing habitat for a variety of species.

***H 2.2.1*** *Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest, or native undisturbed grasslands that connects to estuaries, other wetlands, or relatively undisturbed uplands that are at least 250 acres in size?  (Dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)?*

Start by looking for areas of undisturbed vegetation (vegetated corridor) connected to the wetland.   The corridor may have a stream or channel in it.  In riverine wetlands the stream or channel may be along one side.  Next, determine if this area of relatively undisturbed vegetation meets the criteria for width and percent cover of shrubs or trees. Finally, using a map or aerial photograph, determine if there is an area of undisturbed upland, wetlands, or estuaries, 250 acres in size that connects to the wetland by way of the corridor.

**NOTE 1:** In some cases, the large, undisturbed, area is immediately adjacent to the wetland and actually forms a part of the buffer. In this case answer YES to the first question.

**NOTE 2:** The lake adjacent to a lake-fringe wetland is not considered a corridor because it is not vegetated. If your wetland is a lake-fringe wetland, and does not have an upland connection to other natural areas, answer question H 2.2.2 as YES and add 2 points to the score rather than 4.

***H 2.2.2*** *Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands, or undisturbed uplands that are at least 25 acres in size? OR is the wetland a Lake-fringe wetland (if it does not have an undisturbed upland corridor as in the question above)?*

This question is similar to that above with the size thresholds for the corridor and upland reduced.

***H 2.2.3*** *Is the wetland: within 5 mi (8km) of a mouth of a river that discharges into salt or brackish water, OR within 3 mi of a large field or pasture (>40 acres), OR within 1 mi of a lake greater than 20 acres?* (do not include man-made ditches)

This question addresses only proximity to other habitat types and not the relative disturbance of the connections between them.

***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 is 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 from WDFW (as of April 1, 2003) and any updates are available on the department's web page -http://www.wa.gov/wdfw/hab/phspage.htm.

**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.

**<u>Aspen Stands:</u>** Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

**<u>Cliffs:</u>** Greater than 25 ft (7.6 m) high and occurring below 5000 (ft1524 m).

**<u>Old-growth west of Cascade crest</u>:**

- Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings;
- At least 8 trees/acre having a dbh (diameter at breast height) of 32 in. or more, or the 8 trees/acre are > 200 years of age;
- More than 4 snags/acre over 20 in. diameter and 15 ft tall;
- Numerous downed logs, including 4 logs/acre > 24 in. in diameter and > 50 ft long.
- High elevation stands > 2500ft may have lesser dbh [>30 in], fewer snags [> 1.5/acre], and fewer large downed logs [2 logs/acre that are > 24 in diameter and > 50 ft long].

**<u>Mature forests</u>**: Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 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 - 200 years old west of the Cascade crest.

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

**<u>Talus:</u>** 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.

**<u>Caves:</u>** 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.

**<u>Oregon White Oak</u>:** 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. 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.

**<u>Urban Natural Open Space</u>**: A priority species (*as defined by WDFW*) 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.

**<u>Estuary/Estuary-like</u>:** Deepwater tidal habitats and adjacent tidal wetlands, usually semi-enclosed by land but with open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Estuarine habitat extends upstream and landward to where ocean-derived salts measure less than 0.5% during the period of average annual low flow. Includes both estuaries and lagoons.

**Marine/Estuarine Shorelines**: Shorelines include the intertidal and subtidal zones of beaches, and may also include the backshore and adjacent components of the terrestrial landscape (e.g., cliffs, snags, mature trees, dunes, meadows) that are important to shoreline associated fish and wildlife and that contribute to shoreline function (e.g., sand/rock/log recruitment, nutrient contribution, erosion control). *Consolidated Substrate*: Rocky outcroppings in the intertidal and subtidal marine/estuarine environment consisting of rocks greater that 25 cm (10 in) diameter, hardpan, and/or bedrock. *Unconsolidated Substrate*: Substrata in the intertidal and subtidal marine environment consisting of rocks less than 25 cm (10 in) diameter, gravel, shell, sand, and/or mud.

***H 2.4*** *Position in Landscape:*

**Rationale for indicator**: This indicator addresses one major aspect of a wetland's position in the landscape that affects its opportunity to provide habitat: the proximity of the wetland being rated 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 (Hruby et al. 2000).

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.

- **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, pastures, or other development).**

  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.

## 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 70 points or more. 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 6 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 Estuarine wetlands

*SC 1.1*. Estuarine wetlands are vegetated, tidal fringe, wetlands where the concentration of salt in the water is greater than 0.5 parts per thousand (see p. 24). Estuarine wetlands of any size within National Wildlife Refuges, National Parks, National Estuary Reserves, Natural Area Preserves, State Parks, or Educational, Environmental or Scientific Reserves designated under WAC 332 30 151 are rated a Category I.

*SC 1.2* Estuarine wetlands in which the salt marsh vegetation extends over more than 1 acre, and that meet at least two of the following three criteria are rated a Category I.

- The wetland is relatively undisturbed. This means it has no ditching, filling, cultivation, grazing, and the vegetation has less than 10% cover of non-native plant species. NOTE: If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of *Spartina* would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of *Spartina* in determining the size threshold of 1 acre.
- At least ¾ of the landward edge of the wetland has a 100 ft buffer of ungrazed pasture, shrub, forest, or relatively undisturbed freshwater wetland. A relatively undisturbed dike with vegetation that is not cut or grazed can count as an undisturbed buffer.
- The vegetated areas of the wetland have at least two of the following structural features: tidal channels, depressions with open water, or contiguous freshwater wetlands.

*SC 1.3* Any estuarine wetland that does not meet the criteria above for a Category I becomes a Category II wetland.

> Note: Eel grass beds do not fall within the definition of vegetated wetlands used in the rating system. They are an important aquatic resource but they do not fall within the purview of this rating system.

## SC 2.0 Natural Heritage wetlands

*Is the wetland a Natural Heritage Wetland?*

Wetlands that are 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. To answer this question you first need to determine if the Section, Township, and Range (S/T/R) within which the wetland is found contains a Natural Heritage site (Question SC 2.1 on the rating form). Appendix D lists this information for Washington as of March 2003. If the site does not fall within the S/T/R's listed, it is not a heritage site. *(This question is used to screen out most sites before you need to contact WNHP/DNR).* 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 3.0 Bogs

*Is the wetland a bog?* If the wetland meets the criteria for bogs described below, it is a Category I or II wetland. Bogs cannot be replicated through compensatory mitigation and are very sensitive to disturbance.

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 (between 3.5 and 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. 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.

