OREGON FRESHWATER WETLAND ASSESSMENT METHODOLOGY

APRIL 1996

Oregon

Freshwater Wetland Assessment Methodology

Prepared by:

Emily Roth
Natural Resources Conservation Service

Richard Olsen
Argonne National Laboratory
(formerly with the Oregon Department of Environment Quality)

Patty Snow
Oregon Department of Fish and Wildlife

Richard Sumner
U.S. Environmental Protection Agency

Editing, graphics and layout by Scott McCannell. Cover design by Frank Roth and cover illustration by Sandra Noel.

The preparation of this manual was supported in part by a grant from the U.S. Environmental Protection Agency—Region X.

This manual is published by: Wetlands Program
Oregon Division of State Lands
775 Summer St. NE
Salem, OR 97310

Revised Edition, April 1996

The origins of this manual

The template for this evaluation method, the *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire,* was published in 1991 by the New Hampshire Department of Environmental Services. The New Hampshire method was based on a similar method developed by the Connecticut Department of Environmental Protection. The *Oregon Freshwater Wetland Assessment Methodology* uses some of the same wetland functions developed in the previous two publications. A general wetland characterization, a wetlands of special interest for protection category, and sensitivity to impacts and enhancement potential sections have been added. Some functions used in the New Hampshire or Connecticut methodologies have been combined or removed. All were modified to reflect wetland types found in Oregon. The revised edition clarifies and rearranges some questions, directions and answers found in the December 1993 edition.

The methodology was written by an inter-agency group that worked together for two and a half years. The size and make-up of the group fluctuated, but the following people and other representatives from their agencies were authors of various sections:

Emily Roth
Oregon Division of State Lands

Patty Snow
Oregon Department of Fish and Wildlife

Richard Olsen (and **Mike Nixon**)
Oregon Department of Environmental Quality

Richard Sumner
U.S. Environmental Protection Agency, Corvallis

A July 1993 draft of the Oregon Method was field tested in four areas of the state located within Clatsop, Linn, Benton and Deschutes counties and the Portland metropolitan area. In each area, a group of wetlands experts selected an assortment of familiar wetlands. They evaluated the functions of each wetland based upon their best professional judgment. We then brought together a second group of individuals, including community planners and interested community members. They visited some of the same wetlands and conducted an evaluation using the Oregon Method. The results of their evaluation were then compared to those of the expert group. We used the information from the comparison test to refine the final document.

This edition of the *Oregon Freshwater Wetland Assessment Methodology* is a modification of the original. Changes reflect suggestions of numerous users. We appreciate any comments or suggestions you have concerning the methodology. Suggestions will be evaluated and incorporated into future editions.

Submit comments concerning the methodology or requests for additional copies of this manual to:

Wetlands Program
Oregon Division of State Lands
775 Summer St. N.E.
Salem, OR 97310
(503) 378-3805

The development of this methodology was funded in part by a grant from the U.S. Environmental Protection Agency.

The Oregon Method should be cited as follows:

> Roth, E.M., R.D. Olsen, P.L. Snow, and R.R. Sumner. 1993. *Oregon Freshwater Wetland Assessment Methodology.* Ed. by S.G. McCannell. Oregon Division of State Lands. Salem, OR.

Acknowledgments: second edition

The Oregon Freshwater Wetland Methodology had been in use for almost two years, at least two growing seasons, when we started these revisions. Coastal, central, eastern, Willamette Valley, and southern Oregon wetlands were assessed for either wetland inventories or training sessions. We learned that some clarifications needed to be made and responses simplified, but luckily, no one encountered any fatal flaws.

The revisions were made possible due to the invaluable critique and reasonable suggestions from:

- Lisa Heigh, a graduate student at Oregon State University, who put it through a consistency test, using it as a basis for her masters project.
- The consultant community, our main users, who gave feedback on both clarification and scientific value. I would especially like to thank Mirth Walker and Christie Galen of Fishman Environmental Services and John van Staveren of Pacific Habitat Services.
- Richard Sumner, one of the principal authors and grant wizard extraordinaire at EPA's Corvallis laboratory.

Numerous others also suggested revisions that helped make the second edition more user friendly. They included EnviroCorps members, various people who braved our wetland identification and assessment trainings, and citizen users. I thank them all "en masse."

These revisions would not have been undertaken if it wasn't for Janet Morlan with the Oregon Division of State Lands and Ken Bierly, now working in the Governor's Office on Watershed Health (taking a breather from the Division). Without their subtle yet consistent prodding, I would never have attempted and completed the revisions. They help me keep at least one of my feet mired in the wetland mucks of Oregon. Thanks Janet and Ken.

My final thanks goes to the editor, Scott McCannell. As with the original, his patience persisted with my delays, revisions and the contracting process.

Cheers!

Emily Roth
NRCS/Community Resource Conservation Center
March 1996

Acknowledgments: first edition

The inter-agency working team consisted of more than just the authors. We would like to give a special thanks to Frank Flynn and Lynn Beaton with the Oregon Department of Land Conservation and Development, Jim Goudzwaard with the U.S. Army Corps of Engineers—Portland District, and Steve Morris and Michelle Day with the U.S. National Marine fisheries Service for attending meetings, reviewing numerous drafts of the text and providing valuable input throughout the entire process. We would also like to thank Bob Frenkel, Marv Yoshinaka, Peggy Elting, Rosemary Furfey, John Christy, and Tom Robertson for their participation in the process. For various reasons, they could not continue through the entire development of the manual, but their contributions helped to strengthen the methodology.

We relied on Karen Strohmeyer, Rosemary Furfey, Neil Maine, Steve Moser and Dave Leslie to organize our field testing groups. Their efforts and feedback made the methodology more user friendly and led to many revisions. Lynn Putnam assisted the inter-agency group with the initial testing. She endured the "group process" and even managed to out shout us a few times. Also, a special thanks to all the people who participated in the field testing; they are too numerous to list here.

Many Colleagues supported us from start to finish. Ken Bierly tried to keep us honest and encouraged us to stick with it (though we doubt he ever read it). Scott Leibowitz provided technical assistance; his comments caused us to re-examine basic thought patterns but not change too much copy. Allen "Chip" Dale and Donavin Leckenby assisted in the initial development of the habitat indices. Again, the list of colleagues that supported us with their patience, comments and critical review are too long to mention. Without them, it would never have been completed. We thank them all "en masse."

Finally, many thanks go to our editor, Scott McCannell of Word Design & Graphics, Inc. His patience with our delays, revisions and then requests for a "rush" to get the draft out may entitle him to "sainthood," or at least a good beer.

Cheers!

Emily Roth
Oregon Division of State Lands
November 1993

Table of contents

I. Introduction 1
Purpose 1
Definition of wetlands in Oregon 2
Wetland assessment versus wetland delineation 2
Recommended uses of the Oregon Method 2
Wetland protection 3
Prioritizing wetland values within a community 3
Education 4
Limitations of the Oregon Method 4
Training and professional assistance 5
Origin of the Oregon Method 5
The "Notes" column 5

II. Description of the Oregon Method 7

III. Completing the Oregon Method 11

IV. Preparation of base maps and overlays 17
Watershed map 17
Wetland base map 18

V. Wetlands of Special Interest for Protection & Wetland Characterization 23
Wetlands of Special Interest for Protection 25
Wetland Characterization 29

VI. Function & condition assessment questions 47
Wildlife habitat 49
Fish habitat 55
Water quality 63
Hydrologic control 67
Sensitivity to future impacts 71
Enhancement potential 75
Education 79
Recreation 83
Aesthetic quality 87

VII. Glossary 97

VIII. References 101

Appendix A: *Sources of information* 107

Appendix B: *Wetland Characterization* 113

Appendix C: *Assessment questions, answer sheets & summary sheets* 131

Appendix D: *The Cowardin system of wetland classification* 161

Appendix E: *Interpretation of topographic maps and watershed delineation* 163

Appendix F: *Calculation of the average slope and stream gradient of the watershed* 171

Appendix G: *Uncommon wetland plant communities in Oregon* 175

Appendix H: *Basin Map* 181

Appendix I: *Wetland fact sheets* 183

Introduction

Over the past several decades an understanding of the importance of freshwater wetlands to the quality and integrity of the environment has spread from the scientific community to the public. Because of this increasing awareness, the once popular desire to drain and fill wetlands is being replaced with a desire to preserve and manage them for their natural values. As a result, new laws and regulations have been enacted to protect wetland resources.

While the overall significance of wetlands is recognized, the functions and conditions of specific wetland sites often remain undefined. A wetland *function* refers to the role a wetland plays in the environment. An individual wetland may perform many functions; for instance, it may serve as a wildlife habitat, a recreation area and an educational site. A wetland *condition* refers to a wetland's state or quality. For example, a wetland might be sensitive to impacts or it might be resilient.

The Oregon Method assesses four wetland ecological functions (wildlife habitat, fish habitat, water quality and hydrologic control) and three social functions (education, recreation and aesthetics). It also assesses the conditions of sensitivity to impacts and enhancement potential. Development pressure in wetland areas—and limited means to protect the wetlands—often requires communities to place relative priorities on the future use of these areas. It is essential that communities have available a practical means to assess their wetland resources to determine the level of protection to afford them.

Purpose of the Oregon Method

This manual provides a method of wetland assessment for planners, public officials and others who are familiar with wetlands but who are not necessarily wetland specialists. **It is intended for planning and educational uses, not for detailed impact analysis on individual wetlands.**

The *Oregon Freshwater Wetland Assessment Methodology* (hereafter referred to as the Oregon Method) was designed to be defensible if used for its intended purposes. Its end products are qualitative descriptions of wetland functions and conditions.

The Oregon Method is based on the idea that the functions and conditions of a wetland system and individual sites must be understood at the local, state and federal levels in order to make management decisions. Completion of this method provides the basic information. When more detailed information is needed, another method should be used.

Definition of wetlands in Oregon

For the purposes of the Oregon Method, wetlands comprise those areas defined as wetlands by the Oregon Division of State Lands for the removal-fill program (ORS 196.800):

> [Wetlands are] those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Communities may choose to assess wetlands that the state does not regulate but that meet the above definition. These may include old log ponds, artificially created wetlands smaller than 1 acre or stormwater swales.

Wetland assessment versus wetland delineation

Confusion over the difference between wetland assessment and wetland delineation is common. Wetland delineation is the process of determining the boundary between wetland and upland. For federal and state jurisdictional purposes, delineation must be carried out following the guidelines in a manual approved for that purpose. Wetland delineation locates the wetland-upland boundary based on field indicators—vegetation, soils and hydrology—and is best accomplished by an experienced wetland scientist.

Wetland assessment is the process of determining a wetland's functions and conditions. An assessment may indicate, for example, that a wetland provides diverse habitat for wildlife. The Oregon Method is an assessment method and is independent of the delineation process.

Recommended uses of the Oregon Method

The Oregon Method was designed as a tool for the following purposes:

- To educate planners, city council members, county commissioners, planning commissions and members of the community about wetlands in their community
- To collect basic information about wetlands in an assessment area, which could be a community, a watershed or a region of the state
- To create a database containing information about functions and conditions and other wetland data
- To support the planning and decision-making process within a jurisdiction

It is necessary to remember that the Oregon Method is a planning tool. It is intended for assessing a number of wetlands in an assessment area, not for evaluating site-specific impacts.

For example, if an assessment of a community's wetlands using the Oregon Method indicates that a wetland provides diverse wildlife habitat, the community might require a developer to analyze in detail the impacts on wildlife habitat of a proposed project.

Before conducting the assessment, be sure to obtain landowner permission before entering public or private property. The use of this manual does not give the user permission to trespass.

Wetland protection

Although wetlands in Oregon are regulated by both the Oregon Division of State Lands and the U.S. Army Corps of Engineers, land-use decisions that affect wetlands are primarily made by local governments. Using the results of the Oregon Method, a community can protect wetlands it considers most important. For example, if members of a community decide that wetlands possessing great scenic beauty are particularly important, they could choose to protect the ones that an Oregon Method assessment determines to be aesthetically pleasing.

A community can use the following methods to protect its wetlands:

- Zoning and subdivision regulations—Wetlands can be protected by zoning ordinances and set-back requirements in subdivision regulations.
- Comments to the Oregon Division of State Lands and Corps of Engineers on wetland permits. Wetland permit processes at the state and federal level provide ample opportunity for local input into decisions that affect wetlands.
- State land-use laws—Under Oregon Revised Statutes, local jurisdictions can designate their wetlands as significant and protect them as Goal 5 or 17 resources in their local comprehensive plan. The advantage in designating protected wetlands is that these wetlands are given special consideration by regulatory agencies in permit application reviews.
- Acquisition of wetlands—Wetlands can be acquired as gifts, by fee-purchase, through the purchase of development rights, or by securing conservation easements on lands that contain wetlands.
- Wetland conservation planning—Local communities can choose to develop a wetland conservation plan (ORS 196.678-684). As part of the planning process, wetlands are designated for protection, conservation and development, and ordinances implement the planning decision.

Prioritizing wetland values within a community

The Oregon Method requires each wetland in the study area to be evaluated for the same functions and conditions. It does not determine the wetland's overall value. Using the results of the Oregon Method, communities can make informed decisions on the protection, conservation and best use of wetlands.

Not all functions need to be assessed. (If a function is left out, it should be omitted consistently throughout the assessment.) In practice, eliminating some functions may not save much time because the user must still collect basic data and conduct field visits.

Education

The Oregon Method is a good tool for teaching about wetland functions and conditions. Potential audiences include local government officials, interested members of the public, students, youth groups and environmental organizations.

Limitations of the Oregon Method

Using the Oregon Method out of context or beyond its intended purposes could result in misleading information, which could lead to poor decisions. The Oregon Method has the following limitations:

- The Oregon Method was designed as a planning-level assessment tool.
- The Oregon Method was designed for comparing the functions and conditions of a number of wetlands. It is not suitable for evaluating a single wetland, although the basic information collected during an assessment of a community's wetlands could be useful to wetland professionals undertaking a detailed assessment of individual wetlands.
- The Oregon Method was not designed for impact analysis. Impact analysis requires the judgment of a wetland professional who would be responsible for selecting a detailed method of assessment or conducting detailed on-site studies of wetland functions.
- The Oregon Method is not intended as a justification for adversely impacting wetlands that do not provide a particular function or group of functions. Wetland professionals agree that all wetlands have some value and that impacts to wetlands should be avoided, if possible, and mitigated where avoidance is not possible.
- The Oregon Method will not properly evaluate urban wetlands unless the urban criteria for specific indicators are used. (Urban unincorporated communities and areas within urban growth boundaries are considered urban areas.) These criteria take into account the increased value of urban wetlands due to their surroundings. For example, a small

urban wetland may provide limited wildlife habitat, but it may be the only wetland readily available for bird watching by residents in the urban area.

- The Oregon Method was not designed for use in legal proceedings that require detailed information about individual wetlands.

Training and professional assistance

Before city planners or a citizen group begin an assessment using the Oregon Method, they should contact the Division of State Lands about training in using the method.

Also, some communities may decide to employ the services of a wetland professional to assist in assessing their wetlands. The professional's involvement could vary depending on the community's needs:

- The wetland professional could act as a group leader, organizing data collection and supervising field work and completion of assessment questions.
- In addition to acting as a group leader, the wetland professional could complete all field work.
- The wetland professional could carry out the entire assessment.

Origin of the Oregon Method

The procedure described in this document is an adaptation of the *Method for the Evaluation of Nontidal Wetlands in New Hampshire*, developed by Alan Amman and Amanda Stone, and a similar methodology developed in Connecticut.

We are indebted to the authors of the New Hampshire and Connecticut methods. The Oregon Method differs from the New Hampshire method because it draws more heavily upon the discipline of landscape ecology. The Oregon Method helps the user characterize wetlands in terms of their landscape position and hydrologic regime, as well as the environmental risks associated with human actions.

The "Notes" column

Throughout the Oregon Method appears a column labeled "Notes." Here you can write explanatory comments regarding the methodology that may be useful for reference at a later date. This is especially useful in the Wetland Characterization, where users may want to illustrate or write notes concerning their observations.

Description of the Oregon Method

A general outline of the Oregon Method

When using the Oregon Method, you first gather information about the watershed and the individual wetlands from maps, reports and site visits. You use the information to answer questions about the various functions and conditions.

After answering all the questions, you evaluate the wetland's functions and conditions according to criteria provided. Given the "detection limits" of the Oregon Method, the assessment will give you an indication of whether a wetland function is 1) intact, 2) degraded or impacted or 3) lost or not present. The assessment criteria for wildlife habitat indicate whether the wetland 1) "provides diverse wildlife habitat," 2) "provides habitat for some wildlife species" or 3) whether the wetland's "wildlife habitat function is lost or not present."

A word of caution is in order. As with any form of land-use planning, there is no substitute for critical thinking, and nothing more potentially disastrous than uncritical adherence to a formula or procedure. Check the results of the assessment carefully to ensure that they make sense.

Wetland Characterization and assessment questions

At the heart of the Oregon Method is the Wetland Characterization. This is a set of questions about the watershed and about individual wetland sites. As indicated above, some information for the Characterization is assembled in the office, the rest is gathered from visits to wetland sites. In addition to the Wetland Characterization are the nine sets of function and condition assessment questions. Each set should be completed using information in the Wetland Characterization; they require no additional information gathering in the field or office. If you understand this relationship between the Characterization and the assessment questions, you're well on your way to a firm understanding of the Oregon Method.

The Oregon Method and landscape ecology

Questions 1 through 14 in the Wetland Characterization ask for information on the watershed. In order to set attainable goals for wetland protection, you must understand how wetlands fit within the framework of the surrounding landscape.

Natural forces, such as the flow of water through a stream bed, define an ecosystem's structure, what we call "physical structure." Plants and animals form what we call the "biological structure." Structure, in turn, determines how the area will function. By maintaining its structure, we promote an ecosystem's health and sustain its capability to survive disturbance.

Wetlands are part of an area's ecological structure or pattern. Wetland patches act as sources, sinks or channels for energy and materials. For example, a wetland might serve as a source area for a fishery, part of a channel for animal migration, or as a sink area for water-borne pollutants. Not all wetlands have the same ability to act as sources, sinks or channels. That depends on each wetland's physical and biological structure, as well as on its location. (Human disturbance can impair a wetland's function, and wetland enhancement can increase the ability of degraded wetland's to function.) A wetland's value depends upon its contribution toward maintaining the structure of the watershed.

Wetland functions and conditions

Wetlands provide many benefits to people and their environment. For example, wetlands function to help control floods, enhance water supplies, improve water quality and provide diverse wildlife habitat. A wetland may not perform all these functions, depending on the specific biological and physical features of its location.

The condition of the wetland—the integrity of its physical and biological structure—determines its ability to perform specific functions. The sensitivity to impacts, enhancement potential and aesthetic indices assess the wetland condition.

Most methods of wetland assessment, including the Oregon Method, describe a limited number of wetland functions and conditions. The results from the description are used to make management decisions.

The functions and conditions evaluated by the Oregon Method do not represent a complete list; others may be added later. For this reason, the Oregon Method is designed to be open-ended. Functions can be added and can be evaluated using published methods or methods developed by the user. Conversely, functions that are not important to the user can be dropped. The functions and conditions used in the Oregon Method are listed on the next page.

- **Wildlife habitat**—evaluates the habitat diversity for species typically associated with wetlands and wetland edges. No single species is emphasized.
- **Fish habitat**—evaluates how the wetland contributes to fish habitat in streams, ponds or lakes associated with the wetland for either warm-water or cold-water fisheries. No single species or group of species is emphasized.
- **Water quality**—evaluates the potential of the wetland to reduce the impacts that excess nutrients in runoff water will have on downstream waters.
- **Hydrologic control**—evaluates the effectiveness of the wetland in storing floodwaters and reducing downstream flood peaks.
- **Sensitivity to impact**—evaluates the susceptibility of a wetland to secondary effects of impacts.
- **Enhancement potential**—evaluates the suitability of a degraded wetland site for enhancement.
- **Education**—evaluates the suitability of the wetland as a site for an "outdoor classroom."
- **Recreation**—evaluates the suitability of the wetland and associated watercourses for non-powered boating, fishing and similar recreational activities.
- **Aesthetic quality**—evaluates the visual and aesthetic quality of the wetland.

Completing the Oregon Method

Completing the assessment may seem like a large and sometimes daunting task. By following these steps, the "task" can be broken down into several simpler tasks.

Step 1: determine the assessment area

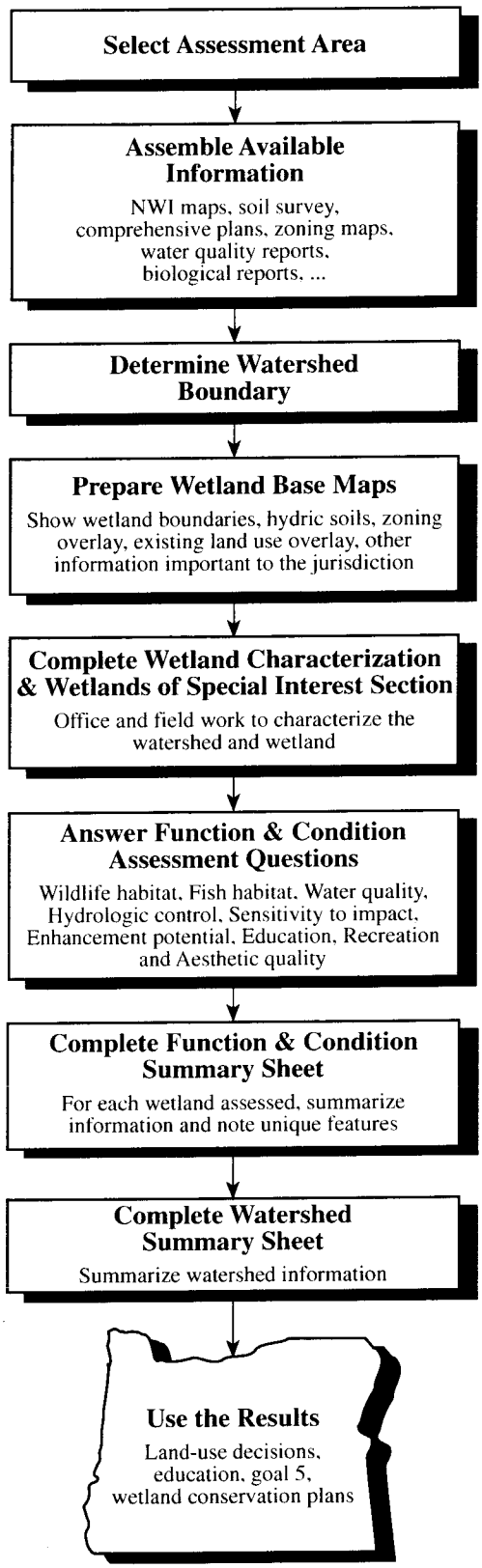
Draw the boundaries of the assessment area on a topographic map. This can be all or a portion of a jurisdiction, watershed, subbasin or a regional area. There is no minimum size, but you should select an area that is large enough to include numerous wetlands.

Step 2: assemble the available information

Below is a list of information that will help you complete the assessment. Refer to Appendix A for a complete list of information sources as well as the location where each can be obtained.

- Aerial photographs, low altitude
- Anadromous fish run information
- Drainage basin maps
- Endangered and threatened wildlife listing
- Endangered and threatened plants listing
- Endangered and threatened species by town
- Fish stocking information
- Flood hazard maps
- 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution
- Atlas of Oregon Lakes
- Lake water quality information
- Municipal Assessor's/tax maps
- Local comprehensive plan and zoning maps
- National Wetlands Inventory Maps
- Local Wetlands Inventory Maps
- Oregon Natural Heritage Plan
- Water Quality Report to Congress 305(b)
- Rare natural communities listing
- Soil survey maps (by county)
- USGS topographical maps

Steps in Completing the Assessment



Notes

Low altitude aerial photos of the assessment area are especially helpful for completing the assessment. If they aren't available for your community, you want to consider having them taken in early spring.

Step 3: determine the boundaries of the watershed that contains the wetlands being evaluated

Appendix E provides guidance for delineating watershed boundaries using topographic maps or information available from the Department of Water Resources. This will help you visualize the watershed containing the wetlands being assessed and put the assessment area into a broader ecological context.

Step 4: prepare the wetland base map and overlays

An essential part of the assessment procedure is the preparation of a wetland base map and overlays of the wetlands to be evaluated. Chapter IV provides guidance on determining wetland boundaries and suggested means for preparing the overlays. The information recorded on the map and overlays is used to answer questions in the Wetland Characterization (see Chapter V or Appendix B).

The information necessary to complete the base map and overlays can be obtained from field examination, local inquiry and by reference to prepared maps. (Refer to Appendix A for suggested information sources as well as the location where each can be obtained.)

Step 5: complete the Wetland Characterization and the Wetlands of Special Interest for Protection section

Fill out the portions of the characterization that should be completed in the office for all wetlands in the assessment area, and complete the Wetlands of Special Interest for Protection section. Both appear in Chapter V. Then fill out the portions of the Characterization that must be completed in the field. (*Portions of the Characterization that need to be filled out in the field are marked with a check.*) The Wetland Characterization is set up so data for three wetlands can be collected per sheet. Copies of both the Wetland Characterization and the Wetlands of Special Interest for Protection section appear in Appendix B. The questionnaires found in the appendix can be photocopied and taken into the field; this will help you avoid misplacing the instructions contained in the body of the manual.

Notes

Some questions in the Characterization require the evaluator to use a degree of judgment. In these cases, criteria are provided on which to base the judgment. The authors recognize the potential problems of introducing subjectivity into any assessment method. We feel it is unavoidable for several reasons. First and foremost is the necessity of keeping the Oregon Method simple enough to be of practical use by those for whom it is intended. Second, most of the communities that will use the Oregon Method simply do not have the financial resources or technical expertise to use the more sophisticated, data intensive methods of wetland assessment on a routine basis.