Forested bogs are more difficult to identify. Bogs may contain highly stunted individual trees of sitka spruce, western red cedar, western hemlock, lodgepole pine, western white pine, Engelmann's spruce, sub-alpine fir, aspen, or crab apple. However, some bogs contain mature, full-size, trees especially on the Long Beach Peninsula. These wetlands 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 peat 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.

### Key for Identifying 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 — 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  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.
If the wetland can be identified as a relatively undisturbed bog, the category rating is based on its size. Bogs larger than ½ acre are Category I wetlands, and bogs between ¼ and ½ acre are Category II wetlands. If the bog is less than ¼ acre it should be rated based on its functions only.

**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 those bogs that have relatively undisturbed native plant communities.

**SC 4.0 Forested Wetlands -** *Does the wetland have at least 1 acre of forest that meet the criteria for the Department of Fish and Wildlife's old-growth or mature forests?*

To answer this question you will need to map out the areas of the wetland that are forested (see question H 1.1 on p. 72). You will then have to determine if the trees in at least one acre of the wetland are old enough, or large enough, to meet the criteria for priority habitats listed below.

- Old-growth forests: (west of Cascade crest) Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age **or** have a diameter at breast height (dbh) of 32 inches (81 cm) or more.

  NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is an "OR" so old-growth forests do not necessarily have to have trees of this diameter. Unpublished data collected in wetlands suggest that 200 year-old trees may have different diameters.

- Mature forests: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old **or** have average diameters (dbh) exceeding 21 inches (53cm); canopy cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth.

  NOTE: The criterion for dbh is based on measurements for upland forests.

Eighty to 200 year-old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is an “OR” so mature forests do not necessarily have to have trees of this diameter.

If you have one acre of old-growth or mature forest the wetland is Category I. 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.

**SC 5.0 Wetlands in Coastal Lagoons**

Coastal lagoons are shallow bodies of water, like a pond, partly or completely separated from the sea by a barrier beach. They may, or may not, be connected to the sea by an inlet, but they all receive periodic influxes of salt water. This can be either through storm surges overtopping the barrier beach, or by flow through the porous sediments of the beach. Coastal lagoons may have freshwater flowing into one side that dilutes the salinity below the 0.5 ppt. The seaward edges of the lagoons, however, always contain some salt water.

*Does the wetland meet all of the following criteria for a wetland in a coastal lagoon?*

To be rated as a wetland in a coastal lagoon, a wetland and its associated lagoon has to meet all of the following criteria.

— The vegetated wetland lies in a depression with open water for at least part of the year that is adjacent to marine waters. This depression is wholly or partially separated from those marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks along part of its circumference (see Figures 42, 43). The banks can be vegetated or bare.

— The unvegetated areas of the lagoon contain water, in at least some parts of the lagoon, that is saline or brackish (> 0.5 ppt) during most of the year *(needs to be measured near the bottom).*

—The lagoon retains some of its surface water at low tide during spring tides.

The categorization of wetlands in coastal lagoons is based on the size and level of disturbance in the wetland and its buffers. If a wetland in a coastal lagoon meets all three of the following criteria it is Category I. If the criteria are not met it is a Category II wetland.

— The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of invasive plant species (see list of invasive species on p. 78).

— At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.

— The wetland is larger than 1/10 acre (4350 square feet)


Figure 42: A coastal lagoon on Hood Canal with associated wetlands that is separated from the ocean by a vegetated bar of gravel and sand. The lagoon has no surface-water connection to the ocean. Salt water, however, can enter the lagoon through the bar or over the top during storms.

Figure 43: A coastal lagoon with a surface-water connection to Puget Sound. In this case there is a salt marsh separating the lagoon from the ocean as well as a sand bar.

## SC 6.0 Interdunal Wetlands

*Is the wetland west of the 1889 line known as the Western Boundary of Upland Ownership or WBUO?*

Interdunal wetlands form in the “deflation plains” and “swales” that are geomorphic features in areas of coastal dunes. These dune forms are the result of the interaction between sand, wind, water and plants. The dune system immediately behind the ocean beach (the primary dune system) is very dynamic and can change from storm to storm (Wiedemann 1984). These wetlands provide critical habitat in this ecosystem (Wiedemann 1984) but many of the more recently formed wetlands cannot be characterized using the questions on the field form (see p. 9).

Wetlands located west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO) along the coast are considered interdunal wetlands because they have formed only in the last century. These wetlands all have formed as a result of accretions of the beach westward since 1889.

In practical terms that means the following geographic areas:

- Long Beach Peninsula- lands west of SR 103
- Grayland-Westport- lands west of SR 105
- Ocean Shores-Copalis- lands west of SR 115 and SR 109

Interdunal wetlands that are 1 acre or larger are a Category II based on their type. Those between 0.1 and 1 acre are Category III. The rating form for Depressional wetlands should still be filled out, however, to determine if the wetlands have enough habitat structure to be categorized higher.

**NOTE**: Small interdunal wetlands often form a mosaic behind the primary dunes (see Figures 44, 45). If the interdunal wetlands meet the criteria for wetlands in a mosaic (see p. 15) and described below, then the category should be based on the overall size of the mosaic not an individual patch.

- 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 wetland are more than 50% of the total area of both the wetlands and dunes.


Figure 44: Interdunal wetlands along the Pacific Coast.

Interdunal wetlands that are larger than 1 acre. Individual wetland areas may be smaller than 1 acre, but they form a mosaic that is larger than 1 acre.