If the assessment is being performed by a larger group that will split up into smaller groups, each of which will evaluate several wetlands, we suggest that the whole group participate in filling out the characterization for the first few wetlands. This should have the effect of "calibrating" the thinking of group members so that when they split up to collect data for their assigned wetlands, they will answer the questions in a similar manner. This will increase the accuracy of comparisons made between wetlands upon completion of the assessment.

Step 6: answer function and condition assessment questions and apply assessment criteria

After you have collected all the data, answer the assessment questions for each function and condition (the questions are contained in Chapter VI). Record your answers on the answer sheet, then evaluate each function and condition, using the criteria provided.

The set of assessment questions for each function and condition is prefaced by an introduction describing how wetlands perform that function or what factors affect the condition. The introduction is followed by the assessment questions, a rationale, and instructions for answering the questions by using the information recorded on the Wetland Characterization. The evaluation criteria appear in a table at the end of each set of assessment questions.

As with the Wetland Characterization, use the margin for sketches or explanatory notes.

Appendix C, which contains the assessment questions and an answer sheet, is also designed to be detached and photocopied for use in the field. This will reduce the possibility of misplacing the instructions.

Notes

Step 7: complete a Function & Condition Summary Sheet for each wetland evaluated

The summary sheet is contained at the end of Chapter VI, following the sets of assessment questions. It provides a place for listing the results of all functions and conditions for a wetland. It also contains space for an overall narrative assessment of the wetland.

Step 8: complete the Watershed Summary Sheet

The Watershed Summary (at the end of Chapter VI and the end of Appendix C) provides a place for describing the general physical and biological features of the watershed that contains the assessment area. The Watershed Summary is a depiction of how wetlands in the assessment area fit within the surrounding environment. It is a place to describe the possible interactions of the wetlands with other ecosystems. Use all your answers to the first 14 questions in the Wetland Characterization and information you have learned in the field to help you address each of the following questions as you complete the narrative summary section.

- How might wetlands in the assessment area be influencing the sources of water and the flow of water within the watershed?
- How might wetlands in the assessment area be contributing to diversity of plant and animal life in the watershed?
- How might land-use practices within the watershed affect the ability of the wetlands to maintain the hydrology and biological diversity within the watershed?
- What management practices within the assessment area might increase the ability of its wetlands to control flood waters and provide for diversity of plant and animal life?
- How might the wetlands in the assessment area contribute to the recreation and educational opportunities in the watershed?

Step 9: use the results

The wetland information is now ready for use in wetland policy formulation and analysis, outdoor classroom siting and the local land-use decision-making process.

Preparation of base maps & overlays

An essential part of the assessment procedure is the preparation of a watershed map, wetland base maps and overlays for each wetland base map. The information recorded on the maps and overlays will be referred to frequently when answering the questions in the Wetland Characterization (Chapter V and Appendix B). The overlays can be created either on transparencies or on separate sheets. The maps may be prepared at any convenient scale, but for consistency it is suggested that the same scale the municipality uses for record keeping be used.

All maps and overlays should contain the following information:

- **Title block**—Include the watershed and wetland name or identification code and the community and county in which it is located. The investigator may use any convenient system of identification. Wetlands, for example, could be named for an associated stream or lake. Several wetlands on the same stream might be consecutively numbered, such as Newton Creek 1, Newton Creek 2, etc. Alternatively, wetlands could be named for nearby roads or landmarks. Whatever system is used, it is essential that the location of the wetland in the watershed be well documented so it can be easily located.
- **North arrow**—True north
- **Legend**—A key to wetland symbology on map
- **Scale**
- **Date of field check**
- **Sources of information**—Local soil survey maps; local comprehensive plan map; identification, date and scale of source air photos, etc.
- **Name of people responsible for map preparation**
- **Disclaimer**—A statement such as "Information shown on this map is of generalized nature" and "Wetland boundaries are approximate" (if not delineated).

Watershed map

The watershed map should include the following information:

- **Wetland locations**—The location and approximate boundaries of wetlands in the assessment area within the watershed. This will generally consist of the wetland base map described on pages 18 and 19.

Notes

- **Designated land uses within the watershed**—Indicate the designated land uses from local comprehensive plan map for this area. Land-use designations to be used should at least include agriculture, open space, exclusive forest use lands, developed uses (or urban uses).
- **Watercourses** (including lakes and ponds)—This information can be obtained from U.S. Geological Survey topographic maps, water resource basin maps, or local comprehensive plans unless a newer source is available.
- **Water Quality Information**—This information can be obtained from the *1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution.*

Wetland base map

The wetland base map should indicate the approximate wetland boundary and physical features associated with the wetland as listed below. A Local Wetlands Inventory map that meets standards developed by the Division of State Lands is an appropriate wetland base map for some purposes, such as urban planning. You may also select a map that best suits your needs (parcel map, zoning map, topographic map, etc.) and follow the procedures below to create your wetland base map.

- **Wetland identification**—One procedure to identify wetlands and their boundaries is to trace the wetland soil (hydric soil) units from the appropriate local soil survey map (published by the Natural Resources Conservation Service) and compare them with aerial photos and with the wetland boundaries on the National Wetlands Inventory map (published by the U.S. Fish and Wildlife Service). Field verification will be necessary to determine more accurate boundaries. Transfer the information from the soil survey and National Wetlands Inventory maps to the base map, which will be at a different scale.

  Because the width of a line on a National Wetlands Inventory map can represent from 20 to 40 feet on the ground, the base map may not be accurate on a site-by-site basis. In addition, the smallest wetlands mapped on National Wetlands Inventory maps are about 1 acre (see fact sheets in Appendix H), and on soil survey maps soil units may vary from 2 to 6 acres. (**Note:** Some forested wetlands do not appear on the National Wetlands Inventory maps because of mapping difficulties associated with these wetlands. Agricultural wetlands are not mapped on the National Wetlands Inventory maps.)

  Another procedure to identify wetlands is to rely on your local wetland and/or fish and wildlife experts. Ask them to assist you in identifying and mapping the wetlands in your area. Then go with them to verify the wetland location. This will greatly assist in accurately mapping the wetlands and determining their approximate boundaries. Or, have a wetland specialist map the wetlands in your community.

Notes

- **Determining wetland assessment boundaries**—The guidelines presented below will help in deciding where to locate the boundary of the wetland for assessment purposes, particularly in instances in which a wetland is bisected by a road or railroad, or where a wetland becomes narrow along a watercourse. The consistency provided by this guidance will make decisions less arbitrary, and hence, more defensible.

  A wetland bisected by a railroad or two-lane road is considered for the purpose of this analysis to be a single wetland site if:

  - Culverts permit free flow of surface water, and
  - The slope and drainage of the wetland are unidirectional.

  A wetland bisected by a railroad or two-lane road is treated as two separate wetland sites for the purpose of this analysis if either:

  - There is no culvert, or the culvert is permanently blocked (easily cleared debris jams do not count as permanent blockages), or
  - The slope and drainage of the wetland run in more than one direction away from the road.

  A wetland cut by a four-lane (or greater) highway is treated as two separate wetland sites.

  If a wetland extends beyond the boundary of the assessment area (community, watershed, etc.) the entire wetland should be mapped and used in the assessment.

  If there is a wetland on opposite sides of a large river, the wetland on both sides and the river water between are considered to be part of the same assessment unit.

  If there is a wetland on only one side of a river or stream, the water body adjacent to the wetland is included in the assessment, as instructed in the characterization questions.

  Wetlands located along river channels greater than 50 feet wide terminate wherever upland directly borders the channel on both sides.

- **Major roads**—If the base map does not include roads, trace major roads onto the map.
- **Railroads, power lines, pipe lines, utility rights of way, etc.**—This information should be obtained from U.S. Geological Survey topographic quadrangles or local comprehensive plans unless a newer source is available.

Notes

- **Watercourses** (including lakes and ponds)—This information should be obtained from U.S. Geological Survey topographic maps, Oregon Department of Water Resources basin maps, the Atlas of Oregon Lakes, or local comprehensive plans unless a newer source is available.
- **Location of educational site(s)**—Information can be obtained from local knowledge and comprehensive plans.
- **Location of viewing area(s)**—Obtain this information from aerial photographs or in-field observations. The viewing area does not have to be a platform or other designated area, just an area that provides a good view of the wetland or portion of the wetland.

Overlay 1—Wetland soils, water quality, wetland classes, and land-use designations

Overlay 1 should contain the following information:

- **Wetland boundaries**—Already available from the base map.
- **Wetland classes**—These may be designated on the wetlands base map in the field, from aerial photographs or National Wetlands Inventory maps. Use the Cowardin wetland classification system. It was used for the National Wetlands Inventory maps and can lend consistency to assessments. Refer to Appendix D for a brief explanation of the Cowardin wetland classification system.
- **Wetland soils**—Trace hydric soil units from the county soil survey map and label each soil type. You may want to map soil units with hydric inclusions and code them separately.
- **Water quality designations for watercourses in the assessment area**—Obtain from the *1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution.* Listings that indicate a watercourse has severe water quality conditions status from nonpoint sources may be based on data or observations. For example, the watercourse may be designated to have severe water quality conditions due to agricultural practices.
- **Land-use designations**—For the entire assessment area, map the comprehensive plan land-use designations.

Overlay 2—Existing land use within 500 feet of the wetland

Overlay 2 should contain the following information:

- **Wetland boundaries**—Already available from the base map.
- **Areas of fill, drainage or altered vegetation**—Indicate all areas that reasonably can be judged to have been filled. Areas of recent fill may be obvious, but older fill areas may be difficult to detect. Look for unnatural or abrupt changes in elevation, especially between developed

areas such as lawns or parking lots and surrounding undeveloped areas. Also indicate areas where the wetland plant community has been altered by mowing, grazing or plowing.

- **Land use within 500 feet of wetland boundaries**—Indicate the existing land use 500 feet from the wetland edge. Land-use designations should include agriculture, open space, exclusive forest use, residential, commercial, industrial, and other designations used in the local comprehensive plan or zoning map. This may be completed in the field. You may want to note the intensity of use.

Notes

Alternatives to overlays

The watershed map and wetland base map are always necessary. Overlays are an important part of the evaluation technique, too, but they take time to make. Because the information contained on overlays is essential, it must be obtained in some form for reference. Two alternatives to overlays are listed below:

- **Using existing information**—One difference between creating overlays and using existing information is that information is not transferred to the same scale as the base map and not made into an overlay format. When using this method, be careful to scale or measure the information accurately for correct interpretation.
- **Employing a geographic information system package (GIS)**—Some users will be able to use a GIS package to prepare the base map and overlays. Using the GIS entails storing data about wetlands and wetland functions and conditions in a database and then generating maps based on that data. For this application, "data layers" about roads, hydrology, soils and drainage basins are required. The determination and mapping of wetlands must be done in such a manner that the information can be transferred into a GIS (digitized). It can then be printed as a map that also depicts information about roads, hydrology and drainage features. This map can be overlaid easily with information about soils and other natural resources. Using a GIS ensures that all maps generated share a common base and that each portrays the data that suits the user's needs.

Wetlands of Special Interest for Protection & Wetland Characterization

This chapter contains the Wetlands of Special Interest for Protection section and the Wetland Characterization.

Listed after each question in the Wetlands of Special Interest for Protection section is a source of information to help you answer that question. In the Wetland Characterization, instructions for answering the questions and sources of information are listed where needed.

Appendix B contains copies of all the questions—but not the instructions—for the Wetland Characterization. This appendix is intended to be photocopied and used in the field. Once you are familiar with the methodology and questions, detach Appendix B from the manual.

Also, the Watershed Summary Sheet and Function & Condition Summary Sheet at the end of Chapter VI are repeated in Appendix C. They can be removed from the appendix and used in the field to note unique features, landscape location and other important information about the wetland site and assessment area. You may want to attach a simple sketch to the summary sheet for each wetland site.

Wetlands of Special Interest for Protection

Wetland 1	Wetland 2	Wetland 3

The first filter in the Oregon Method is to see whether the wetland is in a management plan, is protected by regulatory rules or statutes, or is uncommon in Oregon. A "yes" answer to any of the following questions will place the wetland into this category and management decisions should be made to protect the site. You still may want to evaluate the functions and conditions of each wetland to give you an overall evaluation of the wetlands in your assessment area. You should note on the Function and Condition Summary Sheet (Chapter VI and Appendix C) the information from this section. You do not need to contact every agency listed, but all those listed have all or some of the information you need.

Question 1

Does the wetland contain threatened, endangered or sensitive species of wildlife, plants, invertebrates or fish? (Either federal- or state-listed. Include species.) If yes, list.

a. Yes
b. No
c. Unknown
List:

Information source

Oregon Natural Heritage Program, The Nature Conservancy, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Oregon Department of Fish and Wildlife, Oregon Department of Agriculture.

Question 2

Is the wetland designated as critical habitat or essential habitat for federal- or state-listed threatened or endangered species of wildlife, plants, invertebrates or fish? If yes, list species.

a. Yes
b. No
c. Unknown
List:

Information source

U.S. Fish and Wildlife Service, National Marine Fisheries Service, The Nature Conservancy.

		Wetland 1	Wetland 2	Wetland 3
Question 3 Is the wetland a dedicated or proposed Registered State Natural Area or Area of Critical Environmental Concern, State Natural Heritage Conservation Area, Federal Research Natural Area, or a Nature Conservancy Preserve? ***Information source*** The Nature Conservancy, the Oregon Natural Heritage Program, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, National Park Service and Corps of Engineers.	a. Yes b. No c. Unknown List which it is:			
Question 4 Is the wetland of regional or national significance for migratory birds? ***Information source*** U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife.	a. Yes b. No c. Unknown List which species:			
Question 5 Is the wetland protected in a local wetland conservation plan or a local comprehensive plan as a Goal 5 or Goal 17 resource? ***Information source*** Local planning office.	a. Yes b. No c. Unknown			
Question 6 Is the wetland a designated State Outstanding Resource Water? ***Information source*** Oregon Department of Environmental Quality. (As of 1996, DEQ has not made any such designations.)	a. Yes b. No c. Unknown			

		Wetland 1	Wetland 2	Wetland 3
Question 7 Is the wetland a protected area in a recognized federal, state or local management plan, e.g., for a park, refuge or scenic river? ***Information source*** Oregon Department of Fish and Wildlife, State Parks, U.S. Fish and Wildlife Service, Bonneville Power Administration, Bureau of Land Management, National Park Service, METRO, local parks department.	a. Yes b. No c. Unknown List name:			
Question 8 Is the wetland a *protected* mitigation site for a removal-fill permit, federal 404 fill permit, or enforcement action? Protected means there is a legal instrument, such as a conservation easement, that will preclude a wetland impact permit from being issued for this site. ***Information source*** Oregon Division of State Lands, Corps of Engineers, Environmental Protection Agency.	a. Yes b. No c. Unknown			
Question 9 Is the wetland a restoration or protected area included in the wetland reserve program administered by the Natural Resources Conservation Service? The length of protection may vary depending on landowner agreements. ***Information source*** Natural Resources Conservation Service, Consolidated Farm Services Agency.	a. Yes b. No c. Unknown			

Question 10

Is the wetland considered rare or unique in Oregon? Examples include bogs, vernal pools and old growth forested wetlands (See Appendix G).

a. Yes
b. No
c. Unknown

Information source

The Nature Conservancy, Oregon Division of State Lands, the Oregon Natural Heritage Program.

Wetland 1	Wetland 2	Wetland 3

Wetland Characterization

The Wetland Characterization is designed for information collection in a systematic manner. The Characterization is divided into a landscape section, for which all the information can be gathered in the office with appropriate maps and references (and maybe a few phone calls), and a site-specific section, which requires field observation and measurement. (*Questions that must be answered in the field are marked with a check.*) You may want to record the observation, not just the letter answer, when given the choice, because you might find the descriptive information useful later. Also, take some blank sheets of paper into the field for making sketches of the wetland area that you can refer to later. Another alternative is to put an overlay on an aerial photo and sketch and note information on the overlay. If done thoroughly, this should prevent you from having to return to the field or having to seek additional information when completing the assessment.

The information gathered is used to answer function and condition assessment questions (copies of these questions appear directly following the Characterization). The Characterization should not lead you to any conclusions; this will be done as the assessment sheets are completed.

What you need to take with you into the field:

- Clipboard
- Pencils (various colors for sketching)
- Blank paper to sketch on
- Long tape measure (200 feet if you have one), or measure your pace before going into the field
- Aerial photos (you may want to attach a mylar overlay to draw on)
- Ruler
- Base maps (optional or make copies)
- Binoculars (optional)

Watershed Notes

Watershed setting

All questions pertaining to the watershed can be answered in the office from aerial photographs, U.S. Geological Service topographical maps, and other reference materials. (See Appendix A.) The answers to these questions are used to give decision makers a broader understanding of ecological functions and land uses in the watershed. The answers are summarized on the Watershed Summary Sheet at the end of the Assessment Questions section.

Drainage basin

The Oregon Water Resources Department has divided the state into 18 drainage basins. Check the map in Appendix H to see which drainage basin contains the study site.

1. What is the name of the drainage basin that contains your assessment area?

Physical characteristics of the watershed being assessed (within the drainage basin)

Topography

2. What is the watershed's area in square miles? The watershed area is often much smaller than the drainage basin (see Appendix E).
3. Calculate the average slope of the watershed (see Appendix F).

Hydrologic profile

4. Is the stream flow in the watershed modified by dams, channelization or levees? (Choose all that are appropriate.)
   a. Tributary streams to the main stem stream are modified.
   b. Main stem stream is modified.
   c. Stream flow is not modified (free-flowing.)
5. Is water being taken out of the stream(s) through active diking, drainage or irrigation districts in the watershed upstream of the assessment area?
   a. Yes.
   b. No.

Watershed Notes

Land uses within the watershed

6. What is the dominant land use in the watershed upstream from the assessment area?
   a. Urban.
   b. Urbanizing (mix of urban, agriculture and forest uses).
   c. Agriculture (farming, ranching or grazing).
   d. Forested or natural area.

Water quality *(Use more specific water quality information, if available. Contact local DEQ office, or call the DEQ lab at (503) 229-5983 for sampling information.)*

7. Consult the most recent State of Oregon Department of Environmental Quality 305(b) Report to determine whether any streams in the study area are listed as a *water quality limited.* (You may want to ask DEQ whether there are any proposed changes.) This information is included in Clean Water Act section 303(d) reporting.
   a. Streams or portions of streams within the study area are listed as *water quality limited.*
   b. No streams or portions of streams within the study area are listed as *water quality limited.*

8. Consult the most recent *Oregon Statewide Assessment of Nonpoint Sources of Water Pollution* to determine the water quality condition of stream reaches in the watershed upstream from the assessment area. (If both "b" and "c" apply, choose "c.")
   a. All upstream reaches are listed as *no problem* (or no data available).
   b. One or more upstream reaches are listed in *moderate* water quality condition.
   c. One or more upstream reaches are listed in *severe* water quality condition.

Watershed Notes

Biological characteristics of the watershed

9. Fisheries: Select all that are appropriate and list type if known. (Contact local Oregon Department of Fish and Wildlife office for this information.)

Type

a. Cold water.
b. Warm water.
c. Anadromous.
d. Wild population.
e. Introduced or hatchery populations.
f. None.
g. Other (list).

10. Are known sensitive, threatened or endangered fish species present in the watershed? If so, list which species.

Species

a. Yes.
b. No.
c. Unknown.

11. Wildlife species: Select all that are appropriate and list species if known. (Contact local Oregon Department of Fish and Wildlife office for this information.)

Species

a. Migratory birds.
b. Big game.
c. Nesting birds.

12. Are known sensitive, threatened or endangered plant species or wildlife species other than fish present in the watershed? If so, list which species. (Contact local ODFW office or Natural Heritage Council for this information.)

Species

a. Yes.
b. No.
c. Unknown.

Watershed Notes

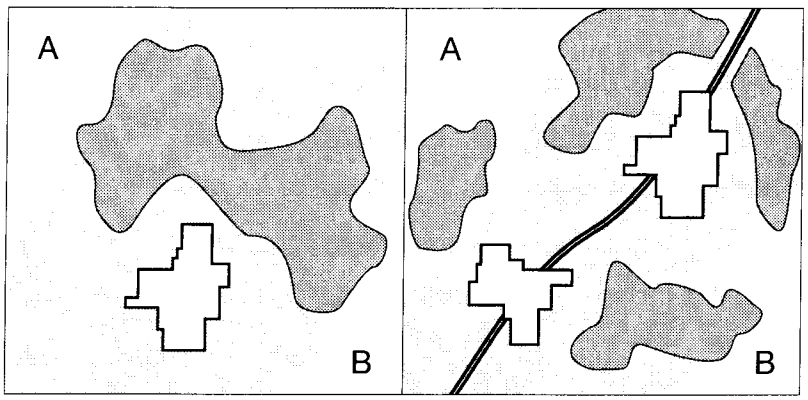


Figure 1. Watersheds as corridors for wildlife movement.
Areas A and B are the end points of a movement corridor through the watershed. Natural areas are shaded darkly, the irregular polygons represent highly developed areas, and the thick black line represents an impassable barrier such as an interstate highway. In the first part of the illustration, the contiguous natural area connects both ends of the corridor. The developed area is a barrier, but it does not obstruct species movement. The second half of the illustration shows fragmented natural areas with an impassable barrier. If the barrier stopped at the smaller developed area and did not continue off the lower left, species movement would still be possible.

13. Does the watershed provide a natural corridor for fish or wildlife movement? (Observe from aerial photographs.) **List whether for fish, wildlife or both.** Consider fences, dams and other barriers to travel. Aerial photographs of the watershed area are the best source of information. Fragmented systems have barriers to movement or a section where the natural area is broken by developed area.

    A corridor is a landscape feature that enables fish or wildlife species to travel between broad geographical areas. (See Figure 1.)

    a. There are contiguous natural areas that allow species movement, and if barriers exist, they do not stop animal or fish movement.
    b. The natural areas are fragmented, but species movement is still possible.
    c. The habitat system is fragmented, and there are barriers to species movement.

14. What are the landscape features at both ends of the movement corridor? (These may lie outside the assessment area.) From an aerial photo, observation or local knowledge, determine whether there are large natural areas at either end of the movement corridor. The natural area does not have to be a wetland.

    a. Large natural habitat areas are at both ends.
    b. One end has a natural habitat area and the other end is developed.
    c. Both ends are developed.

Watershed Notes

	Wetland 1	Wetland 2	Wetland 3

Individual wetland sites

Fill out this part of the characterization for each wetland in the assessment area. Some of the information can be gathered in the office; some must be gathered at the site. You may want to do a rough sketch of the site (doesn't have to be to scale) to refer to back in the office.

Wetland structure and relation to surrounding landscape

✓15. What percentage of the area within 500 feet of the wetland's edge is dedicated to the land uses listed below? (From overlay 2 or in the field.)

It is best to determine the land uses from a recent aerial photo. If an aerial photo is not available, measure 500 feet in the field to get an idea of distance to evaluate. Use the following ranges for your answers for each land-use category:

a. Less than 20%.
b. Between 20% and 50%.
c. Greater than 50%.

1. Open Space (includes natural areas, parks and developed recreation areas, but not land designated for Exclusive Forest Use).
2. Agriculture (pasture, cropped lands, orchards, range land).
3. Exclusive Forest Use lands.
4. Developed uses (residential, commercial or industrial—rural and urban).
5. Other (list).

✓16. What is the dominant existing land use within 500 feet of the wetland on the **downstream or down-slope edge** of the wetland? Use the same land-use categories as question 15.

17. What is the wetland's area in acres? (Measure the entire area of contiguous wetland, not just the portion within the assessment area. Use the dimensions of the wetland as outlined on the base map.)

a. Greater than 5 acres.
b. Between 0.5 acres and 5 acres.
c. Less than 0.5 acres.

✓ *Questions preceded by a check mark can be completed in the field.*

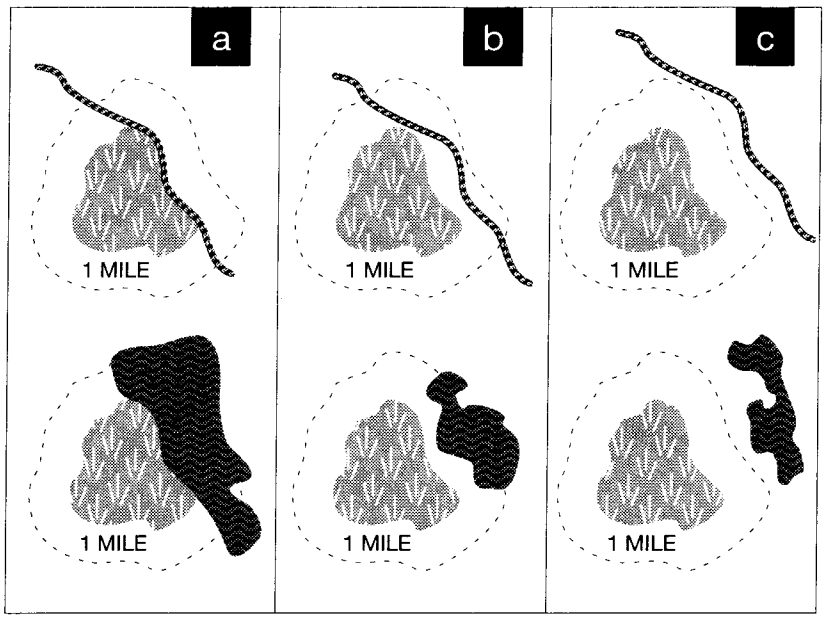


Figure 2. Connectivity to streams, lakes and ponds.
The lightly shaded area represents a wetland, the darkly shaded area represents a lake or pond and the dark line represents a stream. Part "a" shows the wetland connected to a stream, lake or pond, part "b" shows a stream, lake or pond within 1 mile but no surface connection, and part "c" shows no stream, lake or pond within 1 mile and no surface connection.