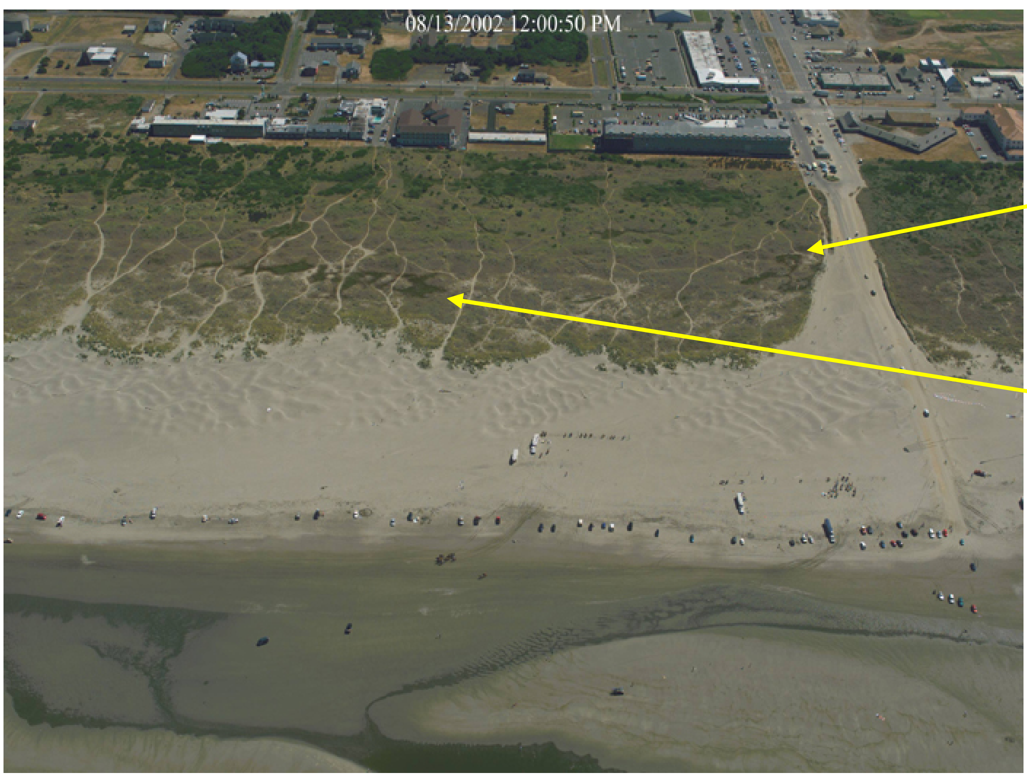



Figure 45: Interdunal wetlands along the Pacific Coast.

Mosaic of wetlands less than 0.1 acres in size

Mosaic of wetlands less than 1 acre in size

## 5.5 RATING THE WETLAND

Each wetland can have several ratings: one resulting from its score for the functions and one or more 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 Western Washington.

| ***NAME*** | ***AFFILIATION*** |
|---|---|
| Brent Haddaway | Washington DOT |
| Charlie Newling | Wetland Training Institute |
| Cindy Wilson | Thurston County Development Services |
| Dan Cox | Skagit County Planning |
| Dyanne Sheldon | Sheldon Associates |
| Francis Naglich | Ecological Land Services, Inc. |
| Geoffrey Thomas | City of Redmond |
| Jeff Meyer | Parametrix |
| Laura Casey | King County Dept. of Dev. and Environmental Services |
| Paul Wagner | Washington DOT |
| Petur Sim | Whatcom County |
| Phil Gaddis | Clark County Dept. of Public Works |
| Randy Middaugh | Snohomish County |
| Sarah Cooke | Cooke Scientific Services |
| Steve Shanewise | Coot Company |
| Tina Miller | King Cty. Dept. of Natural Resources and Parks |
| Ann Boeholt | Washington State Department of Ecology |
| Erik Stockdale | Washington State Department of Ecology |
| Sarah Blake | Washington State Department of Ecology |
| Stephen Stanley | Washington State Department of Ecology |
| Susan Meyer | Washington State Department of Ecology |

# *APPENDIX B*

Salt sensitivity rating of the estuarine wetlands and associated uplands flora of the Pacific Northwest (*=estimated) from Hutchinson (1991).

**Very Sensitive**

Tsuga heterophylla
Angelica arguta
Berberis aquifolium
Caltha asarifolia
Carex rostrata
Equisetum fluviatile
Galium cymosum
Habenaria dilatata
Heracleum lanatum
Hypericum formosum
Iris pseudoacorus
Juncus nevadensis
Lysichitum americanum
Mentha arvensis
Mentha piperata
Myosotis laxa
Pichea sitchensis
Rumex acetosella

**Sensitive**

*Aira praecox
*Alnus rubra
*Angelica lucida
*Anthoxanthum odoratum
*Athyrium felix-femina
*Calamagrotis nutkaensis
*Carex obnupta
*Cornus stolonifera
*Equisetum arvense
*Glyceria grandis
*Holcus lanatus
*Hypochaeris radicata
*Lonicera involucrata
*Maianthemum dilatatum
*Physocarpus capitatus
*Polystichum munitum
*Potentilla palustris
*Pteridium aquilinum
*Ribes sanguineum
*Vaccinium spp.
Alisma plantago-aquatica
Bidens cernua
Bromus mollis
Juncus articulatis
Juncus oxymeris
Lathyrus japonicus
Menyanthes trifoliate
Pyrus fusca
Rosa gymnocarpa
Rosa nutkana
Rubus spp.
Rumex conglomeratus
Sagittara latifolia
Scirpus microcarpus
Sium suave
Typha latifolia

**Moderately Sensitive**

*Ammophila arenaria
*Lathyrus palustris
*Phargmites communis
*Rumex crispus
*Salix hookeriana
*Vicia gigantea
Achilea millefolium
Agropyron repens
Cicuta douglasii
Dactylis glomerata
Limosella aquatica
Lotus ulignosus
Lythrum salicaria
Plantago lanceolata
Poa pratensis
Scirpus acutus
Scirpus validus
Sonchus arvensis
Trifolium spp.

**Moderately Tolerant**

*Elymus mollis
*Hordeum brachyantherum
*Oenanthe sarmentosa
*Phalaris arunidacea
*Scripus cernuus
Agrostis alba
Aster subspicatus
Eleocharis acicularis
Eleocharis palustris
Eleocharis parvula
Festuca arundinacea
Festuca ruba
Lolium perenne
Lotus corniculatus
Potentilla pacifica
Ranunculus cymbalaria
Scripus americanus
Trifolium wormskjoldii