18. How is the wetland connected to another body of water, such as a stream, lake or pond? (See Figure 2.)
    a. The wetland is connected by surface water to another body of water. This may be by a culvert, irrigation ditch, intermittent stream or perennial stream.
    b. No surface-water connection exists to another body of water, but other bodies of water lie within 1 mile of the wetland.
    c. No surface-water connection exists to another body of water, and no other bodies of water lie within 1 mile of the wetland.

19. Is all or part of the wetland located within the 100-year floodplain (use floodplain maps to determine) or within an enclosed basin? An enclosed basin has no inlet or outlet.
    a. Yes.
    b. No.

Wetland 1	Wetland 2	Wetland 3

	Wetland 1	Wetland 2	Wetland 3
20. What percentage of the area within 500 feet of the wetland's edge is **zoned** for each of the land uses listed below?			

Use the following ranges for your answers:

a. Less than 20%
b. Between 20% and 50%
c. Greater than 50%.

1. Open Space (includes natural areas, parks and developed recreation areas, but not lands zoned for Exclusive Forest Use).
2. Agriculture (pasture, cropped lands, orchards, range land).
3. Exclusive Forest Use lands.
4. Developed uses (residential, commercial, industrial).
5. Other (list).

Wetland habitat

✓21. What percentage of the wetland's area is covered by the following Cowardin wetland classes? (Cowardin wetland classes refer to a classification of wetland type by vegetation cover. See Appendix D.) Only list those that compose 10% or more of the overall wetland.

The percentages can be estimated in the field or from aerial photographs. Use the following categories for your answers:

a. Between 70% and 100%.
b. 50% or more, but less than 70%.
c. 20% or more, but less than 50%.
d. 10% or more, but less than 20%.

1. Open water (deep water habitat, greater than or equal to 6.6 feet or 2 meters).
2. Emergent (includes floating aquatics—herbaceous plants that can tolerate flooding and living in wet soils).
3. Scrub-shrub (woody vegetation under 20 feet tall).
4. Forested (woody vegetation 20 feet or taller).

✓22. For urban areas, how many wetland plant species are present? (You need not list the species name.)

a. More than 5 plant species.
b. Between 2 and 5 plant species.
c. 1 plant species (monotypic).

✓23. What is the dominant wetland vegetation cover type?

a. Woody vegetation (forested and scrub-shrub).
b. Emergent vegetation and ponding, or open water only.
c. Emergent vegetation only or wet meadow.

	Wetland 1	Wetland 2	Wetland 3
✓24. Refer to the diagrams in Figure 3 and select the one that most closely resembles the interspersion of Cowardin wetland classes and, if present, upland inclusions. (An upland inclusion is an island or an upland area surrounded on three sides by wetland.).			

Wetlands composed of only one wetland class or with two wetland classes and a simple pattern have low interspersion. Wetland and upland complexes that have at least two wetland classes and a complex pattern have a moderate interspersion pattern. Wetlands with two or more wetland classes or upland inclusions with a complex pattern and lots of edge have a high interspersion pattern. If the wetland you are observing does not reflect any of the diagrams, use the above guidance to determine the complexity of the interspersion pattern and draw a sketch of the wetland.

a. High.
b. Moderate.
c. Low.

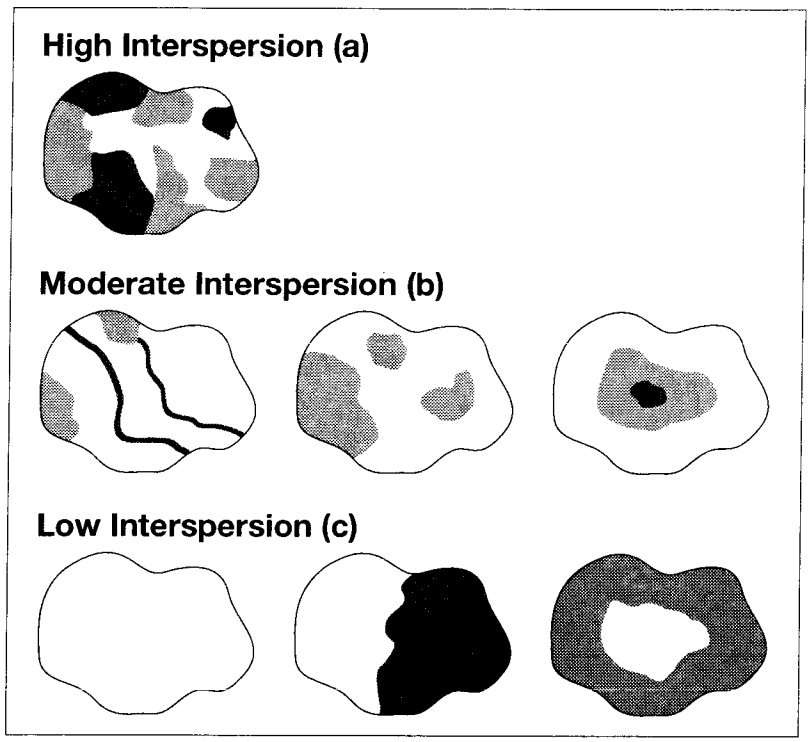


Figure 3. Interspersion of Cowardin classes and upland inclusions.

	Wetland 1	Wetland 2	Wetland 3
✓25. For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide? Brush, woodland, non-farmed agricultural land and range land are considered upland habitat for this question. Actively farmed lands are not considered wildlife habitat. (See Figure 4.) a. Greater than 40%. b. Between 10% and 40%. c. Less than 10%.			
✓26. For **urban areas:** What percentage of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide? A vegetative buffer consists of trees, bushes or vegetation that is not regularly mowed or farmed. (See Figure 5.) a. Greater than 40%. b. Between 10% and 40%. c. Less than 10%.			
27. How is the wetland connected to other wetlands? (Look at an aerial photo or map to determine this.) a. Connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, culvert, canal or lake. b. Not connected by surface waters, but other unconnected wetlands lie within a 3-mile radius. c. Not connected to other wetlands by surface waters, and no other unconnected wetlands lie within a 3-mile radius.			
28. Estimate the area of unvegetated, open water within the wetland. a. More than 3 acres. b. Greater than 1 acre, up to 3 acres. c. Between 0.5 acre and 1 acre. d. Less than 0.5 acre.			

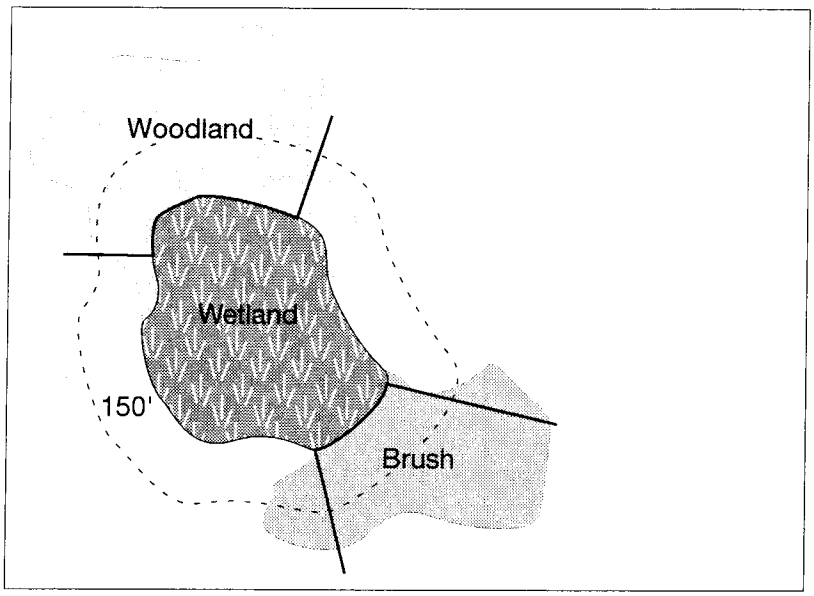


Figure 4. Percent of wetland edge bordered by upland habitat (for Question 25).
The dashed line delineates the area within 150 feet of the wetland; the "woodland" and "brush" areas are upland habitat; and the lines perpendicular to the wetland edge indicate where the upland habitat adjacent to the wetland habitat is at least 150 feet wide. The dark lines (portions of the wetland bordered by upland habitat at least 150 feet wide) make up roughly one-third (between 10% and 40%) of the wetland perimeter.

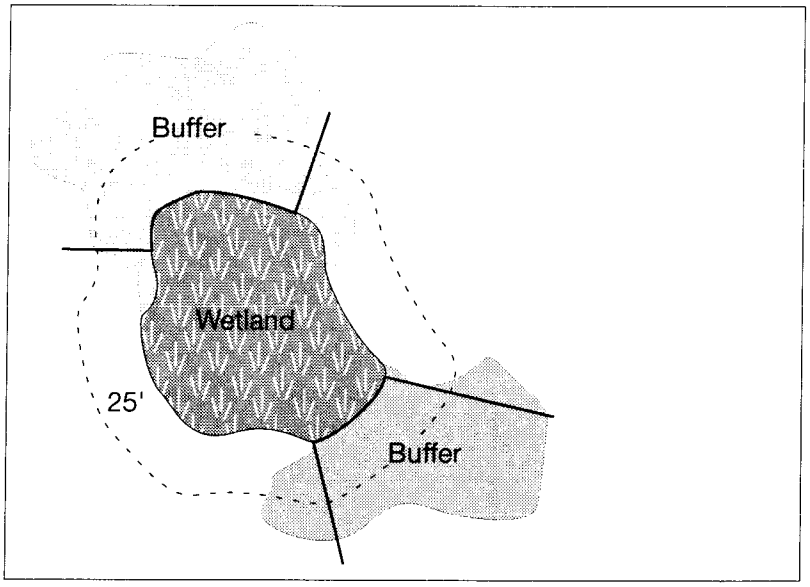


Figure 5. Percent of wetland edge bordered by vegetative buffer (for Question 26).
The dashed line delineates the area within 25 feet of the wetland; the vegetative buffer areas are labeled "buffer"; and the lines perpendicular to the wetland edge indicate where the vegetative buffer adjacent to the wetland habitat is at least 25 feet wide. The dark lines (portions of the wetland bordered by a vegetative buffer at least 25 feet wide) make up roughly one-third (between 10% and 40%) of the wetland perimeter.

Wetland 1	*Wetland 2*	*Wetland 3*

	Wetland 1	Wetland 2	Wetland 3

Fisheries habitat

29. Are fish present in a stream, lake or pond connected to the wetland.
    a. Salmon, trout or sensitive species are present at some time during the year.
    b. Species not covered in "a" are present at some time during the year.
    c. No species are present at any time during the year.

Streams connected to the wetland

Complete this section only if the wetland being assessed has an unimpeded surface water connection to a stream.

✓30. What is the physical character of the stream channel? To observe stream channel modifications, look for built rock banks, cement sides, straightened areas or other human-created features.
    a. The stream is in a natural channel, or modified portions of the stream are returning to a natural channel.
    b. Only portions of the stream are modified.
    c. The stream is extensively modified or confined in a non-vegetated channel or pipe.

✓31. What percentage of the stream is shaded by streamside (riparian) vegetation?
    a. Greater than 75%.
    b. Between 50 and 75%.
    c. 25% or more, but less than 50%.
    d. Less than 25%.

✓32. What percentage of the stream contains instream structures such as large woody debris, floating or submerged vegetation, large rocks or boulders?
    a. Greater than 25%.
    b. Between 10% and 25%.
    c. Less than 10%.

Lakes or ponds (entire lake or pond and wetland complex)

Complete this section only if the wetland being assessed has a surface water connection to a lake or pond.

33. Does the lake or pond contain areas of deep and shallow water? ("Deep" is defined as more than 6.5 feet deep.)
    a. Yes.
    b. Cannot be determined.
    c. No.

	Wetland 1	Wetland 2	Wetland 3
✓34. What percentage of the shoreline is shaded at the water's edge by forested or scrub-shrub vegetation? a. 60% or more. b. 20% or more, but less than 60%. c. Less than 20%.			
✓35. What percentage of the wetland complex contains cover objects such as submerged logs, floating or submerged vegetation, large rocks or boulders? a. Greater than 25% b. Between 10 and 25% c. Less than 10%			

Wetland hydrology

36. What is the wetland's **primary** source of water? (Determine in the field or in the office. This may be difficult to determine. If a surface water connection exists—stream, lake, ditch—use it as the primary source. If no surface water connection is present, talk to local natural resource people for hints.)
    a. Surface flow, including streams and ditches.
    b. Precipitation or sheet flow.
    c. Groundwater, including springs or seeps.

✓37. Is there evidence of flooding or ponding during a portion of the growing season? Look for evidence of water fluctuation such as sediment stains on trees, drift lines, surface scour or sediment deposits. Also look at the location of the wetland. Is it in a distinct topographic depression or adjacent to a stream that is known to flood or fluctuate because of storm pulses?
    a. Yes (describe).
    b. Unable to determine or not applicable.
    c. No.

✓38. Is water flow out of the wetland restricted (e.g., beaver dam, concrete structure, undersized culvert)?
    a. Yes, the outlet is restricted or the wetland has no outlet.
    b. Minor restrictions slow down the water (e.g., undersized culvert).
    c. No, the outlet has unrestricted flow.

	Wetland 1	Wetland 2	Wetland 3
✓39. If the primary source of water is surface flow, is the water flow into the wetland restricted? a. Flow is not restricted, or if blocked, the obstruction can be removed easily. b. Permanent blockage to the flow exists but may be breached or a new flow channel created (engineering or earth moving solution). c. Flow is restricted and cannot be restored.			
40. Has the stream flow or stream bank been modified by human activities less than 1 mile above the wetland? Modifications include dams, channelizations and levees, and confinement of the stream in a pipe. a. Yes. b. No.			
Public access to wetland site *(select an appropriate area to observe the wetland to answer these questions.)*			
41. Is the wetland site open to the public for direct access or observation? a. Yes, the wetland is open to the public. b. Yes, but wetland access is allowed only by permission of the landowner or managing entity. c. No, access is not allowed.			
✓42. Are there visible hazards to the public at the wetland site? (Examples: busy road adjacent to the site, and no buffer or sidewalk exists; steep embankment; and contaminated water.) a. No. b. One or two visible safety hazards exist (describe). c. More than two visible safety hazards exist (describe).			
✓43. Are there other natural landscape features, such as a stream, lake, pond, forest or agricultural land contiguous or adjacent to the wetland? a. Yes. (List type and extent.) b. No.			

	Wetland 1	Wetland 2	Wetland 3
✓44. Is there existing physical public access to features listed in Question 43? If not, can such access be created easily, or can other habitats be observed from the site? For a stream, pond or lake, access may require dry ground to the water's edge. Stream access could also be at a road crossing, but consider the safety at such locations a. Public access to other habitats exists or can be created easily. b. Public access doesn't exist and can't be created easily, but observation of other features can be made from the site. c. Public access doesn't exist and can't be created easily. In addition, observation of other features can't be made from the site.			
✓45. Does it appear that access to a viewing spot or wetland edge is available for individuals with limited mobility? (To see whether the site meets ADA requirements, a more thorough examination should be done.) a. Yes. b. No. (List physical barriers.)			
✓46. Is there a public access point within 250 feet of the wetland's edge? Access points include parking lots, transit stops, bike lanes, trails and water courses. Maintained means that the area is designated as a car or transit area by the managing entity. Unmaintained would be a road pull-off or other area that people use but is not designated for such use. Describe the type of access. a. Yes, a maintained access point exists (describe). b. Yes, an unmaintained access point exists (describe). c. No access point exists, or the access point is hazardous.			
Recreation			
✓47. Is the wetland accessible by boat? a. Boat launching areas or access points exist on site or within 1/2 mile on a connected lake, river, bay or other body of water. b. Potential to develop boat launching areas or access points exists, or such features are more than 1/2 mile but less than 1 mile from the wetland. c. No boat launching areas or access points exist within 1 mile of the wetland, and potential to develop launching areas or access points is limited.			

	Wetland 1	Wetland 2	Wetland 3
✓48. Are there trails, viewing areas or other structures that guide user movement to a particular area or areas in or around the wetland? a. Yes, developed or maintained trails or viewing areas exist. b. Yes, undeveloped trails or viewing areas exist that do not disrupt wildlife or plant habitat. c. No trails or viewing areas exist, or those that do disrupt wildlife or plant habitat.			
49. Is fishing allowed at the wetland or connected water body? (Contact local Oregon Department of Fish and Wildlife office.) Answer "not applicable" if question 18 was answered "b" or "c," unless question 21 indicates that 10% or more of the wetland's area is covered by open water. a. Yes (either all or part of the year). b. No. c. Not applicable.			
50. Is hunting allowed at the wetland? (If the wetland is within the city limits, hunting is not allowed. Otherwise, contact the local Oregon Department of Fish and Wildlife office for this information.) a. Yes (either all or part of the year). b. No.			

Aesthetics

✓51. For **rural areas**, what is the extent of visual contrast with the surrounding landscape? (See Figure 6.) a. Significant contrast with surrounding landscape. b. Limited contrast with surrounding landscape. c. Little or no contrast with surrounding landscape.			
✓52. For **urban areas,** what is the visual character of the surrounding area? (See Figure 7.) a. Open space or naturally landscaped areas. b. Areas landscaped or manipulated by people. c. Developed with no landscaping.			
✓53. Are there visual detractors at the wetland site such as abandoned cars, litter, shopping carts or other objects that distract the viewer from the wetland? a. Yes. b. No.			
✓54. If the wetland contains visual detractors, as indicated in question 53, can they be removed easily? a. Yes. b. No.			

Locate the primary viewing area(s) for the following four questions (be sure to indicate the location on the overlay).

✓55. What odors are present at the primary viewing location(s)?

a. Natural, pleasant odors only.

b. Unpleasant odors such as automobile exhaust or stench from a sewage treatment plant are present at certain times.

c. Unpleasant odors are distinct and continuously present.

	Wetland 1	*Wetland 2*	*Wetland 3*

Figure 6. Visual contrast.
The top part of the figure shows a wetland with significant visual contrast with the surrounding landscape. The bottom part shows a wetland with little or no visual contrast with the surrounding landscape.

	Wetland 1	Wetland 2	Wetland 3
✓56. What noises are audible at the primary viewing location(s)? a. Bird and wildlife noises and other naturally occurring sounds. b. Some traffic and other similar background sounds are audible in addition to naturally occurring sounds. c. Continuous traffic or other intrusive noise is audible in addition to naturally occurring sounds. d. Continuous traffic or other intrusive noise is audible, but no naturally occurring sounds are.			
✓57. How much of the wetland is visible from the viewing area(s)? Describe the view. a. Greater than 50%. b. Between 25% and 50%. c. Less than 25%.			
✓58. How many Cowardin classes are visible from the primary viewing area(s)? (See question 21 for list of Cowardin classes to use.) a. More than two. b. Two c. One			

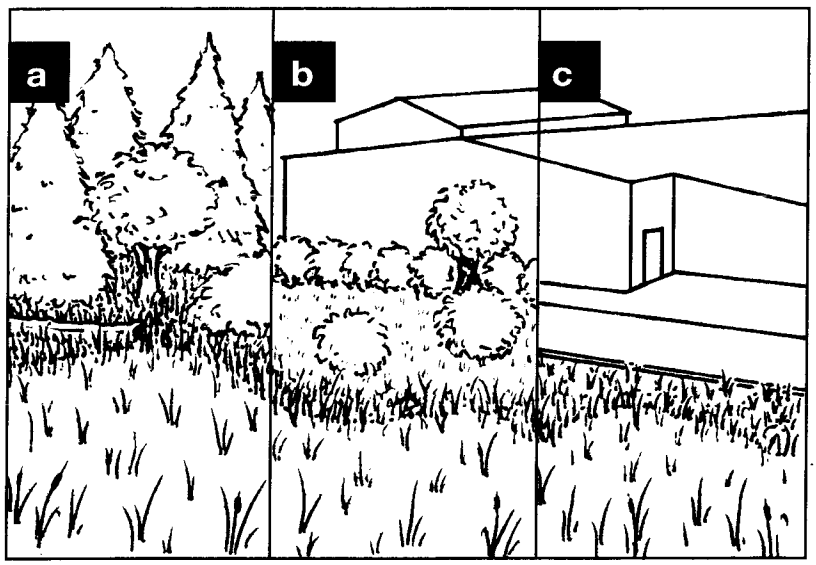


Figure 7. Visual character of urban wetlands.
Beginning with the left part, this figure shows an urban wetland with naturally landscaped areas, areas landscaped by people and with unlandscaped developed areas.

Function & condition assessment questions

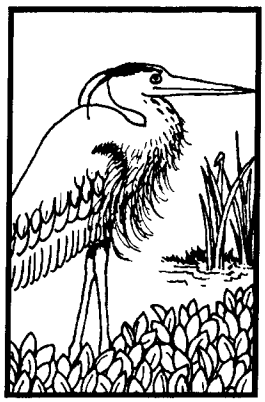
This chapter includes a set of **assessment questions** for each of the nine functions and conditions evaluated using the Oregon Method.

Listed after each assessment question you will find **directions** explaining which questions from the Wetland Characterization you should refer to when determining your answer. Some of the questions are followed by examples.

Then, following the directions for each question, is a **rationale** paragraph that explains the importance of the information you are asked to gather.

Duplicates of all question sets—without the rationales—appear in Appendix C. *Once you are familiar with the directions and rationale for each question, detach the appendix and photocopy it for use in the field.* This will reduce the possibility of losing portions of the main document.

At the end of the chapter (and in Appendix C) is an **answer sheet**, where you can enter your responses to all assessment questions, as well as a **function and condition summary sheet,** where you can enter the results of the assessment criteria for each function and condition and where you can write an overall description of a wetland's functions and conditions. The **watershed summary sheet** is also included at the end of this chapter.



Wildlife habitat

Notes

Wetlands provide habitat for many wildlife species. A single wetland often cannot satisfy all requirements for wildlife use, so its proximity to other bodies of water or upland areas is important. Buffers and corridors are also essential for this reason, and they reduce human disturbance as well. Many species also have special habitat requirements: Good water quality is necessary for amphibians and mammals; structural diversity is important for birds; and a combination of open water and grazing areas is important for waterfowl.

For this assessment, **urban wetlands are those within urban growth boundaries or urban or rural service areas.** Because of the impacts of human activities, urban wetlands may not satisfy as many habitat requirements as wetlands in undeveloped areas. This should not be interpreted to mean that urban wetlands have limited value for all wildlife. The importance of an urban wetland may be increased because of its location and surroundings.

Assessment questions

Question 1

How many Cowardin wetland classes are present?

Directions

See question 21 in the Wetland Characterization. Count only those Cowardin classes for which you answered "a," "b" or "c." For urban areas, also consider the mix of species (Question 22 in the Wetland Characterization.)

Rural areas:

a. Three or four.

b. Two.

c. One.

Urban areas:

a. Two or more.

b. One class with more than five plant species.

c. One class with five or fewer plant species.

Rationale

In Northwest wetlands, vegetation is the most important component of wildlife habitat. It is widely recognized that plant community diversity increases animal community diversity. The existence of two Cowardin classes adjacent to each other may also improve wildlife habitat value because some wetland wildlife species use the edge between plant communities. ("Edge" describes the border between vegetation types or between a vegetation type and open water.)

Structural diversity is also important. If several layers of vegetation are present, more diverse habitat types are provided. (Different birds nest in different layers.) In addition, the number of layers affects the amount of natural debris, which is necessary for amphibians and other wildlife.

Question 2

What is the dominant wetland vegetation cover type?

a. Woody vegetation.
b. Emergent vegetation and ponding, or open water only.
c. Emergent vegetation or wet meadow.

Directions

See question 23 in the Wetland Characterization.

Rationale

Wooded and shrub wetlands provide habitat for the largest overall species assemblages. Emergent wetlands associated with open water are also an essential habitat for a large number of wetland species, particularly waterfowl, amphibians and wading birds. Emergent wetlands without open water provide habitat for wetland species to a lesser degree.

Question 3

What is the degree of Cowardin class interspersion for the wetland being observed?

a. High.
b. Moderate.
c. Low.

Directions

See question 24 in the Wetland Characterization.

Rationale

Interspersion occurs when two or more wetland types or upland inclusions create a mosaic or pattern. In a wetland composed of approximately concentric bands of vegetation, such as cattails ringed by shrubs, interspersion is low. At the opposite extreme, small patches of shrubs scattered throughout an emergent marsh represent a high degree of interspersion.

When two or more vegetation types are highly interspersed, a great deal of edge is created. Edge is important because many wildlife species are edge dwellers. Generally, the greater the edge, the greater the diversity of wildlife.

Notes

Question 4

If the wetland contains unvegetated open water, how many acres of unvegetated open water are present?

Directions

See question 28 in the Wetland Characterization.

Rural areas:

a. More than 3 acres .

b. Between 0.5 and 3 acres.

c. Less than 0.5 acres.

Urban areas:

a. More than 1 acre.

b. Between 0.5 and 1 acre.

c. Less than 0.5 acres.

Rationale

Open water is essential to a number of wetland wildlife species, including waterfowl, wading birds, amphibians and some reptiles.

Question 5

How is the wetland connected to another body of water, such as a stream, lake or pond?

Directions

See question 18 in the Wetland Characterization.

a. The wetland is connected by surface water to another body of water.

b. No surface water connection exists to another body of water, but other bodies of water lie within 1 mile of the wetland.

c. No surface-water connection exists to another body of water, and no other bodies of water lie within 1 mile of the wetland.

Rationale

Wetland wildlife species will often use surface water to travel between a wetland and deep water. Also, water must be available during critical phases for the wildlife that use it. Water available during the nesting season is more valuable to wildlife than water available only during the winter.

Notes

Question 6 *(for Western OR only)*

How is the wetland connected to other wetlands?

Directions

See question 27 in the Wetland Characterization.

a. Connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, culvert, canal or lake.
b. Not connected by surface waters, but other unconnected wetlands lie within a 3-mile radius.
c. Not connected to other wetlands by surface waters, and no other unconnected wetlands lie within a 3-mile radius.

Rationale

Proximity to other wetlands increases a wetland's utility as habitat. Nearby wetlands sometimes contain features absent from the assessment wetland. For example, birds such as the great blue heron may roost near one wetland but travel to another to fish if the wetland where they roost doesn't have an ample supply of fish.

This criterion applies only in western Oregon. Because of the dry climate in eastern Oregon, isolated wetlands provide important habitat to both local and migratory species.

Question 7

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

a. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Rationale

Poor water quality can harm many terrestrial and aquatic species. The character of a wetland ecosystem can change when exposed to nutrients and other chemicals beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies, which in turn can cause a change in the species composition of both plant and animal communities. Studies in Washington and elsewhere have indicated that amphibians are especially sensitive to water quality.

Notes

Question 8

What is the dominant existing land use within 500 feet of the wetland's edge?

a. Exclusive Forest Use or Open Space.
b. Agriculture.
c. Developed uses.

Directions

See question 15 in the Wetland Characterization. If the responses you gave to question 15 in the Characterization indicate that two or more land-use categories are equally dominant, pick the one that will yield the lowest letter response for this question. (Example: In question 15 of the Wetland Characterization, you responded "b. Between 20% and 50%" to both *Exclusive Forest Use lands* and *developed uses,* and the remainder of your responses to question 15 were "a. Less than 20%." For this Wildlife Habitat question, you would respond "a..Exclusive Forest Use or Open Space.")

Rationale

Wildlife habitat generally deteriorates as land use changes from forested land to agricultural land to urban land. Certain game species, such as deer and some waterfowl, may benefit from land clearing. However, the majority of wildlife species are affected adversely when the land is developed because of fencing, lighting and loss of habitat.

Notes

Notes

Question 9a

For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide?

a. Greater than 40%.
b. Between 10% and 40%.
c. Less than 10%.

Question 9b

For **urban areas:** What percent of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide?

a. Greater than 40%.
b. Between 10 and 40%.
c. Less than 10%.

Directions

For rural areas, see question 25 in the Wetland Characterization. For urban areas, see question 26 in the Wetland Characterization.

Rationale

A buffer zone, an uncut or undisturbed area of vegetation providing wildlife cover, increases a wetland's wildlife habitat potential. It provides habitat for both upland animals and wetland dependent species that require upland habitat for parts of their life cycle. A buffer zone also decreases the impacts of disturbance on the wetland. This is particularly important for nesting birds, which may be disturbed by people and household pets.

Well-vegetated buffer areas and corridors are particularly significant in urban areas because of their beneficial effect on water quality as well as their value for wildlife.

Wildlife habitat: assessment criteria

The wetland provides diverse wildlife habitat if:	At least four questions are answered "a," and no more than one is answered "c."
The wetland provides habitat for some wildlife species if:	Answers do not satisfy the above- or below-listed criteria.
The wetland's wildlife habitat function is lost or not present if:	All questions are answered "c."

Fish habitat

Notes

This index assesses the contribution of wetlands connected to streams, rivers, lakes or ponds to fish habitat. **or this index, "connected to" implies a surface-water connection.** The assessment should be done on the reach of the stream or on a section of lake that actually borders the wetland or is contained within the wetland.

A stream is defined as a waterbody with a distinct channel and flow. Examples include sloughs, perennial streams and intermittent streams. If dikes or berms have been built on the stream banks between the stream and wetland that do not allow continual exchange of surface water, do not complete this index. If both a stream and lake are present, choose the one with the longest wetland surface connection.

Wetlands that contribute to habitat for fish include areas with dense, overhanging vegetation. This vegetation provides shade, cover and food sources to related waterways and lakes. Wetlands also provide spawning, rearing and resting opportunities for fish. However, a wetland need not actually contain fish to contribute to fish habitat because wetlands may perform important functions for fish-bearing waters downstream.

The assessment of fish habitat is divided into two parts. Part A evaluates the wetland habitat connected to rivers and streams. If there is no stream or river associated with the wetland, then leave Part A out of the assessment. Part B evaluates the wetland habitat connected to ponds (water greater than 6 feet deep) and lakes. If there is no lake or pond connected to the wetland, then leave Part B out of the assessment. If no stream, river, pond or lake is connected to the wetland, then leave this index out of the assessment altogether.

Notes

Assessment questions: Part A—streams

Question 1

What percentage of the stream is shaded by stream-side (riparian) vegetation?

Directions

See question 31 in the Wetland Characterization.

Western Oregon:

a. More than 75%.

b. Between 50% and 75%.

c. Less than 50%.

Eastern Oregon:

a. 50% or more.

b. 25% or more, but less than 50%.

c. Less than 25%.

Rationale

Many Oregon streams are unsuitable for anadromous and resident fish because riparian vegetation has been cleared. High water temperatures that result from removal of stream-side vegetation can make a stream unsuitable for some fish species. Salmonids and some resident fish are particularly susceptible to elevated water temperatures. The amount and type of stream-bank cover also affects the amount of large woody debris in the stream or river system. In addition, stream-bank vegetation provides habitat for insects, an important food source for salmonids.

Question 2

What is the physical character of the stream channel?

Directions

See question 30 in the Wetland Characterization.

a. The stream is in a natural channel, or modified portions of the stream are returning to a natural channel.

b. Only portions of the stream channel are modified.

c. The stream is extensively modified or confined in a non-vegetated channel or pipe.

Rationale

Although the species or age composition of low- and high-gradient streams is different, both can provide habitat for fish. Artificially channelized or extensively modified streams, however, usually do not provide fish habitat as well as natural stream channels.

Notes

Question 3

What percentage of the entire stream contains instream structures such as large woody debris, floating submerged vegetation, large rocks or boulders?

a. More than 25%.
b. Between 10% and 25%.
c. Less than 10%.

Directions

See question 32 in the Wetland Characterization.

Rationale

Cover is essential for good fish habitat. It provides refuge from predators and serves as substrate for insect larva, which are a good food source for some fish species. The presence of large pieces of woody material in pools is essential for providing adequate winter habitat for salmonid species. In addition, large pieces of woody material contribute to bank stability, dissipate energy, generate pool formation and encourage meandering. The breakdown of this material is also important in the nutrient cycle of the stream or river.

Question 4

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

a. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

Rationale

Poor water quality can harm many aquatic species. The whole character of a wetland ecosystem can change when it is exposed to nutrients and other chemicals beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies, which in turn can cause a species composition change in both plant and animal communities.

Question 5

What is the dominant existing land use within 500 feet of the wetland's edge?

a. Exclusive Forest Use or Open Space.
b. Agriculture.
c. Developed uses.

Directions

Refer to the directions for question 8 of the wildlife habitat assessment questions.

Rationale

Fish habitat generally deteriorates as land use becomes more intensive, e.g., changes from forested land to agricultural land (including rangeland) to urban land. The change in intensity often changes the structure of the habitat and increases runoff, pollutant loading and sedimentation.

Question 6

Are fish present in a stream, lake or pond associated with the wetland?

a. Salmon, trout or sensitive species are present at some time during the year.
b. Species not covered in "a" are present at some time during the year.
c. No species are present at any time during the year.

Directions

See question 29 in the Wetland Characterization.

Rationale

The potential for a wetland to benefit fish is directly related to the presence of fish in the stream or river reach within or adjacent to the wetland.

Part B—lakes and ponds

Question 1

Does the lake or pond contain areas of both deep and shallow water?

a. Yes.
b. Cannot be determined.
c. No.

Directions

See question 33 in the Wetland Characterization.

Rationale

The depth of the pond or lake is important for spawning and may be important for rearing. A mixture of shallow, medium and deeper water is optimum to provide different habitat types.

Notes

Notes

Question 2

What percentage of the wetland complex contains cover objects such as submerged logs, floating or submerged vegetation, large rocks or boulders?

a. More than 25%.
b. Between 10% and 25%.
c. Less than 10%.

Directions

See question 35 in the Wetland Characterization.

Rationale

Cover is essential for good fish habitat. It provides refuge from predators and serves as substrate for insect larva, which are a food source for some fish species. The presence of large pieces of woody material in wetlands is essential for providing adequate winter habitat for salmonid species. In addition, large pieces of woody material contribute to bank stability and dissipate energy. The breakdown of this material is also important in the nutrient cycle of the pond or lake.

Question 3

What percentage of the shoreline is shaded at the water's edge by forested or scrub-shrub vegetation?

a. 60% or more.
b. 20% or more, but less than 60%.
c. Less than 20%.

Directions

See question 34 in the Wetland Characterization.

Rationale

Shoreline cover provides shading, which moderates water temperature in lakes and ponds. High water temperatures that result from removal of lake-side vegetation can make a lake unsuitable for some fish species. Shoreline vegetation also provides food, large pieces of woody debris and cover from predators. Woodland and scrubland vegetation provides more shading than herbaceous vegetation.

Question 4

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

a. No upstream or adjacent reaches are listed as *water quality limited*, and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Rationale

See Part A question 4.

Question 5

What is the dominant existing land use within 500 feet of the wetland's edge?

Directions

Refer to the directions for question 8 of the wildlife habitat assessment questions.

a. Exclusive Forest Use or Open Space.
b. Agriculture.
c. Developed uses.

Rationale

See Part A question 5.

Question 6

Are fish in a stream, lake or pond associated with the wetland?

Directions

See question 29 in the Wetland Characterization.

a. Salmon, trout or sensitive species are present at some time during the year.
b. Species not covered in "a" are present at some time during the year.
c. No species are present at any time during the year.

Rationale

The potential for a wetland to benefit fish is directly related to the presence of fish in the pond or lake.

Notes

Fish habitat: assessment criteria

The wetland's fish habitat function is intact if:	Any three questions are answered "a," and no more than one is answered "c."
The wetland's fish habitat function is impacted or degraded if:	Answers do not satisfy the above- or below-listed criteria.
The wetland's fish habitat function is lost or not present if:	All questions are answered "c."

Notes

Water quality
(pollutant removal)

Notes

Sediment trapping

During periods of heavy rainfall, water runoff may cause erosion and increase solids suspended in receiving surface waters. The excess sediment entering water systems can damage aquatic ecosystems. For example, sediment accumulation in stream bottoms can smother spawning areas and kill aquatic insect larvae. It can also reduce the storage capacity of downstream water supply reservoirs.

Wetlands perform an important function by trapping sediment from waters that pass through them. As water flows through wetlands, it is slowed by vegetation, and sediment settles to the bottom before the water moves farther downstream. As much as 90% of the solids suspended in the water may be removed as the water moves through wetlands, resulting in cleaner water entering streams, rivers, lakes and estuaries.

Nutrient attenuation

Nitrogen and phosphorus are the two nutrients most often associated with water pollution. They are also main ingredients of fertilizers used on agricultural fields and lawns, and both are found in high concentrations in discharges from sewage treatment plants and livestock operations. Excessive amounts of nitrogen and phosphorus in lakes and slow-moving streams can cause algal blooms and subsequent oxygen deficiencies, which may kill fish and reduce water quality. The processes that occur as a result of excess nutrients are lumped together under the term "eutrophication." Within limits, wetlands can reduce nutrient levels so that the effects of eutrophication on downstream areas are prevented or reduced. This index considers only point and non-point pollutant sources that are due to land uses in the watershed.

Assessment questions

Question 1

What is the wetland's primary source of water?

a. Surface flow, including streams and ditches.
b. Precipitation or sheet flow.
c. Groundwater, including seeps and springs.

Directions

See question 36 in the Wetland Characterization.

Rationale

Wetlands bordering a perennial or intermittent stream or lake are areas into which floodwaters spread during periods of high runoff, enabling the wetlands to remove pollutants.

Question 2

Is there evidence of flooding or ponding during a portion of the growing season?

a. Yes.
b. Unable to determine or not applicable.
c. No.

Directions

See question 37 in the Wetland Characterization.

Rationale

Water level fluctuation in the wetland indicates the ability to retain water. Impounded or standing water acts as a sediment trap because it greatly slows the flow of the incoming water, allowing suspended solids to settle out. Additionally, the slower velocity increases the contact time of the water with vegetation, resulting in uptake of nutrients by the vegetation. These actions function to reduce pollutant loads.

Question 3

What is the degree of wetland vegetation cover?

a. High (greater than 60%).
b. Moderate (approximately 60%).
c. Low (less than 60%).

Directions

See question 21 in the Wetland Characterization. Add the lower end of the ranges for forest, scrub-shrub and emergent vegetation to get the result. If the result is 60% or more, answer "high." If the result is 60%, answer "moderate." Answer "low" for other results.

Rationale

The more dense the vegetation, the greater the wetland's ability to take up nutrients. A dense stand of persistent emergent plants (such as cattail and rush) along with floating and submerged aquatics would tend to provide maximum nutrient uptake during the growing season. Wooded and scrub-shrub wetlands remove nutrients mainly through settling of suspended solids in runoff and flood waters.

Notes

Question 4

What is the wetland's area in acres?

a. More than 5 acres.
b. Between 0.5 acres and 5 acres; or wetland area is less than 0.5 acres, and the wetland is connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, canal or lake.
c. Less than 0.5 acres, and the wetland is not connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, canal or lake.

Directions

See questions 17 and 27 in the Wetland Characterization.

Rationale

The larger the wetland, the greater its capacity and ability to filter pollutants. Small wetlands connected by surface water act as a series of filters and thus function similarly to a larger wetland.

Question 5

What is the dominant, existing land use within 500 feet of the wetland's edge?

a. Developed uses.
b. Agriculture.
c. Exclusive Forest Use or Open Space.

Directions

Refer to the directions for question 8 of the wildlife habitat assessment questions.

Rationale

Urbanized areas have more impervious surface areas and concentrate pollution sources. Wetlands in urban areas are important for filtering the runoff water before it enters a stream.

Notes

Question 6

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

a. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.

c. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.

Rationale

A watershed with upstream pollutant loading sources needs wetlands to reduce pollutant levels in water before it is delivered downstream.

Water quality: assessment criteria

A wetland's water-quality function is intact if:	Question 1 is answered "a" or "b," questions 2 and 3 are answered "a," and any other question is answered "a" or "b."
A wetland's water-quality function is impacted or degraded if:	Answers do not satisfy the above- or below-listed criteria.
A wetland's water-quality function is lost or not present if:	Four out of six questions are answered "c."

Notes

Hydrologic control
(flood control & water supply)

Notes

Wetlands function as natural water-storage areas during periods of high runoff and stream flooding. At times they act as flood regulators by holding floodwater then slowly releasing it downstream. This temporary storage reduces the amount of water downstream during floods, thereby reducing peak flows. Through this flood storage mechanism, wetlands associated with tributaries of streams or rivers can prevent water from all tributaries reaching the stream or river at the same time (this is called desynchronization). Wetlands can also act as floodwater "brakes." For example, water flowing through riverine wetlands during floods is slowed by trees, shrubs, reeds, rushes and other wetland vegetation. Wetlands acting as brakes can reduce flood peaks and thereby reduce flood damage, bank and bed erosion, and other adverse effects caused by fast moving water.

Wetlands also have long-term water holding abilities. Wetlands may store water for longer periods, sometimes for months. The slow draining of these wetlands to surface water or ground water as the water level in the wetland recedes may contribute to maintenance of baseflows in streams hydrologically connected to the wetland. The ability of this long-term water storage to maintain stream flows is called "flow conservation."

Assessment questions

Question 1

Is all or part of the wetland located within the 100-year floodplain or within an enclosed basin?

a. Yes.
b. No.

Directions

See question 19 in the Wetland Characterization.

Rationale

Wetlands located within a floodplain or enclosed basin have a greater opportunity to receive and store water from surface flows and to release it slowly downstream or into the groundwater.

Question 2

Is there evidence of flooding or ponding during a portion of the growing season?

a. Yes.
b. Unable to determine or not applicable.
c. No.

Directions

See question 37 in the Wetland Characterization.

Rationale

Water marks are valid indicators of seasonal and episodic stage fluctuations in wetlands and, as such, are strong indicators of storage function.

Question 3

What is the wetland's area in acres?

a. More than 5 acres.
b. Between .5 acres and 5 acres.
c. Less than .5 acres.

Directions

See question 17 in the Wetland Characterization.

Rationale

Generally, the larger the wetland, the greater its ability to store and attenuate flood flows.

Question 4

Is waterflow out of the wetland restricted (e.g., beaver dam, concrete structure, undersized culvert)?

a. Yes, the outlet is restricted or the wetland has no outlet.
b. Minor restrictions slow down the water (i.e., undersized culvert.)
c. No, the outlet has unrestricted flow.

Directions

See question 38 in the Wetland Characterization.

Rationale

Wetlands with no outlets or with restricted or controlled outlets generally will store greater amounts of water than wetlands with unrestricted flow outlets. Also, the wetland can store water for slower release into the water system.

Notes

Notes

Question 5

What is the dominant wetland vegetation cover type?

a. Woody vegetation.
b. Emergent vegetation and ponding, or open water only.
c. Emergent vegetation or wet meadow.

Directions

See question 23 in the Wetland Characterization.

Rationale

Densely vegetated wetlands with vegetation greater than 6 feet tall are better able to control flood flows than wetlands dominated by open water or low growing vegetation, which generally offers little resistance.

Question 6

What is the dominant existing land use, within 500 feet of the wetland on the downstream or down-slope edge of the wetland?

a. Developed uses.
b. Agriculture.
c. Exclusive Forest Use and Open Space.

Directions

See question 16 in the Wetland Characterization.

Rationale

If the wetland is upstream from developed areas, its ability to control floods becomes more important.

Question 7

What is the dominant land use in the watershed upstream from the assessment area?

a. Urban or urbanizing.
b. Agriculture.
c. Forested or natural area.

Directions

See question 6 in the Wetland Characterization.

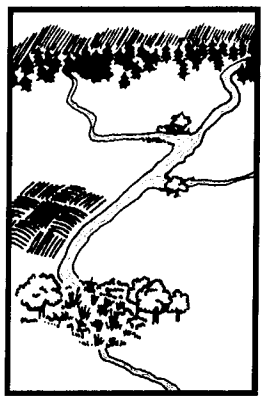
Rationale

Runoff volume is directly related to the level of development in the watershed: The more development, the more runoff. The opportunity for the wetland to provide flood control and flow conservation to a community is greater where runoff is greater.

Hydrologic control: assessment criteria

A wetland's hydrologic control function is intact if:	Four or more questions are answered "a."
A wetland's hydrologic control function is is impacted or degraded if:	Answers do not satisify the above- or below-listed criteria.
A wetland's hydrologic control function is lost or not present if:	Four or more questions are answered "c."

Notes



Sensitivity to future impacts

Notes

The wetland's ability to provide ecological function depends on its condition. If past environmental impacts have affected its ability to sustain itself, then its ability to recover from future impacts is diminished. Factors such as vegetation type contribute to a wetland's sensitivity. Forested wetland types, for example, are considered particularly sensitive because their vegetation structure is complex and slow to recover once disturbed. Also, a wetland is considered sensitive to impact if the quantity and quality of its water supply has been altered or degraded and if the intensity of adjacent land use suggests that the impairment is permanent. Under such circumstances, the wetland will have lost some of its natural capacity to recover from impacts. Small, incremental impacts to sensitive wetlands can cause broader, secondary effects throughout the wetland system. A wetland's resilience depends on whether adverse effects caused by future impacts will be localized or will spread throughout the wetland and beyond into other ecosystems. The sensitivity to impact index is an indication of risk to the wetland because of future changes in the watershed and land surrounding it. The index gives an indication to decision makers of the future conditions of the wetland if planned activities develop.

Assessment questions

Question 1

Has the stream flow or stream bank been modified by human activities less than 1 mile above the wetland, or is the wetland isolated?

a. Yes.
b. No.

Directions

See questions 27 and 40 in the Wetland Characterization. A wetland is considered isolated if the answer to question 27 in the Wetland Characterization is "b" or "c."

Rationale

Wetlands located in areas where natural hydrologic conditions exist are more resilient than wetlands located in altered settings. Control structures such as dams can divert water toward or away from wetland ecosystems. Because plant growth and decomposition and other processes operating within wetlands are controlled in part by the water supply, changes in water distribution can disrupt ecosystem processes and reduce the wetland's capacity to recover from impact.

Question 2

Is water being taken out of the stream(s) through active diking, drainage or irrigation districts upstream of the assessment area, or is the wetland isolated?

a. Yes
b. No

Directions

See questions 5 and 27 in the Wetland Characterization. A wetland is considered isolated if the answer to question 27 in the Wetland Characterization is "b" or "c."

Rationale

Wetlands located in areas with natural hydrologic conditions are more resilient than wetlands located in areas where water is being removed from the active stream channel for other purposes. In areas where active draining, diking or irrigation districts exist, the amount of water available to replenish the wetland is limited, and this reduces the wetland's capacity to recover from impact.

Question 3

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

a. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. No upstream or adjacent reaches are listed as *water quality limited*, and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

Rationale

Ecosystem processes like nutrient cycling are controlled in part by the chemistry of water entering the system. Changes in water quality beyond a wetland's ability to adjust can disrupt ecosystem processes and threaten the wetland's existence.

Notes

Notes

Question 4

What is the dominant, existing land use within 500 feet of the wetland's edge?

a. Developed uses.
b. Agriculture.
c. Exclusive Forest Use or Open Space.

Directions

Refer to question 8 of the wildlife habitat assessment questions.

Rationale

The intensity of human-caused impacts to a wetland affects the wetland's capacity to absorb and withstand those impacts. Land use is an approximation of a wetland's exposure to disturbance.

Question 5

What is the dominant zoned land use within 500 feet of the wetland's edge?

a. Developed uses.
b. Agriculture.
c. Exclusive Forest Use or Open Space.

Directions

See question 20 in the Wetland Characterization. If the responses you gave to question 20 in the Characterization indicate that two or more zoned land-use categories are equally dominant, pick the one that will yield the lowest letter response for this question. (Example: In question 20 of the Wetland Characterization, you responded "b. Between 20% and 50%" to both *Exclusive Forest Use lands* and *developed uses*, and the remainder of your responses to question 15 were "a. Less than 20%." For this Sensitivity to Impact question, you would respond "a. Developed uses.")

Rationale

The duration of human-caused disturbance to a wetland also affects its capacity to absorb and withstand new or additional impacts. Zoned land-use is an approximation of the wetland's future exposure to disturbance.

Question 6

What is the dominant wetland vegetation cover type?

Directions

See question 23 in the Wetland Characterization.

a. Woody vegetation.
b. Emergent vegetation only or wet meadow.
c. Emergent vegetation and ponding, or open water only.

Rationale

The capacity of an individual type of wetland to recover from disturbance is controlled by its community structure. Woody communities exhibit higher structure and are less resilient because of their slow rate of biological turnover.

Sensitivity to impact: assessment criteria

A wetland is sensitive to future impacts if:	Questions 1, 2 and 3 are answered "a," and one other question is answered "a."
A wetland is potentially sensitive to future impacts if:	Answers do not satisfy the above- or below-listed criteria.
A wetland is not sensitive to future impacts if:	Questions 1 and 2 are answered "b", and no other questions are answered "a."

Notes

Enhancement potential

This index evaluates whether impacted or lost wetland functions can be restored at a degraded wetland site. It does **not** evaluate the enhancement potential of changing the vegetation through exotic weed removal, which is considered a management issue. Wetland enhancement provides opportunities to connect wetlands and adjacent natural areas, thus creating larger natural systems that provide corridors for animal movement. Enhancement potential represents how well a wetland might respond to the mitigation of past environmental impacts. The recovery of a wetland, and in particular its functions, depends upon the site's hydrology, its soils and substrate and the presence of environmental buffers surrounding the wetland.

For example, a wetland can be enhanced if its soils are minimally disturbed and if it can receive water from a known perennial or intermittent source. However, the enhancement potential of a site for a specific function may still be adversely impacted because of the surrounding land use. The wetland may be in an area where the source water quality is degraded and where weedy plants can invade the system.

If the wetland provides diverse wildlife habitat, do not complete the enhancement potential assessment questions. (Refer to the results of the assessment criteria for wildlife habitat.)

Notes

Assessment questions

Question 1

What are the assessment results for wildlife habitat, fish habitat, water quality and hydrologic control?

Directions

Refer to the results of the assessment criteria for each of the functions.

a. One or more of the functions is impacted or degraded.
b. The wetland has lost one or more of the functions or one or more of the functions is not present.

Rationale

The success of an enhancement project depends upon the wetland's existing capacity for providing a desired function. Wetlands that are either functionally intact or that are not functional offer little enhancement potential. Wetlands have a greater enhancement potential if their observed functions suggest that structural problems caused by previous environmental impacts can be easily remedied. For purposes of this index, a wetland that provides diverse wildlife habitat is functionally intact and efforts to enhance other functions may adversely affect the diversity of the wildlife habitat.

Question 2

What is the wetland's primary source of water?

a. Surface flow, including streams and ditches.
b. Groundwater, including springs or seeps.
c. Precipitation or sheet flow.

Directions

See question 36 in the Wetland Characterization.

Rationale

The success of a wetland enhancement project depends upon the ease with which local hydrologic regimes can be determined and, if needed, engineered to mitigate impaired conditions.

Question 3

If the primary source of water is surface flow, is the water flow into the wetland restricted?

a. Flow is not restricted, or if blocked, the obstruction can be removed easily.
b. Permanent blockage to the flow exists, but may be breached or a new flow channel created.
c. Flow is restricted and cannot be restored.

Directions

See question 39 in the Wetland Characterization.

Rationale

See rationale for question 2.

Question 4

What is the wetland's area in acres?

a. Greater than 5 acres.
b. Between .5 acres and 5 acres.
c. Less than .5 acres.

Directions

See question 17 in the Wetland Characterization.

Rationale

The variability of environmental conditions across large wetlands is greater than in small wetlands. The opportunity for finding and working with conditions that are amenable to enhancement efforts are therefore greater in large wetlands.

Notes

Notes

Question 5a

For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide?

a. Greater than 40%.
b. Between 10% and 40%.
c. Less than 10%.