**Tolerant**

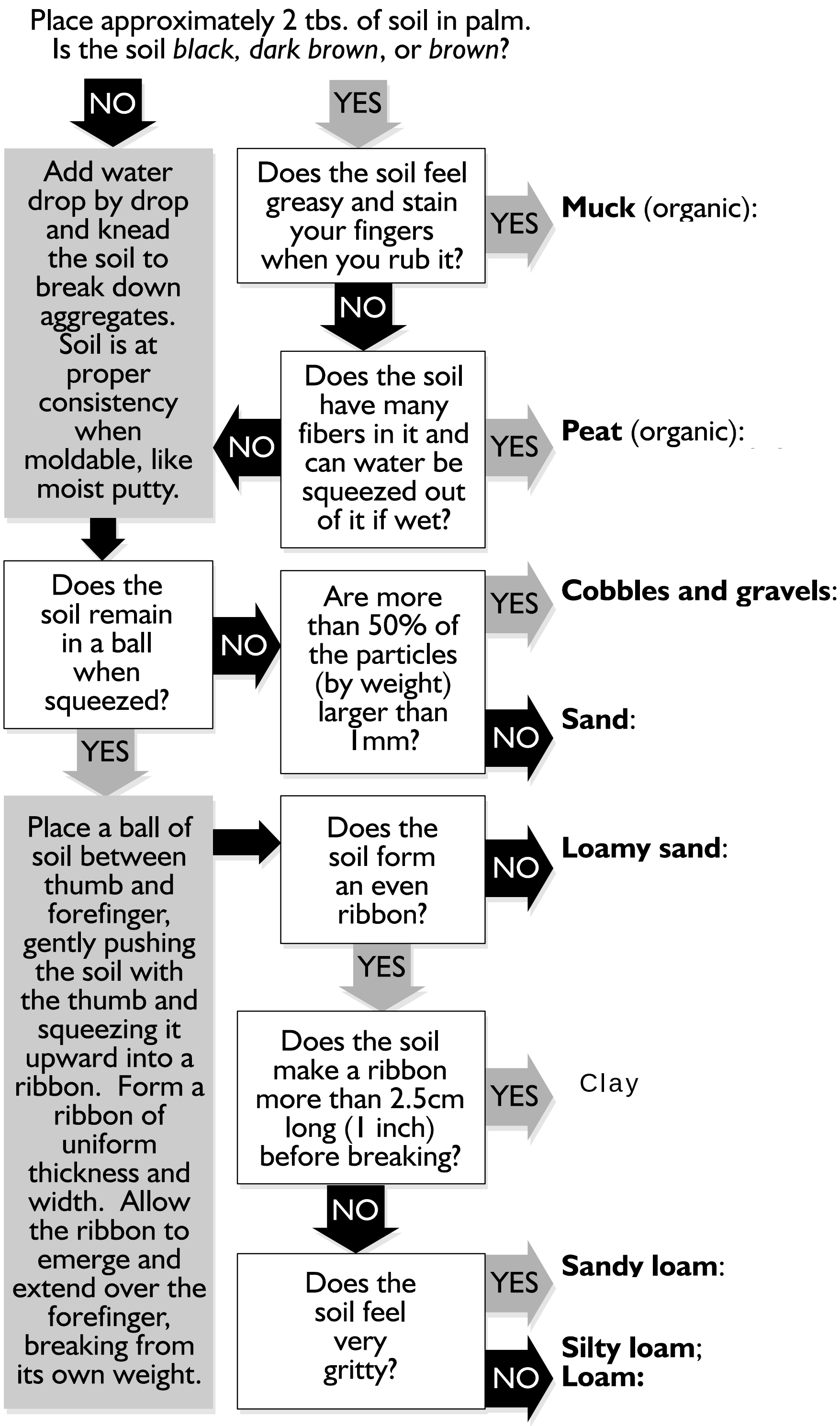
*Orthocarpus castillejoides
*Typha angustifolia
Carex lyngbyei
Deschampsia caespitosa
Glaux maritima
Hordeum jubatum
Juncus gerardii
Liliaeopsis occidentalis
Scripus maritimus
Stellaria humifusa

**Very Tolerant**

*Grindelia integrifolia
*Suaeda maritima
*Triglochin concinnum
*Triglochin maritimum
Atriplex patula
Cotula coronopifolia
Distichlis spicata
Jaumea carnosa
Juncus balticus
Plantago maritima
Salicornia europea
Salicornia viginica
Spergularia canadensis
Spergularia marina

# *APPENDIX C*

Analyzing the type of soil present in the wetland.



# *APPENDIX D*

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

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| 040N037E 08 | 040N037E 33 | 040N038E 26 | 040N043E 34 |
| 040N037E 10 | 040N038E 04 | 040N038E 32 | 040N044E 07 |
| 040N037E 15 | 040N038E 06 | 040N038E 33 | 040N044E 19 |
| 040N037E 18 | 040N038E 07 | 040N039E 02 | 040N044E 20 |
| 040N037E 19 | 040N038E 09 | 040N039E 20 | 040N044E 30 |
| 040N037E 20 | 040N038E 15 | 040N043E 03 | 040N044E 31 |
| 040N037E 25 | 040N038E 20 | 040N043E 14 | 040N045E 10 |
| 040N037E 28 | 040N038E 21 | 040N043E 22 | 040N045E 30 |
| 040N037E 29 | 040N038E 22 | 040N043E 23 | 040N045E 31 |

**WETLAND RATING FORM – WESTERN WASHINGTON**

Name of wetland (if known): ____________________________________________

Location: SEC: ___ TWNSHP: __ RNGE: ___ (attach map with outline of wetland to rating form)

Person(s) Rating Wetland: _____________ Affiliation: ___________ Date of site visit: ___

## 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___ Does not Apply___**

**Final Category (choose the "highest" category from above)** [ ]

**Check the appropriate type and class of wetland being rated.**

| **Wetland Type** | | **Wetland Class** | |
|---|---|---|---|
| **Estuarine** | | **Depressional** | |
| **Natural Heritage Wetland** | | **Riverine** | |
| **Bog** | | **Lake-fringe** | |
| **Mature Forest** | | **Slope** | |
| **Old Growth Forest** | | **Flats** | |
| **Coastal Lagoon** | | **Freshwater Tidal** | |
| **Interdunal** | | | |
| None of the above | | | |

**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 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. | | |
| SP2. *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. | | |
| SP3. *Does the wetland contain individuals of Priority species listed by the WDFW for the state?* | | |
| SP4. *Does the wetland 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. | | |

*To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.*

The hydrogeomorphic classification groups wetlands into those that function in similar ways. This simplifies the questions needed to answer how well the wetland functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 24 for more detailed instructions on classifying wetlands.

## Classification of Vegetated Wetlands for Western Washington

**Wetland Name:** ________________________ **Date:** ________________________

**1.** Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?
NO – go to 2 **YES** – the wetland class is **Tidal Fringe**

If yes, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)? **YES – Freshwater Tidal Fringe** **NO – Saltwater Tidal Fringe (Estuarine)**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is rated as an **Estuarine** wetland.* Wetlands that were called estuarine in the first and second editions of the rating system are called Salt Water Tidal Fringe in the Hydrogeomorphic Classification. Estuarine wetlands were categorized separately in the earlier editions, and this separation is being kept in this revision. To maintain consistency between editions, the term "Estuarine" wetland is kept. Please note, however, that the characteristics that define Category I and II estuarine wetlands have changed (see p. ).