Question 5b

For **urban areas:** What percent of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide?

a. Greater than 40%.
b. Between 10 and 40%.
c. Less than 10%.

Directions

For rural areas, see question 25 in the Wetland Characterization. For urban areas, see question 26 in the Wetland Characterization.

Rationale

Wetlands with a larger intact buffer provide better environmental buffers to work sites within the wetland (e.g., they preclude unwanted access to new water control structures).

Question 6

What is the result of the sensitivity to impact index?

a. The wetland is not sensitive to future impacts.
b. The wetland is potentially sensitive to future impacts.
c. The wetland is sensitive to future impacts.

Directions

See the results of the evaluation criteria for the sensitivity to impact index.

Rationale

The enhancement potential of a wetland for a desired functional performance is greater when the quality of its source water is not impaired. The potential for functional performance also increases when the assessed wetland is not surrounded by land uses that expose the system to future impacts.

Enhancement potential: assessment criteria

A wetland has high enhancement potential if:	Question 1 is answered "a," and not more than one other question is answered "c."
A wetland has moderate potential for enhancement if:	Answers do not satisfy the above- or below-listed criteria.
A wetland has little enhancement potential if:	Question 1 is answered "b," and two or more other questions are answered "c."

Notes

Education

Field trips to wetlands are an important part of the educational experience. At wetland "classrooms" students can learn about ecological principles. The Oregon Method bases the educational assessment on accessibility and diversity of the wetlands. Wetlands that provide fish and wildlife habitat and permit access to other natural features allow for a broader course of study. This index evaluates whether it is possible to use the wetlands for educational purposes, not research.

Notes

Assessment questions

Question 1

Is the wetland site open to the public for direct access or observation?

Directions

See question 41 in the Wetland Characterization.

a. Yes, the wetland is open to the public.
b. Yes, but wetland access is allowed only by permission of the landowner or managing entity.
c. No, access is not allowed.

Rationale

Public access allows educators to use the site on an unrestricted basis. If public access to a wetland is denied, the wetland cannot be used as an educational site. If public access exists, controlling the access limits disruption of the site. If the site is in a management area, the educational opportunities could be greater because of the availability of pamphlets and brochures. Management practices themselves could be of interest to users. Indicate in the "Notes" column, whether the site is in a management area.

Question 2

Are there visible hazards to the public at the wetland site?

Directions

See question 41 in the Wetland Characterization.

a. No.
b. One or two visible safety hazards exist.
c. More than two visible safety hazards exist.

Rationale

A safety hazard is an obvious drawback to an educational site or a reason not to use it.

Question 3

What are the results for the wildlife habitat and fish habitat assessment criteria?

Directions

Refer to the results of the assessment criteria for wildlife habitat and fish habitat.

a. The wetland provides diverse wildlife habitat, or the fish habitat function is intact.
b. Results for the wildlife habitat and fish habitat assessment criteria do not meet the criteria for responses "a" or "c."
c. Both wildlife habitat function and fish habitat function are lost or not present.

Rationale

The Oregon Method assumes that a user's exposure to ecological principles is greater in a naturally functioning ecosystem that is likely to contain fish or wildlife species.

Question 4

Is there existing physical public access to other features? If not, can such access be created easily, or can other habitats be observed from the site?

Directions

See question 44 in the Wetland Characterization.

a. Public access to other habitats exists or can be created easily.
b. Public access doesn't exist and can't be created easily, but observation of other features can be made from the site.
c. Public access doesn't exist and can't be created easily. In addition, observation of other features can't be made from the site.

Rationale

Access to other habitat types allows users to examine the interactive nature of upland and aquatic systems. The presence of non-wetland plant or aquatic communities increases the educational value of the wetland by allowing the learner to compare wetlands, uplands and other aquatic systems.

Notes

Notes

Question 5

Is there a public access point within 250 feet of the wetland's edge?

a. Yes, a maintained access point exists.
b. Yes, an unmaintained access point exists.
c. No access point exists, or the access point is hazardous.

Directions

See question 46 in the Wetland Characterization.

Rationale

Access points within a reasonable distance are important if a wetland is to be a good educational site. But even nearby access points are of little value if they represent a hazard to users.

Question 6

Does it appear that access to a viewing spot or wetland edge is available for individuals with limited mobility?

a. Yes.
b. No.

Directions

See question 45 in the Wetland Characterization.

Rationale

The educational potential of a wetland is increased if people with limited mobility can also use the site. Note: This question is not included in the assessment criteria, but it should still be included on the answer sheet for assessment questions.

Education: assessment criteria

A wetland has educational uses if:	Questions 1 and 2 are answered "a," and questions 3, 4 and 5 are either "a" or "b."
A wetland has potential for educational use if:	Answers do not satisfy the above- or below-listed criteria.
A wetland site is not appropriate for educational use if:	The answer to 1 or 2 is "c."

Recreation

Many recreational activities take place in and around wetlands. Wetlands associated with open bodies of water also support boating and fishing. Many people simply enjoy the beauty and sounds of nature and spend time walking in or near wetlands observing plant and animal life.

This index considers the most common recreational activities associated with wetlands. It does not take into account motor-associated activities.

Notes

Assessment questions

Question 1

Is there a public access point within 250 feet of the wetland's edge?

Directions

See question 46 in the Wetland Characterization.

a. Yes, a maintained access point exists.
b. Yes, an unmaintained access point exists.
c. No access point exists, or the access point is hazardous.

Rationale

Access near the wetland is necessary to enable unloading of boats and equipment and to allow walking to trails or observation areas.

Question 2

Is the wetland accessible by boat?

Directions

See question 47 in the Wetland Characterization.

a. Boat launching areas or access points exist on site or within 1/2 mile on a connected lake, river, bay or other body of water.
b. Potential to develop boat launching areas or access points exists, or such features are more than 1/2 mile but less than 1 mile from the wetland.
c. No boat launching areas or access points exist within 1 mile of the wetland, and potential to develop launching areas or access points is limited

Rationale

Many wetlands are found along streams or lakes suitable for canoeing, kayaking or other non-motorized boating. This provides important recreational opportunities. In addition, a canoe route can provide an important viewpoint for enjoying the aesthetic beauty of a wetland.

Question 3

Are there trails, viewing areas or other structures that guide user movement to a particular area or areas in or around the wetland?

Directions

See question 48 in the Wetland Characterization.

a. Yes, developed or maintained trails or viewing areas exist.
b. Yes, undeveloped trails or viewing areas exist that do not disrupt wildlife or plant habitat.
c. No trails or viewing areas exist, or those that do disrupt wildlife or plant habitat.

Rationale

Hunting, fishing, wildlife observation, photography and plant identification are recreational activities that take place in or around wetlands. Controlled movement of users limits adverse impacts to the wetland.

Question 4

What is the result of the wildlife habitat index?

Directions

Refer to the result of the assessment criteria for wildlife habitat.

a. The wetland provides diverse wildlife habitat.
b. The wetland provides habitat for some wildlife species.
c. The wetland's wildlife habitat function is lost or not present.

Rationale

Wetlands are likely to be ideal areas for wildlife observation and for photography if they contain diverse wildlife habitat.

Question 5

Is fishing allowed at the wetland or adjacent water body?

Directions

See question 49 in the Wetland Characterization.

a. Yes.
b. No or not applicable.

Rationale

Fishing is a popular activity associated with wetland areas and adjacent waterways.

Notes

Question 6

Is hunting allowed at the wetland?

a. Yes.
b. No.

Directions

See question 50 in the Wetland Characterization.

Rationale

Wetlands are ideal hunting areas. Although there will be game species in most wetlands, some wetlands may be closed to hunting.

Notes

Recreation: assessment criteria

The wetland provides recreational opportunities if:	Question 1 or 2 is answered "a," and at least one other question is is answered "a."
The wetland has the potential to provide recreational opportunities if:	Answers do not satisfy the above- or below- listed criteria.
The wetland is not appropriate for or does not provide recreational opportunities if:	Questions 1 and 2 are answered "c"; or questions 3 and 4 are answered "c," and 5 and 6 are answered "b."

Aesthetic quality

"Beauty is in the eye of the beholder." Although this index is subjective, it is included to assess the open space and overall pleasing qualities of wetlands to local residents and users. The assessment assumes the user will be visiting the wetland, not just driving by in a car, bus or on a bicycle.

Wetlands can be areas of scenic beauty. Most often they are viewed from along a stream, from a canoe, along a nature trail or from an overlook. Because some wetlands are large and can be viewed from several locations, it is important to note on the wetland base map which viewing location(s) are being evaluated. The assessment area may include the entire wetland or only a portion, such as an area clearly visible from a road or stream. Thus this assessment can be based on an average of several viewpoints or on one outstanding viewpoint.

Notes

Assessment questions

Question 1

How many Cowardin classes are visible from the primary viewing area(s)?

a. More than two.
b. Two.
c. One.

Directions

See question 58 in the Wetland Characterization.

Rationale

Views of wetlands with a mix of wetland types are often considered most pleasing.

Question 2

How much of the wetland is visible from the viewing area(s)?

a. Greater than 50%.
b. Between 25% and 50%.
c. Less than 25%.

Directions

See question 57 in the Wetland Characterization.

Rationale

The more area that is visible, the more pleasing the wetland is considered.

Question 3

What is the general appearance of the wetland as visible from primary viewing location?

Directions

See questions 53 and 54 in the Wetland Characterization.

a. No visual detractors.
b. Visual detractors exist but can be removed easily.
c. Visual detractors exist and cannot be removed easily.

Rationale

Trash and other signs of disturbance mar the aesthetics of a site, but they often can be removed or hidden. Power lines and other large, permanent structures may distract the viewer and cannot be removed.

Question 4

What is the extent of visual contrast with the surrounding landscape (rural) or visual character of the surrounding area (urban)?

Directions

See questions 51 and 52 in the Wetland Characterization.

Rural

a. Significant contrast with surrounding landscape.
b. Limited contrast with surrounding landscape.
c. Little or no contrast with surrounding landscape.

Urban

a. Open space or naturally landscaped areas.
b. Areas landscaped or manipulated by people.
c. Developed with no landscaping.

Rationale

Wetlands, which are generally low-lying features, often contrast dramatically with the surrounding areas, or their aesthetics are enhanced by the surrounding landscape.

Question 5

What odors are present at the primary viewing location(s)?

Directions

See question 55 in the Wetland Characterization.

a. Natural, pleasant odors only.
b. Unpleasant odors such as automobile exhaust or stench from a sewage treatment plant are present at certain times.
c. Unpleasant odors are distinct and continuously present.

Rationale

Unnatural odors reduce the aesthetic quality of wetlands.

Notes

Question 6

What noises are audible at the primary viewing location?

Directions

See question 56 in the Wetland Characterization.

Rural

a. Bird and wildlife noises and other naturally occurring sounds.

b. Some traffic and other similar background sounds are audible in addition to naturally occurring sounds.

c. Continuous traffic or other intrusive noise is audible in addition to naturally occurring sounds.

Urban

a. Some traffic and other similar background sounds are audible in addition to naturally occurring sounds.

b. Continuous traffic or other intrusive noise is audible in addition to naturally occurring sounds.

c. Continuous traffic or other intrusive noise is audible, but no naturally occurring sounds are.

Rationale

Subjective impressions of noise levels vary from person to person, but most agree that continual noise such as that from a busy highway detracts significantly from aesthetic appreciation of wetlands. Noise can be particularly distracting to observers who are listening for bird songs and other wildlife sounds.

Notes

Aesthetics: assessment criteria

A wetland is considered to be pleasing if:	Question 1 or 2 is answered "a," and all other questions are answered "a" or "b."
A wetland is considered to be moderately pleasing if:	Answers do not satisfy the above- or below-listed criteria.
A wetland is not pleasing if:	Two or more questions are answered "c."

Answer sheets & summary sheets

Wetland Assessment Questions: Answer Sheet				
Wetland identifier				
Wildlife habitat				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Question 7				
Question 8				
Question 9				
Assessment descriptor				
Fish habitat				
Streams and rivers				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Lakes and ponds				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Water quality				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				

Wetland Assessment Questions: Answer Sheet				
Wetland identifier				
Hydrologic control				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Question 7				
Assessment descriptor				
Sensitivity to future impacts				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Enhancement potential				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Education				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				

Wetland Assessment Questions: Answer Sheet				
Wetland identifier				
Recreation				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Aesthetic quality				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				

Function & condition summary sheet for the Oregon Method

Wetland identification:

Function	Assessment Descriptor	Rationale
Wildlife habitat		
Fish habitat		
Water quality		
Hydrologic control		
Sensitivity to future impacts		
Enhancement potential		
Education		
Recreation		
Aesthetic quality		
Narrative description of overall wetland functions and conditions		

Watershed summary sheet for the Oregon Method

Watershed or community identification:

Characteristic	Description
Physical characteristics of the watershed	
Land uses within the watershed	
Water quality	
Biological characteristics of the watershed	

Narrative summary of watershed description

Glossary

This glossary provides nontechnical definitions of some of the technical terms used in this manual. This is by no means an exhaustive list of wetland terminology. For more detailed information, refer to the sources listed in Chapter VIII of this manual.

Anadromous fish
Saltwater fish that enter fresh water to spawn.

Aquatic bed
A wetland class dominated by plants that are completely submerged or float on the water's surface (refer to Appendix E).

Bog
Wetlands characterized by a waterlogged, spongy mat of sphagnum moss, ultimately producing a thickness of acid peat. Bogs are highly acid and tend to be nutrient poor. They are typically dominated by sedges, evergreen trees and shrubs.

Channel
The bed or deeper part of a stream or river.

Channelize
To straighten the bed or banks of a stream or river or to line them with concrete or other materials.

Condition
The integrity of a wetland's physical and biological structure. This determines the wetland's ability to perform specific functions, as well as its resilience and enhancement opportunities.

Deep-water habitat
Aquatic habitats, such as lakes, rivers and oceans, where surface water is permanent and deeper than 6.6 feet most of the year (refer to Appendix E).

Degraded
Lowered in quality from adverse impacts such as vegetation removal, invasion of nonnative species and/or draining.

Ecology
The study of interactions between living things and their environment.

Ecosystem
An organic community of plants and animals, viewed within its physical environment (habitat). The ecosystem results from the interaction between soil, climate, vegetation and animal life.

Edge
The border between two vegetation types or between a vegetation type and open water. Edge contributes to diversity of wildlife in an ecosystem because some species ("edge dwellers") depend on such areas.

Emergents
Erect, rooted herbaceous plants that can tolerate flooded soil conditions, but cannot tolerate being submerged for extended periods, e.g. cattails, reeds and pickerelweeds.

Emergent wetland
A wetland class dominated by emergent plants. Emergent wetlands include marshes and wet meadows (refer to Appendix E).

Enhancement
The alteration or active management of a wetland for improvements of particular functions.

Eutrophication
A high concentration of organic matter and mineral nutrients, such as phosphates and nitrates, can cause the over-fertilization of aquatic ecosystems. This results in excessively high levels of production and decomposition. This situation, called eutrophication, can hasten the aging process of a pond or lake because of the rapid buildup of organic remains.

Forested wetland
A wetland class in which the soil is saturated and often inundated, and woody plants taller than 20 feet form the dominant cover, e.g. Oregon ash, alders and cottonwoods. Water-tolerant shrubs often form a second layer beneath the forest canopy, with a layer of herbaceous plants growing beneath the shrubs (refer to Appendix E).

Function
A characteristic action or behavior associated with a wetland that contributes to a larger ecological condition such as wildlife habitat, water quality and/or flood control.

Ground water
Water found at and beneath the water table in the zones of saturated soil and bedrock.

Ground water discharge
Ground water that emerges at the land surface in the form of springs or seepage areas. Ground water can also discharge into rivers (via bank seepage) and sustain flow during the drier months.

Ground water recharge
The process whereby infiltrating rain, snowmelt or surface water enters and replenishes the ground water stores.

Habitat
The environment in which the requirements of a specific plant or animal are met.

Herptile
A cold-blooded vertebrate; includes reptiles and amphibians.

Hydric soil

A soil that is saturated long enough during the growing season to develop anaerobic (oxygen lacking) conditions in the upper part of the soil. Hydric soils are generally classified as poorly drained or very poorly drained.

- Poorly drained: Water is removed from the soil so slowly that the soil is saturated periodically during the growing season or remains wet for long periods.
- Very poorly drained: Water is removed from the soil so slowly that water remains at or on the surface during most of the growing season.

Impact

An action that creates an effect.

Intermittent stream

Streams that flow primarily during the wet seasons when the water table is high, and remain dry for a portion of the year. Most intermittent streams flow for a good portion of the year.

Main stem

The largest continuous channel of a river system that tributaries flow into.

Marsh

An emergent wetland that is flooded either seasonally or permanently. Marshes support the growth of emergent plants such as cattails, bulrushes, reeds and sedges; floating-leaved plants such as pondweeds; and submergents.

Open water

A wetland class consisting of areas of water less than 6.6 feet deep. Submerged or floating-leaved plants often inhabit the shallower portions along the edges of the body of water.

Palustrine

Palustrine wetlands include all freshwater wetlands dominated by trees, shrubs, emergents, mosses or lichens. They also include wetlands lacking such vegetation but with all of the following characteristics: area less than 20 acres, maximum water depth less than 6.6 feet and salinity less than 0.5% (refer to Appendix E).

Perennial stream

A stream that normally flows year round in all years because it is sustained by ground water discharge as well as by surface runoff.

Riparian

Those areas associated with streams, lakes and wetlands where vegetation communities are predominantly influenced by their association with water.

Scrub-shrub wetland

A wetland class dominated by shrubs and woody plants less than 20 feet tall, e.g. dogwoods, alders, red maple saplings, etc. Water levels in shrub swamps can range from permanent to intermittent flooding (refer to Appendix E).

Submergent
Plants that grow and reproduce while completely submerged in water.

Surface runoff
Water that flows over the surface of the land as a result of rainfall or snowmelt. Surface runoff enters streams and rivers to become channelized stream flow.

Swamp
A wetland in which the soil is saturated and often inundated and that is dominated by woody cover (such as alder or cedar).

Watershed
The area drained by a tributary or a river system.

Water table
The upper level of the portion of the ground (rock) in which all spaces are wholly saturated with water. The water table may be located at or near the land surface, or at a depth below the land surface. It usually fluctuates from season to season. Where the water table intersects the land surface, springs, seepages, marshes or lakes may occur.

Wet meadow
Emergent wetlands that are generally seasonally flooded and have saturated soils for much of the growing season. Wet meadows are dominated by grasses, sedges and rushes and are often cultivated or pastured.

Wetland
Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

References

Adamus P.R. and Stockwell L.T., 1983
A Method of Wetland Functional Assessment: Volumes I and II. Report No. FHWA-1P-82-23 and FHWA-1P-82-24. Offices of Research and Development, Federal Highway Administration, U.S. Department of Transportation, Washington, DC.

Adamus P.R., Clairain E.J., Jr., Smith R.D and Young R.E., 1987
Wetland Evaluation Technique (WET): Volume II: Methodology. Operational Draft Technical Report Y-87-_. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Ammann A.P., Franzen R.W. and Johnson J.L., 1986
Method for the Evaluation of Inland Wetlands in Connecticut. Bulletin No. 9. Connecticut Department of Environmental Protection.

Ammann A.P. and Stone A.L., 1991
Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire. New Hampshire Department of Environmental Services, Concord, NH.

Azous A., 1991
An analysis of urbanization effects on wetland biological communities. King County Environmental Division, Puget Sound Wetlands and stormwater research program.

Balco J.J. 1981
Assessing wetlands values—evaluation dilemmas. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Boechler J.L. and McAlister D., 1992
Riparian classification and protection goals to maintain fish and wildlife populations on state and private forest lands in Oregon. Oregon Department of Fish and Wildlife.

Brown E.R. (ed.), 1985
Management of wildlife and fish habitats in forests of western Oregon and Washington. Publication No. R6-F&WL-192-1985. U.S.D.A. Forest Service, Portland, OR.

Brown S., Brinson M.M. and Lugo A.E., 1979
Structure and function of riparian wetlands. In Johsnon R.R. and McCormick J.F. (technical coordinators), 1979 (op. cit.).

Burke D.G., Meyers E.J., Tiner R.W., Jr., and Groman H., 1988
Protecting Nontidal Wetlands. Report No. 412/413. American Planning Association, Chicago.

Carothers S.W., 1977
Importance, preservation, and management of riparian habitats: an overview. In Johnson R.R. and Jones D.A. (technical coordinators), 1977 (op. cit.).

Castell A.J., Conolly C., Emers M., Metz E.D., Meyer S., Witter M., Mauermann S., Erickson T. and Cooke S.S., 1992
Wetland Buffers: Use and Effectiveness. Publication No. 92-10. Adolfson Associates, Inc., Shorelands and Coastal Zone Management Program, Washington State Department of Ecology, Olympia.

Castell A.J., Conolly C., Emers M., Metz E.D., Meyer S. and Witter M. (eds.), 1992
Wetland Buffers: An Annotated Bibliography. Publication No. 92-11. Adolfson Associates, Inc., for Shorelands and Coastal Zone Management Program, Washington State Department of Ecology, Olympia.

Clark. J.E., 1979
Fresh water wetlands: habitats for aquatic invertebrates, amphibians, reptiles, and fish. Pages In Greeson P.E. et. al. (eds.). *Wetland Functions and Values: the State of Our Understanding*. Technical Publication TPS79-2. American Water Resources Association, Minneapolis.

The Conservation Foundation, 1988
Protecting America's Wetlands: An Action Agenda. The Conservation Foundation, Washington DC..

Cowardin L.M., Carter V., Golet F.C. and LaRoe E.T., 1979
Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service.

Daminski R.M. and Prince M.M., 1981
Dabbling duck and aquatic macroinvertebrate responses to wetland habitat. *Journal of Wildlife Management* 44:1-15.

Dyer P. (ed.), 1897
Northwest wetlands: What are they? For whom? For what? Conference Proceedings. Institute for Environmental Studies, University of Washington, Seattle.

Ewel K.C. 1979
Riparian ecosystems; conservation of their unique characteristics. In Johsnon R.R. and McCormick J.F. (technical coordinators), 1979 (op. cit.).

Federal Interagency Committee for Wetland Delineation, 1989
Federal Manual for Identifying and Delineating Wetlands. Cooperative Technical Publication. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service and U.S.D.A. Soil Conservation Service, Washington, DC.

Forman R.T.T. and Godron M., 1986
Landscape Ecology. John Wiley and Sons, New York.

Fredrickson L.H and Reid. F.A., 1986
Wetland and riparian habitats; a nongame management overview. In Hale J.B., Best L.B. and Clawson R.L., 1986. *Management of Nongame Wildlife in the Midwest: A Developing Art.*

Fried E., 1981
Evaluation of wetlands for regulatory protection. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Gibbs J.P, Longcore J.R., McAuley, Ringelman J.K., 1991
Use of wetland habitats by selected nongame water birds in Maine. U.S. Fish and Wildlife Service.

Golet F.C., 1982
Guidelines for Wetland Delineation and Evaluation. University of Rhode Island.

Golet F.C., 1976
Wildlife wetland evaluation model. In Larson J.S. (ed.), 1976 (op. cit.).

Greeson P.E., Clark J.R. and Clark J.E. (eds.), 1978
Wetland Functions and Values: The State of Our Understanding: Proceedings of the National Symposium on Wetlands, Minneapolis, Minnesota.

Harmon K.W., 1981
Impacts of wetland losses on wildlife. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Helmers D.L., 1991
Habitat use by migrant shorebirds and invertebrate availability in a managed wetland complex. University of Missouri, Columbia. Thesis.

Hitchcock C.L. and Cronquist A., 1973
Flora of the Pacific Northwest. University of Washington Press, Seattle.

Horton S.K., Lettlefield C.D., Paullin D.G. and Vorderstrasse R.E., 1983
Migratory Bird Populations and Habitat Relationships in Malheur-Harney Lakes Basin, Oregon. U.S. Fish and Wildlife Service, Portland, OR.

Johnson D.M. et. al., 1985
Atlas of Oregon Lakes. Oregon State University Press, Corvallis, OR.

Johnson R.R. and Jones D.A. (technical coordinators), 1977
Importance, Preservation and Management of Riparian Habitat: a Symposium, Tucson, AZ, July 1977.

Johnson R.R. and McCormick J.F., 1979
Strategies for Protection and Management of Floodplain Wetlands and Other Riparian Ecosystems. Proceedings of the symposium, Calloway Gardens, GA, December 1978.

Jordan R.A. and Shisler J.K., 1986
Research needs for the use of buffer zones for wetland protection. In *Proceedings: National wetland symposium, mitigation of impacts and losses.*

Kusler J.A., 1983
Our National Wetland Heritage, A Protection Guidebook. Environmental Law Institute, Washington DC.

Kusler J.A. and Kentula M.E. (eds.), 1990
Wetland Creation and Restoration: The Status of the Science. Island Press, Washington, DC.

Kusler J.A. and Riexinger P., 1985
Proceedings of The National Wetland Assessment Symposium.

Larson J.S. (ed.), 1976
Models for Assessment of Freshwater Wetlands. Publication No. 32. Water Resources Research Center, University of Massachusetts, Amherst.

Leibowitz S.G., Abbruzzese B., Adamus P.A., Hughes L.E. and Irish J.T., 1992
A Synoptic Approach to Cumulative Impact Assessment: A Proposed Methodology. EPA/600/R-92/167. U.S. Environmental Protection Agency, Environmental Research Laboratory, Corvallis, OR.

Levere A. (ed.), 1990
Method for Evaluating Inland Wetlands in Connecticut. Connecticut Department of Environmental Protection. (A draft revision of Ammann et. al. (1986) dated August 1990).

Lonard R.I., Clairain E.J., Jr., Huffman R.T., Hardy J.W., Brown L.D., Ballard P.E. and Watts J.W., 1981
Analysis of Methodologies Used for the Assessment of Wetland Values. Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Meehan W.R., Swanson F.J. and Sedell J.R., 1977
Influences of riparian vegetation on aquatic ecosystems with particular reference to salmonid fishes and their food supply. In Johnson R.R. and Jones D.A. (technical coordinators), 1977 (op. cit.).

Mitsch W.J. and Gosselink J.G., 1986
Wetlands. Van Nostrand Reinhold, New York.

National Reseach Council, 1992
Restoration of Aquatic Ecosystems. National Academy Press, Washington, DC.

Nelson J.W. and Kaldlec J.A. 1984
A conceptual approach to relating habitat structure and macroinvertebrate production in freshwater wetlands. *Trans. N. Am. Will. and Nat. Resource. Conf.* 49:262-270.

Platts W.S. and Jensen S.E., 1986
Wetland/riparian ecosystem of the Great Basin/desert and montaine region: an overview. In Sather J. H. and Low J.B. (eds.). *Proceedings of the Workshop on Great Basin/Desert and Montaine Regional Wetland Functions.*

Porter B.W., 1981
The wetland edge as a community and its value to wildlife. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Reed P.B., 1988
National List of Plant Species that Occur in Wetlands: Oregon. NERC-88/18.37. U.S. Government Printing Office, Washington, DC.

Reppert R.T., 1981
Wetland values, concepts and methods for wetlands evaluation. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Richter K.O., Azous A., Cooke S.S., Wisseman R.W. and Horner R.R., 1991
Effects of Stormwater Runoff on Wetland Zoology and Wetland Soils Characterization and Analysis. Puget Sound Wetlands and Stormwater Management Research Program.

Roman C.T. and Good R.E., 1985
Delineating wetland buffer protection areas: the New Jersey pineland model. In Kusler (ed.). *Proceedings: National wetlands assessment symposium.*

Schaefer J.M and Brown M.T., 1992
Designing and protecting river corridors for wildlife. *Rivers* 3(1): 14-26.

Shabman L.A. and Batie S.S., 1981
Basic economic concepts important for wetlands evaluation. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Simenstad, C.A., 1987
The role of pacific Northwest estuarine wetlands in supporting fish and macroinvertebrates: The unseen users. In Dyer P. (ed.), 1897 (op. cit.).

Smardon R.C. and Fabos J.G., 1976
Visual-cultural sub-model. In Larson J.S. (ed.), 1976 (op. cit.).

Stuber P.J., 1983
Proceedings of the National wetland values assessment workshop. U.S. Fish and Wildlife Service.

Thomas J.W. (ed.), 1979
Wildlife Habitats in Managed Forests of the Blue Mountains of Oregon and Washington, Agricultural Handbook No. 553. U.S.D.A. Forest Service, Portland, OR.

Thomas, J.W. and Maser C. (eds.), 1986
Wildlife Habitats in Managed Rangelands—The Great Basin of Southeastern Oregon. General Technical Report PNW-80. U.S.D.A. Forest Service, Portland, OR.

United States Department of Agriculture, 1978
Water and Related Land Resources of the Connecticut River Region Massachusetts. A cooperative study of the Economics, Statistics, and Cooperative Service, Forest Service, and Soil Conservation Service in cooperation with Massachusetts Water Resources Commission.

U.S. Department of Agriculture, 1984
Central Coastal River Basin Study. A cooperative study of the Economic Research Service, Forest Service, and Soil Conservation Service in cooperation with Connecticut Department of Environmental Protection. Soil Conservation Service. Storrs, Connecticut.

U.S. Fish and Wildlife Service, 1980
Habitat Evaluation Procedures. ESM 100. Division of Ecological Services, U.S. Fish and Wildlife Service, Washington, DC.

Weller M.W., 1981
Estimating wildlife and wetland losses due to drainage and other perturbations. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Wetzel R.G., 1975
Limnology. Saunders College Publishing and Holt, Rinehart, and Winston.

Williams G.L., 1981
A modeling strategy for wetland habitat management and planning. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Wolverton C.L., 1981
Wetland evaluation techniques in Michigan. In *Midwest Conference on Wetland Values and Management*, June, 1981.

Appendix A
Sources of information

Notes

Where to go for information

Table A.1 on the following page lists sources of information needed to complete the Wetland Characterization. Some of the sources are given as abbreviations. Full agency names appear in Table A.2. Not all information listed in Table A.1 is available immediately for purchase. However, purchasing information can also be obtained from these offices. Addresses and phone numbers for many of the agencies listed appear in the following material.

Resources and assistance available to Oregon communities

The freshwater wetland function and condition assessment is interdisciplinary, and depending on your community's expertise, you may need to contact a list of people and agencies, including consultants, regional planning agencies, state permitting agencies, economic development specialists, and environmental organizations.

It is no coincidence that Oregon's first statewide planning goal is "citizen involvement." When formulating local wetland plans and assessing wetlands, your community must look for ways to include public input at every stage. Your "number one resource" is the people who live and work in your community—including older residents, who know a region's history, and young people, who are a community's future.

Although this list is not complete, the following are places to turn for help, whatever the stage of the planning and assessment process:

- Regional councils of government
- Other agencies and commissions
- State government agencies
- Miscellaneous state bureaus and services
- State colleges and universities
- State extension services (university specialists and county agents)
- State and regional offices of federal agencies
- Nonprofit organizations and conservation groups

Table A.1: Sources of information

Information	Available from
Aerial photographs, low altitude	County's Consolidated Farm Services Agency, Private Businesses, COG
Anadromous fish run information	ODFW Habitat Conservation Division, NMFS
Archaeological & historical information*	PRD Historic Preservation, SHPO
Drainage basin maps	WRD
Endangered and threatened wildlife listing	ODFW Threatened and Endangered Coordination, NHAC, USFWS
Endangered and threatened plants listing	NHAC, USFWS, ODA Plant Conservation Biology Program
Endangered and threatened species by town	NHAC
Fish stocking information	ODFW Fish Division
Flood hazard maps	Local planning offices, COGs
Surficial geology maps*	DOGAMI, USGS
Geographic information system*	GISSC
1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution	DEQ Surface Water Division
Atlas of Oregon Lakes	DEQ, libraries
Lake water quality information	DEQ, Cooperative extension service, Lakes Lay Monitoring Program
State-owned waters*	DSL
Municipal Assessor's/tax maps	Local government offices
Local comprehensive plan and zoning maps	Local government offices
National Wetlands Inventory Maps	DSL
National Heritage Inventory	NHAC
Water Quality Report to Congress 305(b)	DEQ, State library
Rare natural communities listing	NHAC (Appendix A)
Soil survey maps (by county)	County NRCS offices
USGS topographical maps	Local bookstores and sporting goods stores or order by calling 1-800-USAMAPS

**Optional*

Table A.2: Agency abbreviations

Abbreviation	Agency
State agencies	
DEQ	Department of Environmental Quality
DLCD	Department of Land Conservation and Development
DSL	Division of State Lands
DOGAMI	Department of Geology and Minerals Industries
Ext.	Oregon State University Extension Service
GISSC	Geographic Information System Service Center
NHAC	Natural Heritage Advisory Council
ODA	Oregon Department of Agriculture
OACD	Oregon Association of Conservation Districts
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
PRD	Parks and Recreation Department
SHPO	State Historic Preservation Office
WRD	Water Resources Department
Federal agency abbreviations and others	
CFBS	Consolidated Farm Bureau Services
COE	Army Corps of Engineers (Corps)
EPA	Environmental Protection Agency
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
SWCD	Soil and Water Conservation District
COG	Council of governments

Contact Addresses

Regional councils of government

In Oregon, regional councils of government (COG's) have been formed to promote greater cooperation between all levels of government. COG's are usually voluntary associations of local governments cooperating on issues and problems that cross city, county, and sometimes state boundaries. They are multi-jurisdictional and multipurpose organizations, with an emphasis on economic development and developing regional planning strategies.

Columbia River Estuary Study Taskforce (CREST)
750 Commercial Street, Room 214
Astoria, OR 97103-4513
(503) 325-0435

Metropolitan Service District (Metro)
600 N.E. Grande Ave.
Portland, OR 97232-2799
(503) 797-1700

Clatsop-Tillamook Intergovernmental Council
1063 S. Hemlock Street
P.O. Box 488
Cannon Beach, OR 97110
(503) 436-1156

Lane Council of Governments
125 E. 8th Avenue
Eugene, OR 97401
(503) 687-4283

Mid-Willamette Valley Council of Governments
105 High Street SE
Salem, OR 97301
(503) 588-6177

Rogue Valley Council of Governments
155 S. Second Street
P.O. Box 3275
Central Point, OR 97502
(503) 664-6674

Umpqua Regional Council of Governments
Room 305
Douglas Co. Courthouse
Roseburg, OR 97470
(503) 440-4231

State agencies

Department of Land Conservation and Development (DLCD)
1175 Court Street NE
Salem, OR 97310-0590
(503) 373-0050

DLCD reviews and coordinates application of statewide planning goals to city and county comprehensive plans and to state agency land-use programs. There are field offices in Portland, Newport and Bend.

Department of Environmental Quality (DEQ)
Executive Building
811 SW 6th Ave.
Portland, OR 97204
(503) 229-5696/5630

DEQ develops comprehensive plans and programs for environmental quality, conducts field investigations, and establishes standards of quality for Oregon's waters. There are field offices throughout the state.

Department of Fish and Wildlife (ODFW)
2501 SW First Street
P.O. Box 59
Portland, OR 97207
(503) 229-5403

ODFW assists and advises other regulatory agencies and private parties in protecting water quality, water flows, and fish and wildlife habitat. There are regional offices in Corvallis, Roseburg, Bend, La Grande, Hines, Newport and Clackamas.

Division of State Lands (DSL)
775 Summer Street NE
Salem, OR 97310
(503) 378-3805

DSL performs many public services assigned by the legislature, including administering state laws protecting Oregon wetlands and waterways from dredging and filling alterations and approving local wetland inventories and wetland conservation plans. There is a regional office in Bend.

Natural Heritage Advisory Council (NHAC)
c/o Division of State Lands
775 Summer Street NE
Salem, OR 97310
(503) 378-3805

This council works with DSL to carry out the Natural Heritage Plan approved by the legislature in 1981. Development of an inventory (The Natural Heritage Data Bank) of native Oregon ecosystems was primary objective of the Council. Material from the data bank is available through:

The Natural Heritage Program
821 SE 14th Ave.
Portland, OR 97214
(503) 731-3070

Water Resources Department (WRD)
158 12th St. NE
Salem, OR 97310
(503) 378-3739

Although mainly concerned with regulation of state laws pertaining to water rights and diversion of surface and ground waters, this department is a good contact for local water resource information. There are regional offices in Salem, Grants Pass, Bend, Baker, and Pendleton.

Other state agencies

Department of Geology and Minerals Industries (DOGAMI)
State Office Bldg. Suite 965
800 NE Oregon Street #28
Portland, OR 97232
(503) 731-4100

Department of Forestry (ODF)
2600 State Street
Salem, OR 97310
(503) 945-7200

Department of Parks and Recreation (PRO)
Vick Building
525 Trade Street SE
Salem, OR 97310
(503) 378-6305

State Historic Preservation Office (SHPO)
(503) 378-6508

State and regional offices of federal agencies

The state agencies below can be contacted for information on federal land use, permits and technical assistance.

U.S. Department of Agriculture Natural Resources Conservation Service State Office
101 SW Main St., Suite 1300
Portland, OR 97204-3221
(503) 414-3200

U.S. Army Corps of Engineers (COE) Portland District
Box 2946
Portland, OR 97208-2946
(503) 326-6995

U.S. Environmental Protection Agency (EPA)
811 SW 6th Avenue
Portland, OR 97204
(503) 326-2716

U.S. Fish and Wildlife Service (USFWS) Ecological Services
2600 SE 98th Suite 100
Portland, OR 97266
(503) 231-6179

National Marine Fisheries Service (NMFS)
911 NE 11th Ave., Room 620
Portland, OR 97232
(503) 230-5400

U.S. Geological Survey National Cartographic Information Center Western Mapping Center
345 Middlefield Road
Menlo Park, CA 94025
(415) 329-4309 (California number)
1-800-USA-MAPS (Virginia number)

Nonprofit organizations and conservation groups

The following groups are state chapters of some known public-interest and conservation organizations, as well as some Oregon-only groups. They often can provide information on other local citizen-activist organizations involved in environmental and governmental issues.

Audubon Society of Portland
5151 N.W. Cornell Road
Portland, OR 97210
(503) 292-6855

The Nature Conservancy
821 SE 14th Ave.
Portland, OR 97214
(503) 230-1221

The Wetland Conservancy
P.O. Box 1195
Tualatin, OR 97062
(503) 691-1394

Sierra Club, Oregon Chapter
1413 S.E. Hawthorne Blvd.
Portland, OR 96214
(503) 238-0442

Oregon Coastal Zone Management Association, Inc. (OCZMA)
P.O. Box 1033
Newport, OR 97365
(503) 265-8918

Appendix B
Wetland Characterization

Notes

Watershed identification _____

Wetland Characterization (Page 1 of 19)

Watershed setting

All questions pertaining to the watershed can be answered in the office from aerial photographs, U.S. Geological Service topographical maps, and other reference materials. (See Appendix A.)

Drainage basin

The Oregon Water Resources Department has divided the state into 18 drainage basins. Check the map in Appendix H to see which drainage basin contains the study site.

1. What is the name of the drainage basin that contains your assessment area?

Physical characteristics of the watershed being assessed (within the drainage basin)

Topography

2. What is the watershed's area in square miles? The watershed area is often much smaller than the drainage basin (see Appendix E).
3. Calculate the average slope of the watershed (see Appendix F).

Hydrologic profile

4. Is the stream flow in the watershed modified by dams, channelization or levees? (Choose all that are appropriate.)
   a. Tributary streams to the main stem stream are modified.
   b. Main stem stream is modified.
   c. Stream flow is not modified (free-flowing.)
5. Is water being taken out of the stream(s) through active diking, drainage or irrigation districts in the watershed upstream of the assessment area?
   a. Yes.
   b. No.

Land uses within the watershed

6. What is the dominant land use in the watershed upstream from the assessment area?
   a. Urban.
   b. Urbanizing (mix of urban, agriculture and forest uses).
   c. Agriculture (farming, ranching or grazing).
   d. Forested or natural area.

Watershed Notes

Watershed identification _____

Wetland Characterization (Page 2 of 19)

Watershed Notes

Water quality *(Use more specific water quality information, if available. Contact local DEQ office, or call the DEQ lab at (503) 229-5983 for sampling information.)*

7. Consult the most recent State of Oregon Department of Environmental Quality 305(b) Report to determine whether any streams in the study area are listed as a *water quality limited.* (You may want to ask DEQ whether there are any proposed changes.) This information is included in Clean Water Act section 303(d) reporting.
   a. Streams or portions of streams within the study area are listed as *water quality limited.*
   b. No streams or portions of streams within the study area are listed as *water quality limited.*

8. Consult the most recent *Oregon Statewide Assessment of Nonpoint Sources of Water Pollution* to determine the water quality condition of stream reaches in the watershed upstream from the assessment area. (If both "b" and "c" apply, choose "c.")
   a. All upstream reaches are listed as *no problem* (or no data available).
   b. One or more upstream reaches are listed in *moderate* water quality condition.
   c. One or more upstream reaches are listed in *severe* water quality condition.

Biological characteristics of the watershed

9. Fisheries: Select all that are appropriate and list type if known. (Contact local Oregon Department of Fish and Wildlife office for this information.)

	Type
a. Cold water.	
b. Warm water.	
c. Anadromous.	
d. Wild population.	
e. Introduced or hatchery populations.	
f. None.	
g. Other (list).	

Watershed identification _____

Wetland Characterization (Page 3 of 19)

Watershed Notes

10. Are known sensitive, threatened or endangered fish species present in the watershed? If so, list which species.

    Species

    a. Yes.
    b. No.
    c. Unknown.

11. Wildlife species: Select all that are appropriate and list species if known. (Contact local Oregon Department of Fish and Wildlife office for this information.)

    Species

    a. Migratory birds.
    b. Big game.
    c. Nesting birds.

12. Are known sensitive, threatened or endangered plant species or wildlife species other than fish present in the watershed? If so, list which species. (Contact local ODFW office or Natural Heritage Council for this information.)

    Species

    a. Yes.
    b. No.
    c. Unknown.

13. Does the watershed provide a natural corridor for fish or wildlife movement? (Observe from aerial photographs.) **List whether for fish, wildlife or both.** Consider fences, dams and other barriers to travel. Aerial photographs of the watershed area are the best source of information. Fragmented systems have barriers to movement or a section where the natural area is broken by developed area.

    A corridor is a landscape feature that enables fish or wildlife species to travel between broad geographical areas. (See Figure 1.)

    a. There are contiguous natural areas that allow species movement, and if barriers exist, they do not stop animal or fish movement.
    b. The natural areas are fragmented, but species movement is still possible.
    c. The habitat system is fragmented, and there are barriers to species movement.

Watershed identification _____

Wetland Characterization (Page 4 of 19)

Watershed Notes

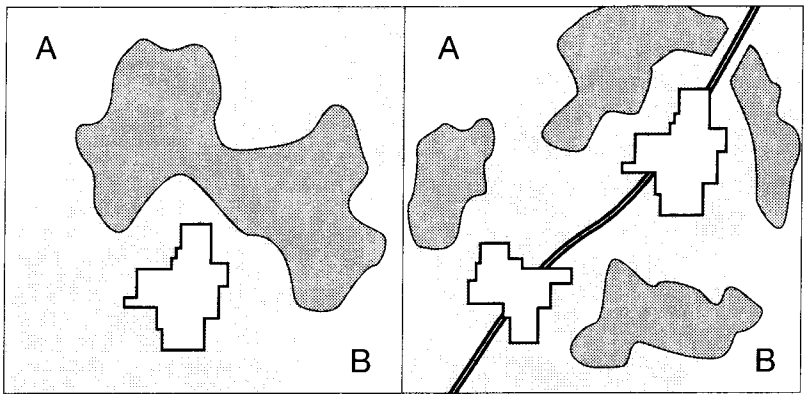


Figure 1. Watersheds as corridors for wildlife movement.
Areas A and B are the end points of a movement corridor through the watershed. Natural areas are shaded darkly, the irregular polygons represent highly developed areas, and the thick black line represents an impassable barrier such as an interstate highway. In the first part of the illustration, the contiguous natural area connects both ends of the corridor. The developed area is a barrier, but it does not obstruct species movement. The second half of the illustration shows fragmented natural areas with an impassable barrier. If the barrier stopped at the smaller developed area and did not continue off the lower left, species movement would still be possible.

14. What are the landscape features at both ends of the movement corridor? (These may lie outside the assessment area.) From an aerial photo, observation or local knowledge, determine whether there are large natural areas at either end of the movement corridor. The natural area does not have to be a wetland.
    a. Large natural habitat areas are at both ends.
    b. One end has a natural habitat area and the other end is developed.
    c. Both ends are developed.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 5 of 19)

Individual wetland sites

Fill out this part of the characterization for each wetland in the assessment area. Some of the information can be gathered in the office; some must be gathered at the site. You may want to do a rough sketch of the site (doesn't have to be to scale) to refer to back in the office.

Wetland structure and relation to surrounding landscape

✓15. What percentage of the area within 500 feet of the wetland's edge is dedicated to the land uses listed below? (From overlay 2 or in the field.)

It is best to determine the land uses from a recent aerial photo. If an aerial photo is not available, measure 500 feet in the field to get an idea of distance to evaluate. Use the following ranges for your answers for each land-use category:

a. Less than 20%.
b. Between 20% and 50%.
c. Greater than 50%.

1. Open Space (includes natural areas, parks and developed recreation areas, but not land designated for Exclusive Forest Use).
2. Agriculture (pasture, cropped lands, orchards, range land).
3. Exclusive Forest Use lands.
4. Developed uses (residential, commercial or industrial—rural and urban).
5. Other (list).

✓16. What is the dominant existing land use within 500 feet of the wetland on the **downstream or down-slope edge** of the wetland? Use the same land-use categories as question 15.

17. What is the wetland's area in acres? (Measure the entire area of contiguous wetland, not just the portion within the assessment area. Use the dimensions of the wetland as outlined on the base map.)

a. Greater than 5 acres.
b. Between 0.5 acres and 5 acres.
c. Less than 0.5 acres.

✓ *Questions preceded by a check mark can be completed in the field.*

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 6 of 19)

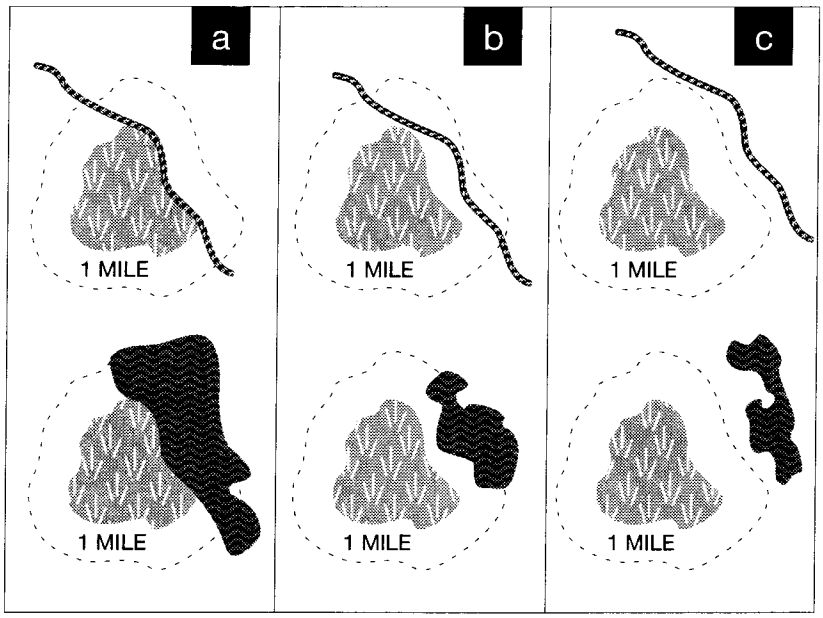


Figure 2. Connectivity to streams, lakes and ponds.
The lightly shaded area represents a wetland, the darkly shaded area represents a lake or pond and the dark line represents a stream. Part "a" shows the wetland connected to a stream, lake or pond, part "b" shows a stream, lake or pond within 1 mile but no surface connection, and part "c" shows no stream, lake or pond within 1 mile and no surface connection.

18. How is the wetland connected to another body of water, such as a stream, lake or pond? (See Figure 2.)
    a. The wetland is connected by surface water to another body of water. This may be by a culvert, irrigation ditch, intermittent stream or perennial stream.
    b. No surface-water connection exists to another body of water, but other bodies of water lie within 1 mile of the wetland.
    c. No surface-water connection exists to another body of water, and no other bodies of water lie within 1 mile of the wetland.

19. Is all or part of the wetland located within the 100-year floodplain (use floodplain maps to determine) or within an enclosed basin? An enclosed basin has no inlet or outlet.
    a. Yes.
    b. No.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 7 of 19)

20. What percentage of the area within 500 feet of the wetland's edge is **zoned** for each of the land uses listed below?

    Use the following ranges for your answers:

    a. Less than 20%
    b. Between 20% and 50%
    c. Greater than 50%.

    1. Open Space (includes natural areas, parks and developed recreation areas, but not lands zoned for Exclusive Forest Use).
    2. Agriculture (pasture, cropped lands, orchards, range land).
    3. Exclusive Forest Use lands.
    4. Developed uses (residential, commercial, industrial).
    5. Other (list).

Wetland habitat

✓21. What percentage of the wetland's area is covered by the following Cowardin wetland classes? (Cowardin wetland classes refer to a classification of wetland type by vegetation cover. See Appendix D.) Only list those that compose 10% or more of the overall wetland.

    The percentages can be estimated in the field or from aerial photographs. Use the following categories for your answers:

    a. Between 70% and 100%.
    b. 50% or more, but less than 70%.
    c. 20% or more, but less than 50%.
    d. 10% or more, but less than 20%.

    1. Open water (deep water habitat, greater than or equal to 6.6 feet or 2 meters).
    2. Emergent (includes floating aquatics—herbaceous plants that can tolerate flooding and living in wet soils).
    3. Scrub-shrub (woody vegetation under 20 feet tall).
    4. Forested (woody vegetation 20 feet or taller).

✓22. For urban areas, how many wetland plant species are present? (You need not list the species name.)

    a. More than 5 plant species.
    b. Between 2 and 5 plant species.
    c. 1 plant species (monotypic).

Watershed identification _____

Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 8 of 19)

✓23. What is the dominant wetland vegetation cover type?
- a. Woody vegetation (forested and scrub-shrub).
- b. Emergent vegetation and ponding, or open water only.
- c. Emergent vegetation only or wet meadow.

✓24. Refer to the diagrams in Figure 3 and select the one that most closely resembles the interspersion of Cowardin wetland classes and, if present, upland inclusions. (An upland inclusion is an island or an upland area surrounded on three sides by wetland.).

Wetlands composed of only one wetland class or with two wetland classes and a simple pattern have low interspersion. Wetland and upland complexes that have at least two wetland classes and a complex pattern have a moderate interspersion pattern. Wetlands with two or more wetland classes or upland inclusions with a complex pattern and lots of edge have a high interspersion pattern. If the wetland you are observing does not reflect any of the diagrams, use the above guidance to determine the complexity of the interspersion pattern and draw a sketch of the wetland.

- a. High.
- b. Moderate.
- c. Low.