**2.** Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.
NO – go to 3 **YES** – The wetland class is **Flats**

If your wetland can be classified as a "Flats" wetland, use the form for **Depressional** wetlands.

**3.** Does the wetland **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) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);

___At least 30% of the open water area is deeper than 6.6 ft (2 m)?

NO – go to 4 **YES –** The wetland class is **Lake-fringe (Lacustrine Fringe)**

**4.** Does the wetland **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 1 foot deep).*

NO - go to 5 **YES –** The wetland class is **Slope**

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

NO - go to 6 **YES –** The wetland class is **Riverine**

**6**. Is the wetland in a topographic depression 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 7 **YES –** The wetland class is **Depressional**

7. Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES –** The wetland class is **Depressional**

8. Your wetland seems to be difficult to classify. 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. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. 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 being rated. If the area of the second class is less than 10% classify the wetland using the first class.

| *HGM Classes Within a Delineated Wetland Boundary* | *Class to Use in Rating* |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake-fringe | Lake-fringe |
| Depressional + Riverine along stream within boundary | Depressional |
| Depressional + Lake-fringe | Depressional |
| Salt Water Tidal Fringe and any other class of freshwater wetland | Treat as ESTUARINE under wetlands with special characteristics |

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 and Flats Wetlands | Points |
|---|---|---|
| | WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality | |
| D | **D 1. Does the wetland have the <u>potential</u> to improve water quality?** ***(see p. 38)*** | |
| D | D 1.1 Characteristics of surface water flows out of the wetland:<br>Wetland is a depression with no surface water outlet points = 3<br>Wetland has an intermittently flowing, or highly constricted, outlet points = 2<br>Wetland has an unconstricted surface outlet points = 1<br>Wetland is flat and has no obvious outlet and/or outlet is a ditch points = 1 | |
| D | D 1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).<br>YES points = 4<br>NO points = 0 | |
| D | D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest class):<br>Wetland has persistent, ungrazed, vegetation > = 95% of area points = 5<br>Wetland has persistent, ungrazed, vegetation > = 1/2 of area points = 3<br>Wetland has persistent, ungrazed vegetation > = 1/10 of area points = 1<br>Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 | |
| D | D1.4 Characteristics of seasonal ponding or inundation.<br>*This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.*<br>Area seasonally ponded is > ½ total area of wetland points = 4<br>Area seasonally ponded is > ¼ total area of wetland points = 2<br>Area seasonally ponded is < ¼ total area of wetland points = 0<br>NOTE: *See text for indicators of seasonal and permanent inundation..* | |
| D | **Total for D 1** *Add the points in the boxes above* | |
| D | **D 2. Does the wetland have the <u>opportunity</u> to improve water quality?** ***(see p. 44)***<br>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.*<br>— Grazing in the wetland or within 150 ft<br>— Untreated stormwater discharges to wetland<br>— Tilled fields or orchards within 150 ft of wetland<br>— A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging<br>— Residential, urban areas, golf courses are within 150 ft of wetland<br>— Wetland is fed by groundwater high in phosphorus or nitrogen<br>— Other______________________<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>_____ |
| D | **<u>TOTAL</u> - Water Quality Functions** Multiply the score from D1 by D2<br>***Add score to table on p. 1*** | |

| D | Depressional and Flats Wetlands | Points |
|---|---|---|
| | HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream degradation | |
| | **D 3. Does the wetland have the <u>potential</u> to reduce flooding and erosion?** ***(see p. 46)*** | |
| D | D 3.1 Characteristics of surface water flows out of the wetland<br>Wetland has no surface water outlet points = 4<br>Wetland has an intermittently flowing, or highly constricted, outlet points = 2<br>Wetland is flat and has no obvious outlet and/or outlet is a small ditch points = 1<br>Wetland has an unconstricted surface outlet points = 0 | |
| D | D 3.2 Depth of storage during wet periods<br>*Estimate the height of ponding above the bottom of the outlet*<br>Marks of ponding are 3 ft or more above the surface points = 7<br>The wetland is a "headwater" wetland" points = 5<br>Marks of ponding between 2 ft to < 3 ft from surface points = 5<br>Marks are at least 0.5 ft to < 2 ft from surface points = 3<br>Wetland is flat but has small depressions on the surface that trap water points = 1<br>Marks of ponding less than 0.5 ft points = 0 | |
| D | D 3.3 Contribution of wetland to storage in the watershed<br>*Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland itself.*<br>The area of the basin is less than 10 times the area of wetland points = 5<br>The area of the basin is 10 to 100 times the area of the wetland points = 3<br>The area of the basin is more than 100 times the area of the wetland points = 0<br>Wetland is in the FLATS class (basin = the wetland, by definition) points = 5 | |
| D | **Total for D 3** *Add the points in the boxes above* | |
| D | **D 4. Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?** ***(see p. 49)***<br>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. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater.<br>*Note which of the following indicators of opportunity apply.*<br>— Wetland is in a headwater of a river or stream that has flooding problems<br>— Wetland drains to a river or stream that has flooding problems<br>— Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems<br>— Other________________________________________<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>______ |
| D | **TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4<br>***Add score to table on p. 1*** | |

| R | Riverine and Freshwater Tidal Fringe Wetlands | Points |
|---|---|---|
| | WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality | |
| R | **R 1. Does the wetland have the <u>potential</u> to improve water quality? *(see p. 52)*** | |
| R | R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event:<br>Depressions cover >3/4 area of wetland — points = 8<br>Depressions cover > 1/2 area of wetland — points = 4<br>Depressions present but cover < 1/2 area of wetland — points = 2<br>No depressions present — points = 0 | |
| R | R 1.2 Characteristics of the vegetation in the wetland:<br>Forest or shrub > 2/3 the area of the wetland — points = 8<br>Forest or shrub > 1/3 area of the wetland — points = 6<br>Ungrazed, emergent plants > 2/3 area of wetland — points = 6<br>Ungrazed emergent plants > 1/3 area of wetland — points = 3<br>Forest, shrub, and ungrazed emergent < 1/3 area of wetland — points = 0 | |
| R | *Add the points in the boxes above* | |
| R | **R 2. Does the wetland have the <u>opportunity</u> to improve water quality? *(see p. 53)***<br>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.*<br>— Grazing in the wetland or within 150ft<br>— Untreated stormwater discharges to wetland<br>— Tilled fields or orchards within 150 feet of wetland<br>— A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging<br>— Residential, urban areas, golf courses are within 150 ft of wetland<br>— The river or stream linked to the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above standards for water quality<br>— Other________________________________________<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>_____ |
| R | **<u>TOTAL</u> - Water Quality Functions** Multiply the score from R 1 by R 2<br>***Add score to table on p. 1*** | |

**Comments**

| R | Riverine and Freshwater Tidal Fringe Wetlands | Points |
|---|---|---|
| | HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion | |
| | **R 3. Does the wetland have the <u>potential</u> to reduce flooding and erosion?** ***(see p. 54)*** | |
| R | R 3.1 Characteristics of the overbank storage the wetland provides:<br>*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). Calculate the ratio: ( width of wetland)/( width of stream).*<br>If the ratio is more than 20 points = 9<br>If the ratio is between 10 – 20 points = 6<br>If the ratio is 5- <10 points = 4<br>If the ratio is 1- <5 points = 2<br>If the ratio is < 1 points = 1 | |
| R | R 3.2 Characteristics of vegetation that slow down water velocities during floods:<br>*Treat large woody debris as "forest or shrub". Choose the points appropriate for the best description.*<br>Forest or shrub for >1/3 area OR Emergent plants > 2/3 area points = 7<br>Forest or shrub for > 1/10 area OR Emergent plants > 1/3 area points = 4<br>Vegetation does not meet above criteria points = 0 | |
| R | *Add the points in the boxes above* | |
| R | **R 4. Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?** ***(see p. 57)***<br>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.*<br>— There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding.<br>— There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding<br>— Other_____________________________________<br>*(Answer NO if the major source of water to the wetland is controlled by a reservoir or the wetland is tidal fringe along the sides of a dike)*<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>______ |
| R | **TOTAL - Hydrologic Functions** Multiply the score from R 3 by R 4<br>***Add score to table on p. 1*** | |

**Comments**

| L | Lake-fringe Wetlands | Points |
|---|---|---|
| | WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality | |
| L | **L 1. Does the wetland have the potential to improve water quality?** ***(see p. 59)*** | |
| L | L 1.1 Average width of vegetation along the lakeshore :<br>Vegetation is more than 33ft (10m) wide points = 6<br>Vegetation is more than 16 (5m) wide and <33ft points = 3<br>Vegetation is more than 6ft (2m) wide and <16 ft points = 1<br>Vegetation is less than 6 ft wide points = 0 | |
| 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. In this case the herbaceous plants can be either the dominant form (called emergent class) or as an understory in a shrub or forest community.*<br>Herbaceous plants cover >90% of the vegetated area points = 6<br>Herbaceous plants cover >2/3 of the vegetated area points = 4<br>Herbaceous plants cover >1/3 of the vegetated area points = 3<br>Other vegetation that is not aquatic bed in > 2/3 vegetated area points = 3<br>Other vegetation that is not aquatic bed in > 1/3 vegetated area points = 1<br>Aquatic bed cover > 2/3 of the vegetated area points = 0 | |
| L | *Add the points in the boxes above* | |
| L | **L 2. Does the wetland have the opportunity to improve water quality?** ***(see p. 61)***<br>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.*<br>— Wetland is along the shores of a lake or reservoir that does not meet water quality standards<br>— Grazing in the wetland or within 150ft<br>— Polluted water discharges to wetland along upland edge<br>— Tilled fields or orchards within 150 feet of wetland<br>— Residential or urban areas are within 150 ft of wetland<br>— Parks with grassy areas that are maintained, ballfields, golf courses (all within 150 ft. of lake shore)<br>— Power boats with gasoline or diesel engines use the lake<br>— Other________________________________________<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>_____ |
| L | **TOTAL - Water Quality Functions** Multiply the score from L1 by L2<br>***Add score to table on p. 1*** | |

**Comments**

| L | Lake-fringe Wetlands | Points |
|---|---|---|
| | HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce shoreline erosion | |
| L | **L 3. Does the wetland have the <u>potential</u> to reduce shoreline erosion?** ***(see p. 62)*** | |
| L | L 3 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)*<br>> ¾ of fringe vegetation is shrubs or trees at least 33 ft (10m) wide points = 6<br>> ¾ of fringe vegetation is shrubs or trees at least 6 ft. (2 m) wide points = 4<br>> ¼ of fringe vegetation is shrubs or trees at least 33 ft (10m) wide points = 4<br>Fringe vegetation is at least 6 ft (2m) wide points = 2<br>Fringe vegetation is less than 6 ft (2m) wide points = 0 | |
| L | *Record the points from the box above* | |
| L | **L 4. Does the wetland have the <u>opportunity</u> to reduce erosion?** ***(see p. 63)***<br>Are there features along the shore that will be impacted if the shoreline erodes? *Note which of the following conditions apply.*<br>— There are human structures and activities along the upland edge of the wetland (buildings, fields) that can be damaged by erosion.<br>— There are undisturbed natural resources along the upland edge of the wetland (e.g. mature forests other wetlands) than can be damaged by shoreline erosion<br>— Other________________________________________<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>_____ |
| L | **TOTAL - Hydrologic Functions** Multiply the score from L 3 by L 4<br>***Add score to table on p. 1*** | |

**Comments**

| S | Slope Wetlands | Points |
|---|---|---|
| | **WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality** | |
| S | **S 1. Does the wetland have the <u>potential</u> to improve water quality?** ***(see p. 64)*** | |
| S | S 1.1 Characteristics of average slope of wetland:<br>Slope is1% or less *(a 1% slope has a 1 foot vertical drop in elevation for every 100 ft horizontal distance*) ……. ………………………… points = 3<br>Slope is 1% - 2% points = 2<br>Slope is 2% - 5% points = 1<br>Slope is greater than 5% points = 0 | |
| S | S 1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).<br>YES = 3 points NO = 0 points | |
| S | S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants:<br>*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.*<br>Dense, ungrazed, herbaceous vegetation > 90% of the wetland area points = 6<br>Dense, ungrazed, herbaceous vegetation > 1/2 of area points = 3<br>Dense, woody, vegetation > ½ of area points = 2<br>Dense, ungrazed, herbaceous vegetation > 1/4 of area points = 1<br>Does not meet any of the criteria above for vegetation points = 0 | |
| S | **Total for S 1** *Add the points in the boxes above* | |
| S | **S 2. Does the wetland have the <u>opportunity</u> to improve water quality?** ***(see p. 67)***<br>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.*<br>— Grazing in the wetland or within 150ft<br>— Untreated stormwater discharges to wetland<br>— Tilled fields, logging, or orchards within 150 feet of wetland<br>— Residential, urban areas, or golf courses are within 150 ft upslope of wetland<br>— Other________________________________<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>_____ |
| S | **TOTAL - Water Quality Functions** Multiply the score from S1 by S2<br>***Add score to table on p. 1*** | |