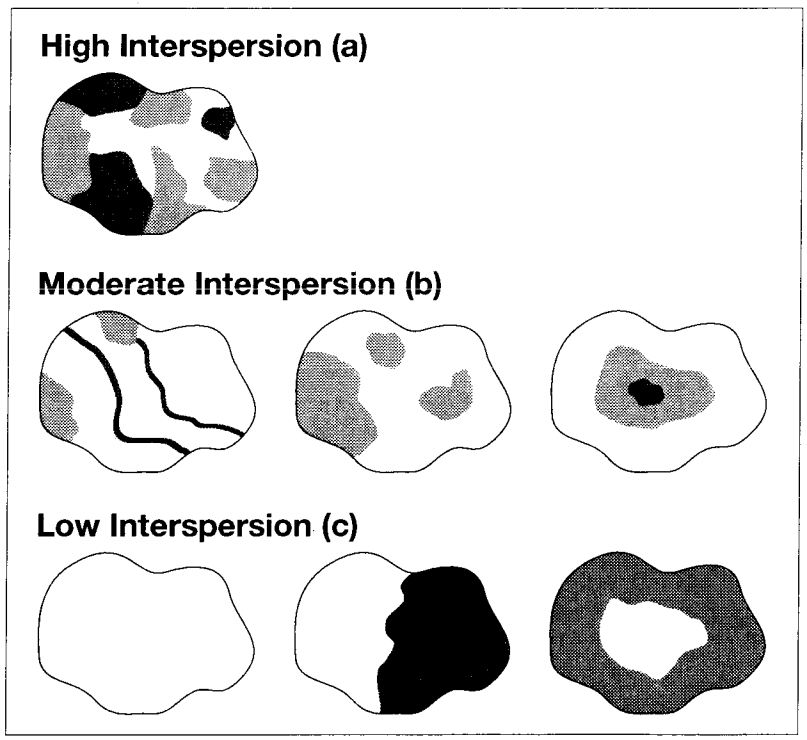


Figure 3. Interspersion of Cowardin classes and upland inclusions.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 9 of 19)

✓25. For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide? Brush, woodland, non-farmed agricultural land and range land are considered upland habitat for this question. Actively farmed lands are not considered wildlife habitat. (See Figure 4.)

a. Greater than 40%.

b. Between 10% and 40%.

c. Less than 10%.

✓26. For **urban areas:** What percentage of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide? A vegetative buffer consists of trees, bushes or vegetation that is not regularly mowed or farmed. (See Figure 5.)

a. Greater than 40%.

b. Between 10% and 40%.

c. Less than 10%.

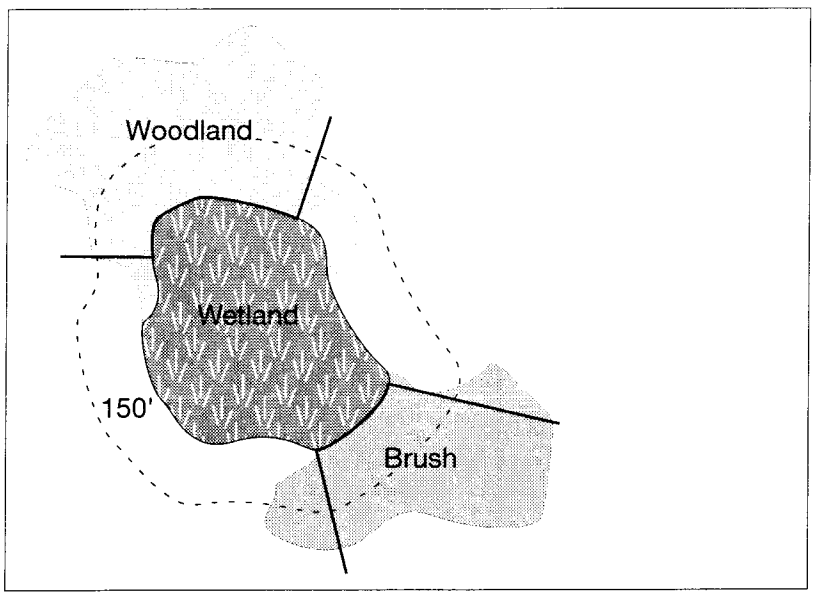


Figure 4. Percent of wetland edge bordered by upland habitat (for Question 25).
The dashed line delineates the area within 150 feet of the wetland; the "woodland" and "brush" areas are upland habitat; and the lines perpendicular to the wetland edge indicate where the upland habitat adjacent to the wetland habitat is at least 150 feet wide. The dark lines (portions of the wetland bordered by upland habitat at least 150 feet wide) make up roughly one-third (between 10% and 40%) of the wetland perimeter.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 10 of 19)

27. How is the wetland connected to other wetlands? (Look at an aerial photo or map to determine this.)
    a. Connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, culvert, canal or lake.
    b. Not connected by surface waters, but other unconnected wetlands lie within a 3-mile radius.
    c. Not connected to other wetlands by surface waters, and no other unconnected wetlands lie within a 3-mile radius.
28. Estimate the area of unvegetated, open water within the wetland.
    a. More than 3 acres.
    b. Greater than 1 acre, up to 3 acres.
    c. Between 0.5 acre and 1 acre.
    d. Less than 0.5 acre.

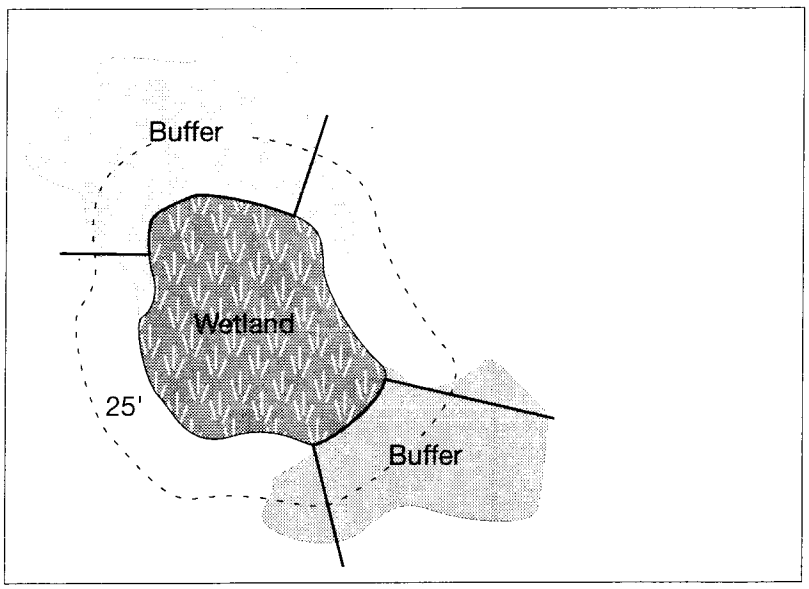


Figure 5. Percent of wetland edge bordered by vegetative buffer (for Question 26).
The dashed line delineates the area within 25 feet of the wetland; the vegetative buffer areas are labeled "buffer"; and the lines perpendicular to the wetland edge indicate where the vegetative buffer adjacent to the wetland habitat is at least 25 feet wide. The dark lines (portions of the wetland bordered by a vegetative buffer at least 25 feet wide) make up roughly one-third (between 10% and 40%) of the wetland perimeter.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 11 of 19)

Fisheries habitat

29. Are fish present in a stream, lake or pond connected to the wetland.
    a. Salmon, trout or sensitive species are present at some time during the year.
    b. Species not covered in "a" are present at some time during the year.
    c. No species are present at any time during the year.

Streams connected to the wetland

Complete this section only if the wetland being assessed has an unimpeded surface water connection to a stream.

✓30. What is the physical character of the stream channel? To observe stream channel modifications, look for built rock banks, cement sides, straightened areas or other human-created features.
    a. The stream is in a natural channel, or modified portions of the stream are returning to a natural channel.
    b. Only portions of the stream are modified.
    c. The stream is extensively modified or confined in a non-vegetated channel or pipe.

✓31. What percentage of the stream is shaded by streamside (riparian) vegetation?
    a. Greater than 75%.
    b. Between 50 and 75%.
    c. 25% or more, but less than 50%.
    d. Less than 25%.

✓32. What percentage of the stream contains instream structures such as large woody debris, floating or submerged vegetation, large rocks or boulders?
    a. Greater than 25%.
    b. Between 10% and 25%.
    c. Less than 10%.

Lakes or ponds (entire lake or pond and wetland complex)

Complete this section only if the wetland being assessed has a surface water connection to a lake or pond.

33. Does the lake or pond contain areas of deep and shallow water? ("Deep" is defined as more than 6.5 feet deep.)
    a. Yes.
    b. Cannot be determined.
    c. No.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 12 of 19)

✓34. What percentage of the shoreline is shaded at the water's edge by forested or scrub-shrub vegetation?
   a. 60% or more.
   b. 20% or more, but less than 60%.
   c. Less than 20%.

✓35. What percentage of the wetland complex contains cover objects such as submerged logs, floating or submerged vegetation, large rocks or boulders?
   a. Greater than 25%
   b. Between 10 and 25%
   c. Less than 10%

Wetland hydrology

36. What is the wetland's **primary** source of water? (Determine in the field or in the office. This may be difficult to determine. If a surface water connection exists—stream, lake, ditch—use it as the primary source. If no surface water connection is present, talk to local natural resource people for hints.)
   a. Surface flow, including streams and ditches.
   b. Precipitation or sheet flow.
   c. Groundwater, including springs or seeps.

✓37. Is there evidence of flooding or ponding during a portion of the growing season? Look for evidence of water fluctuation such as sediment stains on trees, drift lines, surface scour or sediment deposits. Also look at the location of the wetland. Is it in a distinct topographic depression or adjacent to a stream that is known to flood or fluctuate because of storm pulses?
   a. Yes (describe).
   b. Unable to determine or not applicable.
   c. No.

✓38. Is water flow out of the wetland restricted (e.g., beaver dam, concrete structure, undersized culvert)?
   a. Yes, the outlet is restricted or the wetland has no outlet.
   b. Minor restrictions slow down the water (e.g., undersized culvert).
   c. No, the outlet has unrestricted flow.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 13 of 19)

✓39. If the primary source of water is surface flow, is the water flow into the wetland restricted?
   a. Flow is not restricted, or if blocked, the obstruction can be removed easily.
   b. Permanent blockage to the flow exists but may be breached or a new flow channel created (engineering or earth moving solution).
   c. Flow is restricted and cannot be restored.

40. Has the stream flow or stream bank been modified by human activities less than 1 mile above the wetland? Modifications include dams, channelizations and levees, and confinement of the stream in a pipe.
   a. Yes.
   b. No.

Public access to wetland site *(select an appropriate area to observe the wetland to answer these questions.)*

41. Is the wetland site open to the public for direct access or observation?
   a. Yes, the wetland is open to the public.
   b. Yes, but wetland access is allowed only by permission of the landowner or managing entity.
   c. No, access is not allowed.

✓42. Are there visible hazards to the public at the wetland site? (Examples: busy road adjacent to the site, and no buffer or sidewalk exists; steep embankment; and contaminated water.)
   a. No.
   b. One or two visible safety hazards exist (describe).
   c. More than two visible safety hazards exist (describe).

✓43. Are there other natural landscape features, such as a stream, lake, pond, forest or agricultural land contiguous or adjacent to the wetland?
   a. Yes. (List type and extent.)
   b. No.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 14 of 19)

✓44. Is there existing physical public access to features listed in Question 43? If not, can such access be created easily, or can other habitats be observed from the site? For a stream, pond or lake, access may require dry ground to the water's edge. Stream access could also be at a road crossing, but consider the safety at such locations

a. Public access to other habitats exists or can be created easily.

b. Public access doesn't exist and can't be created easily, but observation of other features can be made from the site.

c. Public access doesn't exist and can't be created easily. In addition, observation of other features can't be made from the site.

✓45. Does it appear that access to a viewing spot or wetland edge is available for individuals with limited mobility? (To see whether the site meets ADA requirements, a more thorough examination should be done.)

a. Yes.

b. No. (List physical barriers.)

✓46. Is there a public access point within 250 feet of the wetland's edge? Access points include parking lots, transit stops, bike lanes, trails and water courses. Maintained means that the area is designated as a car or transit area by the managing entity. Unmaintained would be a road pull-off or other area that people use but is not designated for such use. Describe the type of access.

a. Yes, a maintained access point exists (describe).

b. Yes, an unmaintained access point exists (describe).

c. No access point exists, or the access point is hazardous.

Recreation

✓47. Is the wetland accessible by boat?

a. Boat launching areas or access points exist on site or within 1/2 mile on a connected lake, river, bay or other body of water.

b. Potential to develop boat launching areas or access points exists, or such features are more than 1/2 mile but less than 1 mile from the wetland.

c. No boat launching areas or access points exist within 1 mile of the wetland, and potential to develop launching areas or access points is limited.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 17 of 19)

✓48. Are there trails, viewing areas or other structures that guide user movement to a particular area or areas in or around the wetland?
   a. Yes, developed or maintained trails or viewing areas exist.
   b. Yes, undeveloped trails or viewing areas exist that do not disrupt wildlife or plant habitat.
   c. No trails or viewing areas exist, or those that do disrupt wildlife or plant habitat.

49. Is fishing allowed at the wetland or connected water body? (Contact local Oregon Department of Fish and Wildlife office.) Answer "not applicable" if question 18 was answered "b" or "c," unless question 21 indicates that 10% or more of the wetland's area is covered by open water.
   a. Yes (either all or part of the year).
   b. No.
   c. Not applicable.

50. Is hunting allowed at the wetland? (If the wetland is within the city limits, hunting is not allowed. Otherwise, contact the local Oregon Department of Fish and Wildlife office for this information.)
   a. Yes (either all or part of the year).
   b. No.

Aesthetics

✓51. For **rural areas**, what is the extent of visual contrast with the surrounding landscape? (See Figure 6.)
   a. Significant contrast with surrounding landscape.
   b. Limited contrast with surrounding landscape.
   c. Little or no contrast with surrounding landscape.

✓52. For **urban areas,** what is the visual character of the surrounding area? (See Figure 7.)
   a. Open space or naturally landscaped areas.
   b. Areas landscaped or manipulated by people.
   c. Developed with no landscaping.

✓53. Are there visual detractors at the wetland site such as abandoned cars, litter, shopping carts or other objects that distract the viewer from the wetland?
   a. Yes.
   b. No.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 18 of 19)

✓54. If the wetland contains visual detractors, as indicated in question 53, can they be removed easily?

a. Yes.

b. No.

Locate the primary viewing area(s) for the following four questions (be sure to indicate the location on the overlay).

✓55. What odors are present at the primary viewing location(s)?

a. Natural, pleasant odors only.

b. Unpleasant odors such as automobile exhaust or stench from a sewage treatment plant are present at certain times.

c. Unpleasant odors are distinct and continuously present.

Figure 6. Visual contrast.
The top part of the figure shows a wetland with significant visual contrast with the surrounding landscape. The bottom part shows a wetland with little or no visual contrast with the surrounding landscape.

Watershed identification _____

	Wetland 1	Wetland 2	Wetland 3

Wetland Characterization (Page 19 of 19)

✓56. What noises are audible at the primary viewing location(s)?

a. Bird and wildlife noises and other naturally occurring sounds.

b. Some traffic and other similar background sounds are audible in addition to naturally occurring sounds.

c. Continuous traffic or other intrusive noise is audible in addition to naturally occurring sounds.

d. Continuous traffic or other intrusive noise is audible, but no naturally occurring sounds are.

✓57. How much of the wetland is visible from the viewing area(s)? Describe the view.

a. Greater than 50%.

b. Between 25% and 50%.

c. Less than 25%.

✓58. How many Cowardin classes are visible from the primary viewing area(s)? (See question 21 for list of Cowardin classes to use.)

a. More than two.

b. Two

c. One

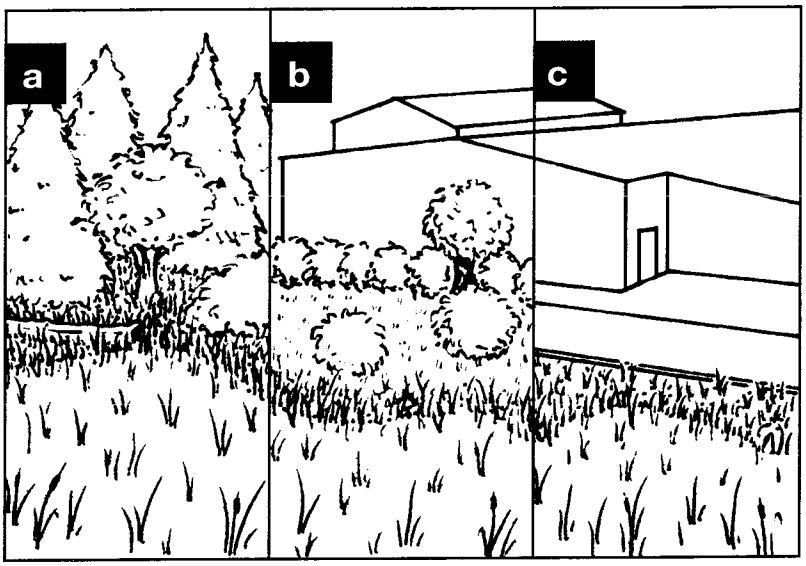


Figure 7. Visual character of urban wetlands.
Beginning with the left part, this figure shows an urban wetland with naturally landscaped areas, areas landscaped by people and with unlandscaped developed areas.

Appendix C

Assessment questions, answer sheets & summary sheets

Notes

Wetland identification _____

Notes

Assessment questions: wildlife habitat (Page 1 of 3)

Question	Answer
1. How many Cowardin wetland classes are present? (Characterization: 21)	*Rural areas:* a. Three or four. b. Two. c. One. *Urban areas:* a. Two or more. b. One class with more than five plant species. c. One class with five or fewer plant species.
2. What is the dominant wetland vegetation cover type? (Characterization: 23)	a. Woody vegetation. b. Emergent vegetation and ponding, or open water only. c. Emergent vegetation or wet meadow.
3. What is the degree of Cowardin class interspersion for the wetland being observed? (Characterization: 24)	a. High. b. Moderate. c. Low.
4. If the wetland contains unvegetated open water, how many acres of unvegetated open water are present? (Characterization: 28)	*Rural areas:* a. More than 3 acres . b. Between 0.5 and 3 acres. c. Less than 0.5 acres. *Urban areas:* a. More than 1 acre. b. Between 0.5 and 1 acre. c. Less than 0.5 acres.

Wetland identification _____

Assessment questions: wildlife habitat (Page 2 of 3)

Question	Answer
5. How is the wetland connected to another body of water, such as a stream, lake or pond? (Characterization: 18)	a. The wetland is connected by surface water to another body of water. b. No surface water connection exists to another body of water, but other bodies of water lie within 1 mile of the wetland. c. No surface-water connection exists to another body of water, and no other bodies of water lie within 1 mile of the wetland.
6. How is the wetland connected to other wetlands? (Characterization: 27)	a. Connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, culvert, canal or lake. b. Not connected by surface waters, but other unconnected wetlands lie within a 3-mile radius. c. Not connected to other wetlands by surface waters, and no other unconnected wetlands lie within a 3-mile radius.
7. What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland? (Characterization: 8)	a. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants. b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants. c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Notes

Wetland identification _____

Notes

Assessment questions: wildlife habitat (Page 3 of 3)

Question	Answer
8. What is the dominant existing land use within 500 feet of the wetland's edge? (Characterization: 15)	a. Exclusive Forest Use or Open Space. b. Agriculture. c. Developed uses.
9a. For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide? (Characterization: 25)	a. Greater than 40%. b. Between 10% and 40%. c. Less than 10%.
9b. For **urban areas:** What percent of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide? (Characterization: 26)	a. Greater than 40%. b. Between 10 and 40%. c. Less than 10%.

Wildlife habitat: assessment criteria

The wetland provides diverse wildlife habitat if:	At least four questions are answered "a," and no more than one is answered "c."
The wetland provides habitat for some wildlife species if:	Answers do not satisfy the above- or below-listed criteria.
The wetland's wildlife habitat function is lost or not present if:	All questions are answered "c."

Wetland identification _____

Notes

Assessment questions: fish habitat (Page 1 of 3)

Part A—streams

Question	Answer
1. What percentage of the stream is shaded by streamside (riparian) vegetation? (Characterization: 31)	*Western Oregon:* a. More than 75%. b. Between 50% and 75%. c. Less than 50%. *Eastern Oregon:* a. 50% or more. b. 25% or more, but less than 50%. c. Less than 25%.
2. What is the physical character of the stream channel? (Characterization: 30)	a. The stream is in a natural channel, or modified portions of the stream are returning to a natural channel. b. Only portions of the stream channel are modified. c. The stream is extensively modified or confined in a non-vegetated channel or pipe.
3. What percentage of the entire stream contains instream structures such as large woody debris, floating submerged vegetation, large rocks or boulders? (Characterization: 32)	a. More than 25%. b. Between 10% and 25%. c. Less than 10%.
4. What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland? (Characterization: 8)	a. No upstream or adjacent reaches are listed as *water quality limited*, and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants. b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants. c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Wetland identification _____

Assessment questions: fish habitat (Page 2 of 3)

Question	Answer
5. What is the dominant existing land use within 500 feet of the wetland's edge? (Characterization: 15)	a. Exclusive Forest Use or Open Space. b. Agriculture. c. Developed uses.
6. Are fish present in a stream, lake or pond associated with the wetland? (Characterization: 29)	a. Salmon, trout or sensitive species are present at some time during the year. b. Species not covered in "a" are present at some time during the year. c. No species are present at any time during the year.

Part B—lakes and ponds

1. Does the lake or pond contain areas of both deep and shallow water? (Characterization: 33)	a. Yes. b. Cannot be determined. c. No.
2. What percentage of the wetland complex contains cover objects such as submerged logs, floating or submerged vegetation, large rocks or boulders? (Characterization: 35)	a. More than 25%. b. Between 10% and 25%. c. Less than 10%.
3. What percentage of the shoreline is shaded at the water's edge by forested or scrub-shrub vegetation? (Characterization: 34)	a. 60% or more. b. 20% or more, but less than 60%. c. Less than 20%.

Notes

Wetland identification _____

Notes

Assessment questions: fish habitat (Page 3 of 3)

Question	Answer
4. What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland? (Characterization: 8)	a. No upstream or adjacent reaches are listed as *water quality limited*, and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants. b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants. c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.
5. What is the dominant existing land use within 500 feet of the wetland's edge? (Characterization: 15)	a. Exclusive Forest Use or Open Space. b. Agriculture. c. Developed uses.
6. Are fish in a stream, lake or pond associated with the wetland? (Characterization: 29)	a. Salmon, trout or sensitive species are present at some time during the year. b. Species not covered in "a" are present at some time during the year. c. No species are present at any time during the year.

Fish habitat: assessment criteria	
The wetland's fish habitat function is intact if:	Any three questions are answered "a," and no more than one is answered "c."
The wetland's fish habitat function is impacted or degraded if:	Answers do not satisfy the above- or below-listed criteria.
The wetland's fish habitat function is lost or not present if:	All questions are answered "c."

Wetland identification _____

Notes

Assessment questions: water quality (Page 1 of 2)

Question	Answer
1. What is the wetland's primary source of water? (Characterization: 36)	a. Surface flow, including streams and ditches. b. Precipitation or sheet flow. c. Groundwater, including seeps and springs.
2. Is there evidence of flooding or ponding during a portion of the growing season? (Characterization: 37)	a. Yes. b. Unable to determine or not applicable. c. No.
3. What is the degree of wetland vegetation cover? (Characterization: 21)	a. High (greater than 60%). b. Moderate (approximately 60%). c. Low (less than 60%).
4. What is the wetland's area in acres? (Characterization: 17, 27)	a. More than 5 acres. b. Between 0.5 acres and 5 acres; or wetland area is less than 0.5 acres, and the wetland is connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, canal or lake. c. Less than 0.5 acres, and the wetland is not connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, canal or lake.
5. What is the dominant, existing land use within 500 feet of the wetland's edge? (Characterization: 15)	a. Developed uses. b. Agriculture. c. Exclusive Forest Use or Open Space.

Wetland identification _____

Notes

Assessment questions: water quality (Page 2 of 2)

Question

6. What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland? (Characterization: 8)

Answer

a. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.

c. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.

Water quality: assessment criteria

A wetland's water-quality function is intact if:	Question 1 is answered "a" or "b," questions 2 and 3 are answered "a," and any other question is answered "a" or "b."
A wetland's water-quality function is impacted or degraded if:	Answers do not satisfy the above- or below-listed criteria.
A wetland's water-quality function is lost or not present if:	Four out of six questions are answered "c."

Wetland identification _____

Notes

Assessment questions: hydrologic control (Page 1 of 2)

Question	Answer
1. Is all or part of the wetland located within the 100-year floodplain or within an enclosed basin? (Characterization: 19)	a. Yes. b. No.
2. Is there evidence of flooding or ponding during a portion of the growing season? (Characterization: 37)	a. Yes. b. Unable to determine or not applicable. c. No.
3. What is the wetland's area in acres? (Characterization: 17)	a. More than 5 acres. b. Between .5 acres and 5 acres. c. Less than .5 acres.
4. Is waterflow out of the wetland restricted (e.g., beaver dam, concrete structure, undersized culvert)? (Characterization: 38)	a. Yes, the outlet is restricted or the wetland has no outlet. b. Minor restrictions slow down the water (i.e., undersized culvert.) c. No, the outlet has unrestricted flow.
5. What is the dominant wetland vegetation cover type? (Characterization: 23)	a. Woody vegetation. b. Emergent vegetation and ponding, or open water only. c. Emergent vegetation or wet meadow.
6. What is the dominant existing land use, within 500 feet of the wetland on the downstream or down-slope edge of the wetland? (Characterization: 16)	a. Developed uses. b. Agriculture. c. Exclusive Forest Use and Open Space.
7. What is the dominant land use in the watershed upstream from the assessment area? (Characterization: 6)	a. Urban or urbanizing. b. Agriculture. c. Forested or natural area.

Wetland identification _____

Assessment questions: hydrologic control (Page 2 of 2)

Hydrologic control: assessment criteria	
A wetland's hydrologic control function is intact if:	Four or more questions are answered "a."
A wetland's hydrologic control function is is impacted or degraded if:	Answers do not satisify the above- or below-listed criteria.
A wetland's hydrologic control function is lost or not present if:	Four or more questions are answered "c."