**Comments**

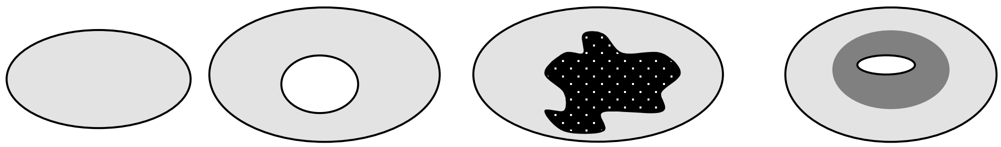
| S | Slope Wetlands | Points |
|---|---|---|
| | HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion | |
| | **S 3. Does the wetland have the <u>potential</u> to reduce flooding and stream erosion?** ***(see p. 68)*** | |
| S | S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland.*<br>Dense, uncut, **rigid** vegetation covers > 90% of the area of the wetland. (stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows) points = 6<br>Dense, uncut, **rigid** vegetation > 1/2 area of wetland points = 3<br>Dense, uncut, **rigid** vegetation > 1/4 area points = 1<br>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:<br>The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES points = 2<br>NO points = 0 | |
| S | *Add the points in the boxes above* | |
| S | **S 4. Does the wetland have the <u>opportunity</u> to reduce flooding and erosion?** ***(see p. 70)***<br>Is the wetland 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.*<br>— Wetland has surface runoff that drains to a river or stream that has flooding problems<br>— Other________________________________________<br>*(Answer NO if the major source of water is controlled by a reservoir (e.g. wetland is a seep that is on the downstream side of a dam)*<br>**YES** multiplier is **2** **NO** multiplier is **1** | multiplier<br>______ |
| S | **TOTAL - Hydrologic Functions** Multiply the score from S 3 by S 4<br>***Add score to table on p. 1*** | |

**Comments**

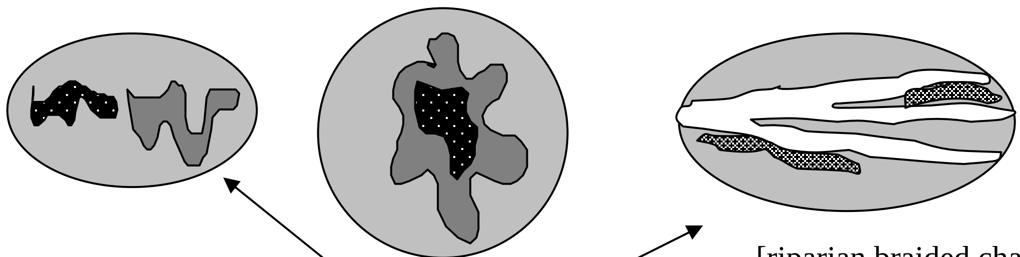
| ***These questions apply to wetlands of all HGM classes.*** | **Points** |
|---|---|
| HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat | |
| **H 1. Does the wetland have the <u>potential</u> to provide habitat for many species?** | |
| H 1.1 <u>Vegetation structure</u> ***(see p. 72)***<br>*Check the types of vegetation classes present (as defined by Cowardin) if the class covers more than 10% of the area of the wetland or ¼ acre.*<br>____Aquatic bed<br>____Emergent plants<br>____Scrub/shrub (areas where shrubs have >30% cover)<br>____Forested (areas where trees have >30% cover)<br>____Forested areas have 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover)<br>*Add the number of vegetation types that qualify. If you have:*<br>4 types or more — points = 4<br>3 types — points = 2<br>2 types — points = 1<br>1 type — points = 0 | |
| H 1.2. <u>Hydroperiods</u> ***(see p. 73)***<br>*Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)*<br>____Permanently flooded or inundated — 4 or more types present — points = 3<br>____Seasonally flooded or inundated — 3 types present — points = 2<br>____Occasionally flooded or inundated — 2 types present — point = 1<br>____Saturated only<br>____ Permanently flowing stream or river in, or adjacent to, the wetland<br>____ Seasonally flowing stream in, or adjacent to, the wetland<br>**____ *Lake-fringe wetland* = 2 points**<br>**____*Freshwater tidal wetland* = 2 points** | |
| H 1.3. <u>Richness of Plant Species</u> ***(see p. 75)***<br>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)*<br>*You do not have to name the species.*<br>*Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle*<br>If you counted: > 19 species — points = 2<br>*List species below if you want to:* 5 - 19 species — points = 1<br>< 5 species — points = 0 | |

H 1.4. <u>Interspersion of habitats</u> ***(see p. 76)***

Decide from the diagrams below whether interspersion between types of vegetation (described in H 1.1), or vegetation types and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.



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



[riparian braided channels]

High = 3 points

NOTE: If you have four or more vegetation types or three vegetation types and open water the rating is always “high”.

H 1.5. <u>Special Habitat Features:</u> ***(see p. 77)***

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

____Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long).

____Standing snags (diameter at the bottom > 4 inches) in the wetland

____Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream for at least 33 ft (10m)

____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present

____At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated.*(structures for egg-laying by amphibians)*

____ Invasive plants cover less than 25% of the wetland area in each stratum of plants

**H 1. TOTAL** Score - potential for providing habitat
*Add the scores in the column above*

**Comments**

**H 2. Does the wetland have the opportunity to provide habitat for many species?**

H 2.1 Buffers ***(see p. 80)***

*Choose the description that best represents condition of buffer of wetland. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."*

- 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No developed areas within undisturbed part of buffer**.** **(relatively undisturbed also means no-grazing)** **Points = 5**
- 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4**
- 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4**
- 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3**
- 50 m (170ft) 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 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2**
- No paved areas or buildings within 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 <2m wide (6.6ft) 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**

H 2.2 Corridors and Connections ***(see p. 81)***

H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? (*dams in riparian corridors, heavily used gravel roads, paved roads, 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 wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above?

YES = **2 points** (*go to H 2.3*) NO = H 2.2.3

H 2.2.3 Is the wetland:

within 5 mi (8km) of a brackish or salt water estuary OR
within 3 mi of a large field or pasture (>40 acres) OR
within 1 mi of a lake greater than 20 acres?

YES = **1 point** NO = **0 points**

| H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see p. 82)* | |
|---|---|
| Which of the following priority habitats are within 330ft (100m) of the wetland?<br>*(see text for a more detailed description of these priority habitats)*<br>____**Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.<br>____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres).<br>____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft.<br>____**Old-growth forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age.<br>____**Mature forests:** Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; 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; 80 - 200 years old west of the Cascade crest.<br>____**Prairies:** Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community.<br>____**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.<br>____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages<br>_____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%.<br>____**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.<br>____**Estuary/Estuary-like:** Deepwater tidal habitats and adjacent tidal wetlands, usually semi-enclosed by land but with open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. Estuarine habitat extends upstream and landward to where ocean-derived salts measure less than 0.5ppt. during the period of average annual low flow. Includes both estuaries and lagoons.<br>_____**Marine/Estuarine Shorelines**: Shorelines include the intertidal and subtidal zones of beaches, and may also include the backshore and adjacent components of the terrestrial landscape (e.g., cliffs, snags, mature trees, dunes, meadows) that are important to shoreline associated fish and wildlife and that contribute to shoreline function (e.g., sand/rock/log recruitment, nutrient contribution, erosion control).<br>If wetland has **3 or more** priority habitats **= 4 points**<br>If wetland has **2** priority habitats = **3 points**<br>If wetland has **1** priority habitat **= 1 point** No habitats = 0 points | |

| | |
|---|---|
| H 2.4 <u>Wetland Landscape</u> (*choose the* ***one*** *description of the landscape around the wetland that best fits*) ***(see p. 84)***<br>There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5<br>The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5<br>There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3<br>The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3<br>There is at least 1 wetland within ½ mile. points = 2<br>There are no wetlands within ½ mile. points = 0 | |
| **H 2**. TOTAL Score - opportunity for providing habitat<br>*Add the scores in the column above* | |
| **Total Score for Habitat Functions –** add the points for H 1, H 2 and record the result on p. 1 | |

## CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

***Please determine if the wetland meets the attributes described below and circle the appropriate answers and Category.***

| **Wetland Type**<br>*Check off any criteria that apply to the wetland. Circle the appropriate Category when the appropriate criteria are met.* | **Category** |
|---|---|
| **SC 1.0 Estuarine wetlands** ***(see p. 86)***<br>Does the wetland meet the following criteria for Estuarine wetlands?<br>— The dominant water regime is tidal,<br>— Vegetated, and<br>— With a salinity greater than 0.5 ppt.<br>YES = Go to SC 1.1 NO ___ | |
| SC 1.1 Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?<br>YES = Category I NO go to SC 1.2 | **Cat. I** |
| SC 1.2 Is the wetland at least 1 acre in size and meets at least two of the following three conditions? YES = Category I NO = Category II<br>— The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. If the non-native *Spartina* spp. are the only species that cover more than 10% of the wetland, then the wetland should be given a dual rating (I/II). The area of Spartina would be rated a Category II while the relatively undisturbed upper marsh with native species would be a Category I. Do not, however, exclude the area of Spartina in determining the size threshold of 1 acre.<br>— At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.<br>— The wetland has at least 2 of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. | **Cat. I**<br>**Cat. II**<br><br>**Dual rating**<br>**I/II** |
| | |

| | |
|---|---|
| **SC 2.0 Natural Heritage Wetlands** ***(see p. 87)***<br>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.<br>SC 2.1 Is the wetland 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)*<br>S/T/R information from Appendix D ___ or accessed from WNHP/DNR web site ___<br><br>YES____ – contact WNHP/DNR (see p. 79) and go to SC 3.2 NO ___<br><br>SC 2.2 Has DNR identified the wetland as a high quality undisturbed wetland or as or as a site with state threatened or endangered plant species?<br>YES = Category I NO ____ | **Cat. I** |
| | |
| **SC 3.0 Bogs** ***(see p. 87)***<br>Does the wetland (or part of the wetland) 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.***<br>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<br>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 a lake or pond?<br>Yes - go to Q. 3 No - Is not a bog for purpose of rating<br>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)?<br>Yes – Is a bog for purpose of rating No - go to Q. 4<br>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.<br>*3.* 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)?*<br>4. YES = Category I No___ Is not a bog for purpose of rating | **Cat. I** |

| | |
|---|---|
| **SC 4.0 Forested Wetlands** *(see p. 90)*<br>Does the wetland have at least 1 acre of forest that meet one of these criteria for the Department of Fish and Wildlife's forests as priority habitats? *If you answer yes you will still need to rate the wetland based on its functions.*<br>— **Old-growth forests**: (west of Cascade crest) Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/acre (20 trees/hectare) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 inches (81 cm) or more.<br>NOTE: The criterion for dbh is based on measurements for upland forests. Two-hundred year old trees in wetlands will often have a smaller dbh because their growth rates are often slower. The DFW criterion is and "OR" so old-growth forests do not necessarily have to have trees of this diameter.<br>— **Mature forests**: (west of the Cascade Crest) Stands where the largest trees are 80 – 200 years old OR have average diameters (dbh) exceeding 21 inches (53cm); 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.<br>YES = Category I NO ___ | **Cat. I** |
| **SC 5.0 Wetlands in Coastal Lagoons** *(see p. 91)*<br>Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?<br>— The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks<br>— The lagoon in which the wetland is located contains surface water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)*<br>YES = Go to SC 5.1 NO___ not a wetland in a coastal lagoon<br><br>SC 5.1 Does the wetland meets all of the following three conditions?<br>— The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of invasive plant species (see list of invasive species on p. 74).<br>— At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.<br>— The wetland is larger than 1/10 acre (4350 square feet)<br>YES = Category I NO = Category II | **Cat. I**<br><br>**Cat. II** |

| | |
|---|---|
| **SC 6.0 Interdunal Wetlands** ***(see p. 93)***<br>Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)?<br>YES - go to SC 6.1 NO __ not an interdunal wetland for rating<br>***If you answer yes you will still need to rate the wetland based on its functions.***<br>In practical terms that means the following geographic areas:<br>• Long Beach Peninsula- lands west of SR 103<br>• Grayland-Westport- lands west of SR 105<br>• Ocean Shores-Copalis- lands west of SR 115 and SR 109<br>SC 6.1 Is the wetland one acre or larger, or is it in a mosaic of wetlands that is once acre or larger?<br>YES = Category II NO – go to SC 6.2<br>SC 6.2 Is the wetland between 0.1 and 1 acre, or is it in a mosaic of wetlands that is between 0.1 and 1 acre?<br>YES = Category III | **Cat. II**<br><br>**Cat. III** |
| **Category of wetland based on Special Characteristics**<br>*Choose the "highest" rating if wetland falls into several categories, and record on p. 1.*<br>If you answered NO for all types enter "Not Applicable" on p.1 | |