Notes

Wetland identification _____

Assessment questions: sensitivity (Page 1 of 2)

Question	Answer	Notes
1. Has the stream flow or stream bank been modified by human activities less than 1 mile above the wetland, or is the wetland isolated? (Characterization: 27, 40)	a. Yes. b. No.	
2. Is water being taken out of the stream(s) through active diking, drainage or irrigation districts upstream of the assessment area, or is the wetland isolated? (Characterization: 5, 27)	a. Yes b. No	
3. What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland? (Characterization: 8)	a. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants. b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants. c. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.	
4. What is the dominant, existing land use within 500 feet of the wetland's edge? (Characterization: 15)	a. Developed uses. b. Agriculture. c. Exclusive Forest Use or Open Space.	
5. What is the dominant zoned land use within 500 feet of the wetland's edge? (Characterization: 20)	a. Developed uses. b. Agriculture. c. Exclusive Forest Use or Open Space.	

Wetland identification _____

Assessment questions: sensitivity (Page 2 of 2)

Question	Answer
6. What is the dominant wetland vegetation cover type? (Characterization: 23)	a. Woody vegetation. b. Emergent vegetation only or wet meadow. c. Emergent vegetation and ponding, or open water only.

Sensitivity to impact: assessment criteria

A wetland is sensitive to future impacts if:	Questions 1, 2 and 3 are answered "a," and one other question is answered "a."
A wetland is potentially sensitive to future impacts if:	Answers do not satisfy the above- or below-listed criteria.
A wetland is not sensitive to future impacts if:	Questions 1 and 2 are answered "b", and no other questions are answered "a."

Notes

Wetland identification _____

Assessment questions: enhancement (Page 1 of 2)

Question	Answer
1. What are the assessment results for wildlife habitat, fish habitat, water quality and hydrologic control?	a. One or more of the functions is impacted or degraded. b. The wetland has lost one or more of the functions or one or more of the functions is not present.
2. What is the wetland's primary source of water? (Characterization: 36)	a. Surface flow, including streams and ditches. b. Groundwater, including springs or seeps. c. Precipitation or sheet flow.
3. If the primary source of water is surface flow, is the water flow into the wetland restricted? (Characterization: 39)	a. Flow is not restricted, or if blocked, the obstruction can be removed easily. b. Permanent blockage to the flow exists, but may be breached or a new flow channel created. c. Flow is restricted and cannot be restored.
4. What is the wetland's area in acres? (Characterization: 17)	a. Greater than 5 acres. b. Between .5 acres and 5 acres. c. Less than .5 acres.
5a. For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide? (Characterization: 25)	a. Greater than 40%. b. Between 10% and 40%. c. Less than 10%.
5b. For **urban areas:** What percent of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide? (Characterization: 26)	a. Greater than 40%. b. Between 10 and 40%. c. Less than 10%.

Notes

Wetland identification _____

Assessment questions: enhancement (Page 2 of 2)

Question	Answer
6. What is the result of the sensitivity to impact index?	a. The wetland is not sensitive to future impacts. b. The wetland is potentially sensitive to future impacts. c. The wetland is sensitive to future impacts.

Enhancement potential: assessment criteria	
A wetland has high enhancement potential if:	Question 1 is answered "a," and not more than one other question is answered "c."
A wetland has moderate potential for enhancement if:	Answers do not satisfy the above- or below-listed criteria.
A wetland has little enhancement potential if:	Question 1 is answered "b," and two or more other questions are answered "c."

Notes

Wetland identification _____

Assessment questions: education (Page 1 of 2)

Question	Answer
1. Is the wetland site open to the public for direct access or observation? (Characterization: 41)	a. Yes, the wetland is open to the public. b. Yes, but wetland access is allowed only by permission of the landowner or managing entity. c. No, access is not allowed.
2. Are there visible hazards to the public at the wetland site? (Characterization: 41)	a. No. b. One or two visible safety hazards exist. c. More than two visible safety hazards exist.
3. What are the results for the wildlife habitat and fish habitat assessment criteria?	a. The wetland provides diverse wildlife habitat, or the fish habitat function is intact. b. Results for the wildlife habitat and fish habitat assessment criteria do not meet the criteria for responses "a" or "c." c. Both wildlife habitat function and fish habitat function are lost or not present.
4. Is there existing physical public access to other features? If not, can such access be created easily, or can other habitats be observed from the site? (Characterization: 44)	a. Public access to other habitats exists or can be created easily. b. Public access doesn't exist and can't be created easily, but observation of other features can be made from the site. c. Public access doesn't exist and can't be created easily. In addition, observation of other features can't be made from the site.

Notes

Wetland identification _____

Assessment questions: education (Page 2 of 2)

Question	Answer
5. Is there a public access point within 250 feet of the wetland's edge? (Characterization: 46)	a. Yes, a maintained access point exists. b. Yes, an unmaintained access point exists. c. No access point exists, or the access point is hazardous.
6. Does it appear that access to a viewing spot or wetland edge is available for individuals with limited mobility? (Characterization: 45)	a. Yes. b. No.

Education: assessment criteria

A wetland has educational uses if:	Questions 1 and 2 are answered "a," and questions 3, 4 and 5 are either "a" or "b."
A wetland has potential for educational use if:	Answers do not satisfy the above- or below-listed criteria.
A wetland site is not appropriate for educational use if:	The answer to 1 or 2 is "c."

Notes

Wetland identification _____

Assessment questions: recreation (Page 1 of 2)

Question	Answer
1. Is there a public access point within 250 feet of the wetland's edge? (Characterization: 46)	a. Yes, a maintained access point exists. b. Yes, an unmaintained access point exists. c. No access point exists, or the access point is hazardous.
2. Is the wetland accessible by boat? (Characterization: 47)	a. Boat launching areas or access points exist on site or within 1/2 mile on a connected lake, river, bay or other body of water. b. Potential to develop boat launching areas or access points exists, or such features are more than 1/2 mile but less than 1 mile from the wetland. c. No boat launching areas or access points exist within 1 mile of the wetland, and potential to develop launching areas or access points is limited
3. Are there trails, viewing areas or other structures that guide user movement to a particular area or areas in or around the wetland? (Characterization: 48)	a. Yes, developed or maintained trails or viewing areas exist. b. Yes, undeveloped trails or viewing areas exist that do not disrupt wildlife or plant habitat. c. No trails or viewing areas exist, or those that do disrupt wildlife or plant habitat.
4. What is the result of the wildlife habitat index?	a. The wetland provides diverse wildlife habitat. b. The wetland provides habitat for some wildlife species. c. The wetland's wildlife habitat function is lost or not present.
5. Is fishing allowed at the wetland or adjacent water body? (Characterization: 49)	a. Yes. b. No or not applicable.

Notes

Wetland identification _____

Assessment questions: recreation (Page 2 of 2)

Question	Answer
6. Is hunting allowed at the wetland? (Characterization: 50)	a. Yes. b. No.

Recreation: assessment criteria	
The wetland provides recreational opportunities if:	Question 1 or 2 is answered "a," and at least one other question is is answered "a."
The wetland has the potential to provide recreational opportunities if:	Answers do not satisfy the above- or below- listed criteria.
The wetland is not appropriate for or does not provide recreational opportunities if:	Questions 1 and 2 are answered "c"; or questions 3 and 4 are answered "c," and 5 and 6 are answered "b."

Notes

Wetland identification _____

Notes

Assessment questions: aesthetics (Page 1 of 2)

Question	Answer
1. How many Cowardin classes are visible from the primary viewing area(s)? (Characterization: 58)	a. More than two. b. Two. c. One.
2. How much of the wetland is visible from the viewing area(s)? (Characterization: 57)	a. Greater than 50%. b. Between 25% and 50%. c. Less than 25%.
3. What is the general appearance of the wetland as visible from primary viewing location? (Characterization: 53, 54)	a. No visual detractors. b. Visual detractors exist but can be removed easily. c. Visual detractors exist and cannot be removed easily.
4. What is the extent of visual contrast with the surrounding landscape (rural) or visual character of the surrounding area (urban)? (Characterization: 52)	*Rural* a. Significant contrast with surrounding landscape. b. Limited contrast with surrounding landscape. c. Little or no contrast with surrounding landscape. *Urban* a. Open space or naturally landscaped areas. b. Areas landscaped or manipulated by people. c. Developed with no landscaping.
5. What odors are present at the primary viewing location(s)? (Characterization: 55)	a. Natural, pleasant odors only. b. Unpleasant odors such as automobile exhaust or stench from a sewage treatment plant are present at certain times. c. Unpleasant odors are distinct and continuously present.

Wetland identification _____

Assessment questions: aesthetics (Page 2 of 2)

Question	Answer
6. What noises are audible at the primary viewing location? (Characterization: 56)	*Rural* a. Bird and wildlife noises and other naturally occurring sounds. b. Some traffic and other similar background sounds are audible in addition to naturally occurring sounds. c. Continuous traffic or other intrusive noise is audible in addition to naturally occurring sounds. *Urban* a. Some traffic and other similar background sounds are audible in addition to naturally occurring sounds. b. Continuous traffic or other intrusive noise is audible in addition to naturally occurring sounds. c. Continuous traffic or other intrusive noise is audible, but no naturally occurring sounds are.

Aesthetics: assessment criteria

A wetland is considered to be pleasing if:	Question 1 or 2 is answered "a," and all other questions are answered "a" or "b."
A wetland is considered to be moderately pleasing if:	Answers do not satisfy the above- or below-listed criteria.
A wetland is not pleasing if:	Two or more questions are answered "c."

Notes

Wetland Assessment Questions: Answer Sheet				
Wetland identifier				
Wildlife habitat				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Question 7				
Question 8				
Question 9				
Assessment descriptor				
Fish habitat				
Streams and rivers				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Lakes and ponds				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Water quality				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				

Wetland Assessment Questions: Answer Sheet				
Wetland identifier				
Hydrologic control				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Question 7				
Assessment descriptor				
Sensitivity to future impacts				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Enhancement potential				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Education				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				

Wetland Assessment Questions: Answer Sheet				
Wetland identifier				
Recreation				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				
Aesthetic quality				
Question 1				
Question 2				
Question 3				
Question 4				
Question 5				
Question 6				
Assessment descriptor				

Function & condition summary sheet for the Oregon Method

Wetland identification:

Function	Assessment Descriptor	Rationale
Wildlife habitat		
Fish habitat		
Water quality		
Hydrologic control		
Sensitivity to future impacts		
Enhancement potential		
Education		
Recreation		
Aesthetic quality		

Narrative description of overall wetland functions and conditions

Watershed summary sheet for the Oregon Method

Watershed or community identification:

Characteristic	Description
Physical characteristics of the watershed	
Land uses within the watershed	
Water quality	
Biological characteristics of the watershed	

Narrative summary of watershed description

Notes

Appendix D
The Cowardin system of wetland classification

In 1979, the U.S. Fish & Wildlife Service published a classification of wetlands and deep water habitats (Cowardin et al., 1979). In this classification system, wetlands are defined by plants (hydrophytes), soils (hydric soils), and frequency of flooding.

The structure of the classification scheme is hierarchical, with systems forming the highest level of the classification hierarchy. Of the five major wetland systems, three are of interest in inland watersheds:

- **Riverine System**—All freshwater rivers and their tributaries are included in this system.
- **Lacustrine System**—Includes areas of open water greater than 20 acres or more than 6.6 feet in depth.
- **Palustrine System**—All nontidal wetlands dominated by trees, shrubs and persistent emergent herbaceous plants.

Within these three systems, wetlands are further divided into a number of classes. The classes which are important to the Oregon Method are as follows:

- **Open Water**—Areas of water where there are no beds of emergent, submergent or floating vegetation. (This is not in the Cowardin classification system, but is used on National Wetland Inventory maps.)
- **Emergent Wetland**—Characterized by rooted herbaceous and grass-like plants which stand erect above the water or ground surface, e.g. cattails, pickerel weed.
- **Scrub-shrub Wetland**—Wetlands dominated by shrubs and tree saplings less than 20 feet in height, e.g. wild rose, alders, willow saplings.
- **Forested Wetland**—Wetlands dominated by trees taller than 20 feet in height, e.g. willow, ashes, spruce.

For a more complete explanation of this classification system, the reader should refer to the original publication (Cowardin et al. 1979—see Chapter VIII for the full reference). Users of the Oregon Method may be able to obtain copies of this report from the U.S. Fish & Wildlife Service depending on availability. Reprints of the publication may be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4780, or you can contact the Oregon Division of State lands.

Notes

Appendix E
Interpretation of topographic maps & watershed delineation

For watershed delineation, you will need the following:

- Topographic map
- Ability to interpret topographic maps
- Planimeter or dot grid

For the purpose of the Oregon Method, a watershed or drainage basin is defined as the geographic area that contributes surface water runoff to a watercourse or wetland. The Oregon Method requires that an evaluator delineate and measure the watershed area of the wetland being evaluated, unless this information is already available.

This appendix describes a method for delineating a watershed on a topographic map such as a U.S. Geological Survey quadrangle sheet. Once the watershed boundary is established, the area of the watershed can be measured using one of the methods described under *Measuring Watershed Area.*

How to interpret a topographic map

In order to successfully delineate a watershed boundary, the evaluator must visualize the landscape as represented by a topographic map. This is not difficult once the following basic concepts of the topographic maps are understood.

Each contour line on a topographic map represents a ground elevation or vertical distance above a reference point such as sea level. A contour line is level with respect to the earth's surface just like the top of a building foundation. All points along any one contour line are at the same elevation.

The difference in elevation between two adjacent contours is called the contour interval. This is typically given in the map legend. It represents the vertical distance you would need to climb or descend from one contour elevation to the next.

The horizontal distance between contours, on the other hand, is determined by the steepness of the landscape and can vary greatly on a given map. On relatively flat ground, two 20-foot contours can be far apart horizontally. On a steep cliff face two 20-foot contours might be directly above and below each other. In each case the vertical distance between the contour lines would still be 10 feet.

Notes

One of the easiest landscapes to visualize on a topographic map is an isolated hill. If this hill is more or less circular the map will show it as a series of more or less concentric circles (Figure E-1). Imagine that a surveyor actually marks these contour lines onto the ground. If two people start walking in opposite directions on the same contour line, beginning at point A, they will eventually meet face to face.

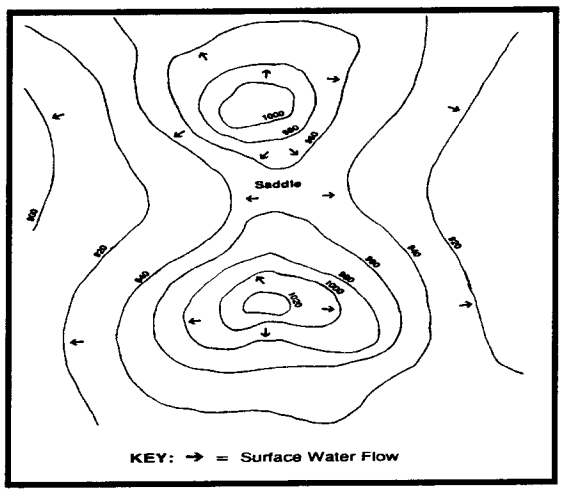


Figure E-1

If these same two people start out in opposite directions on different contours, beginning at points A and B respectively, they will pass each other somewhere on the hill and their vertical distance apart would remain 20 feet. Their horizontal distance apart could be great or small depending on the steepness of the hillside where they pass.

A rather more complicated situation is where two hills are connected by a saddle (Figure E-2). Here each hill is circled by contours but at some point toward the base of the hills, contours begin to circle both hills.

How do contours relate to water flow? A general rule is that water flow is perpendicular to contour lines. In the case of the isolated hill, water flows down on all sides of the hill. Water flows from the top of the saddle or ridge, down each side in the same way water flows down each side of a garden wall (See arrow on Figure E-2).

As the water continues downhill it flows into progressively larger watercourses and ultimately into the ocean. Any point on a watercourse can be used to define a watershed. That is, the entire drainage area of a major river like the Willamette can be considered a watershed, but the drainage areas of each of its tributaries are also watersheds.

Notes

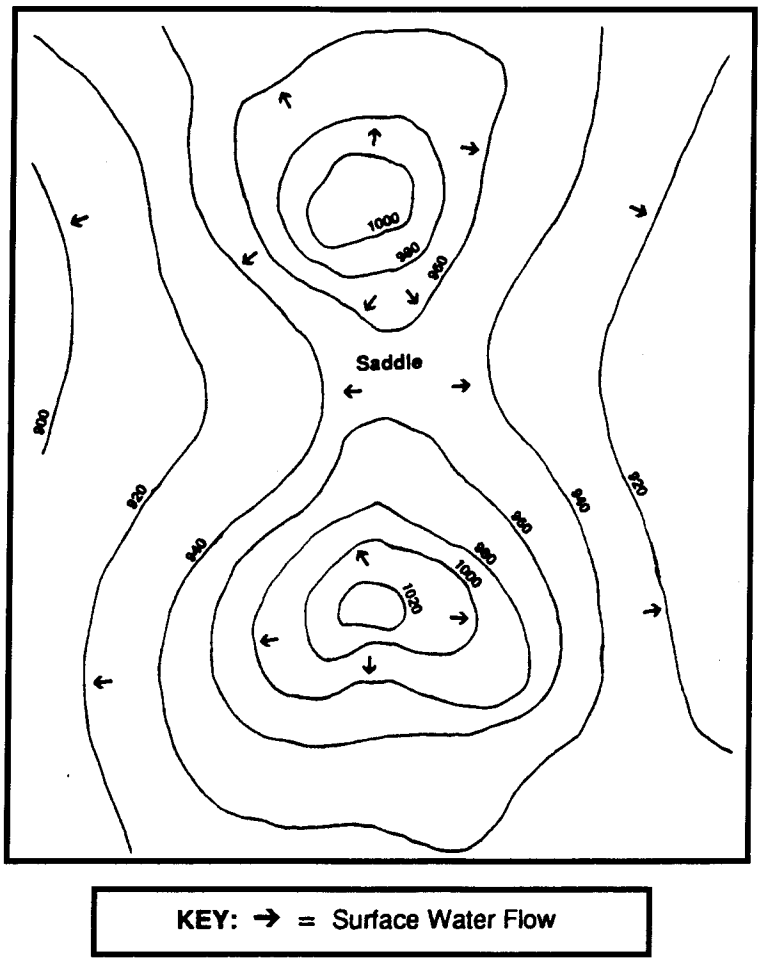
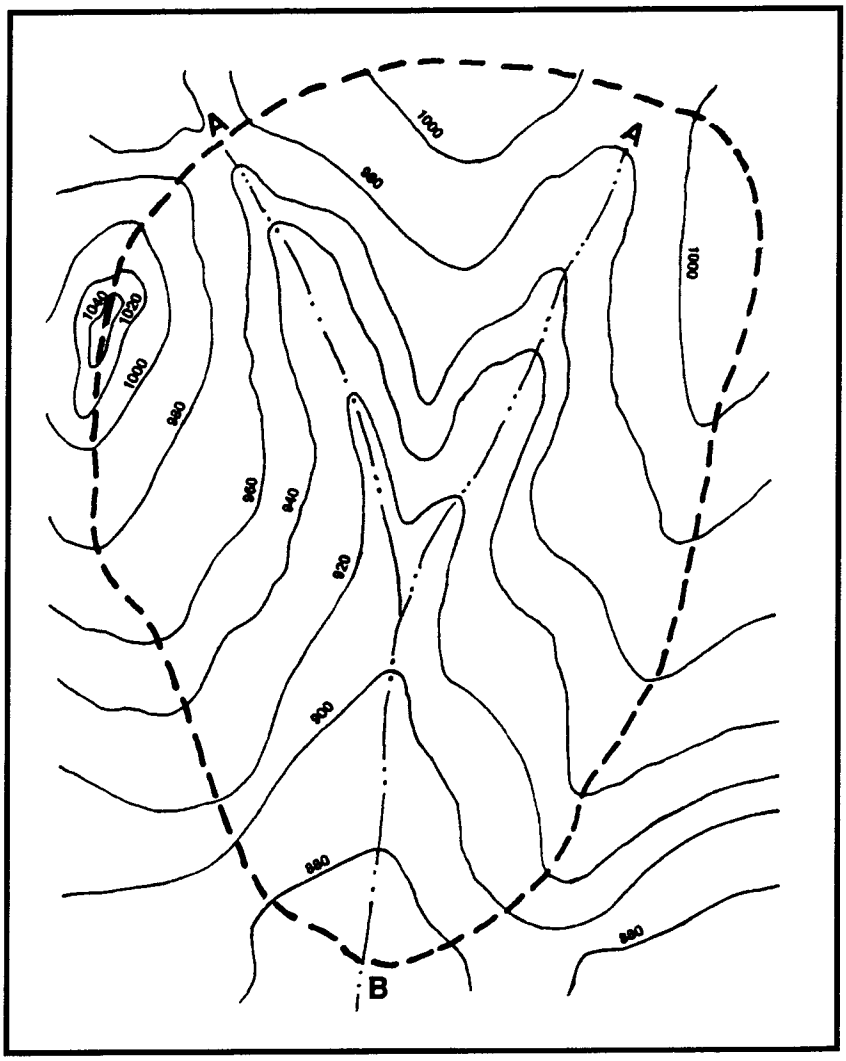


Figure E-2

Each tributary in turn has tributaries, and each one of these tributaries has a watershed. This process of subdivision can continue until very small, local watersheds are defined which might only drain a few acres, and might not contain a defined watercourse.

Figure E-3 shows an idealized watershed of a small stream. Water always flows downhill perpendicular to the contour lines. As one proceeds upstream, successively higher and higher contour lines first parallel then cross the stream. This is because the floor of a river valley rises as you go upstream. Like-wise the valley slopes upward on each side of the stream. A general rule is that topographic lines always point upstream. With that in mind, it is not difficult to make out drainage patterns and the direction of flow on the landscape even when there is no stream depicted on the map. In Figure E-3, for example, the direction of streamflow is from point A to point B.

Notes



KEY:

Stream — • • —

Watershed Boundary — — —

Figure E-3

Ultimately, you must reach the highest point upstream. This is the head of the watershed, beyond which the land slopes away into another watershed. At each point on the stream the land slopes up on each side to some high point then down into another watershed. If you were to join all of these high points around the stream you would have the watershed boundary. (High points are generally hill tops, ridge lines or saddles).

Notes

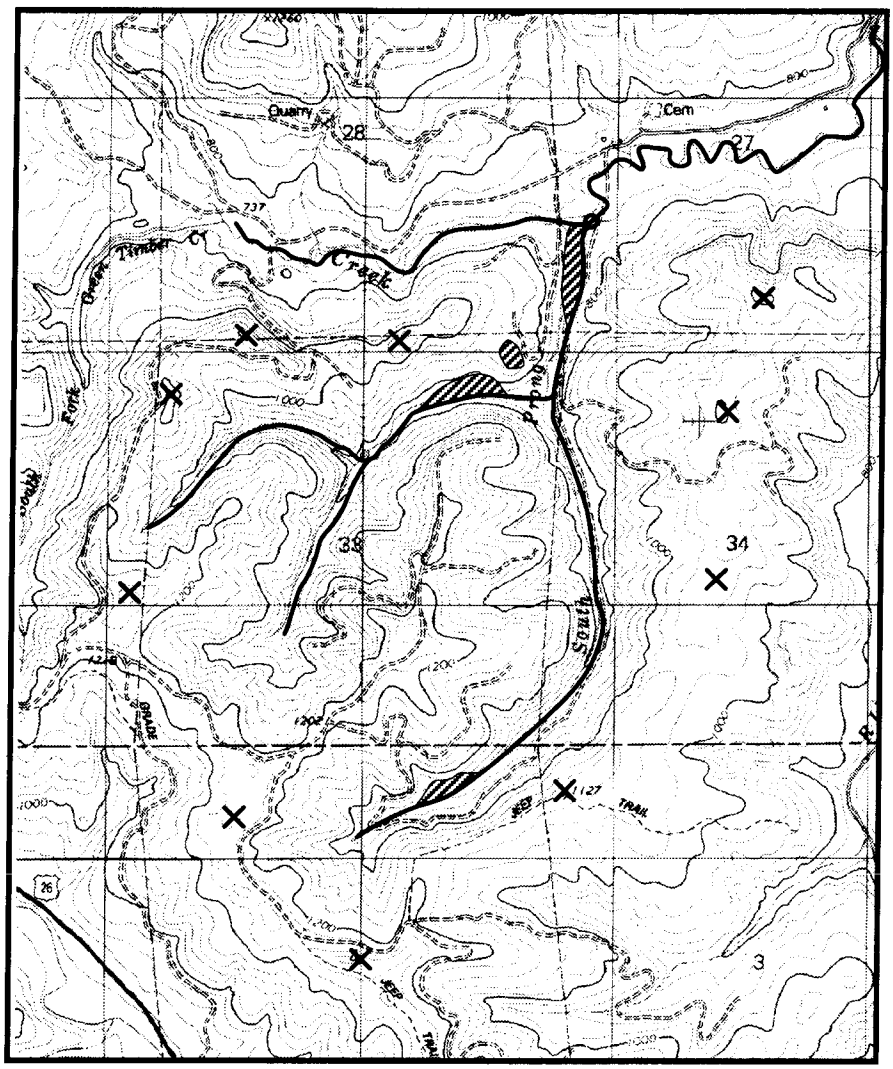


Figure E-4

Notes

How to delineate a watershed

The following procedure and example will help you locate and connect all of the high points around a watershed on a topographic map shown in Figure E-4. Visualizing the landscape represented by the topographic map will make the process much easier than simply trying to follow a method by rote.

1 Draw a circle at the outlet or downstream point of the wetland in question (the wetland is the hatched area shown in Figure E-4).

2. Put small X's at the high points along both sides of the watercourse, working your way upstream towards the headwaters of the watershed.

3. Starting at the circle that was made in step one, draw a line connecting the X's along one side of the water course (Figure E-5). This line should always cross the contours at right angles (i.e. it should be perpendicular to each contour line it crosses).

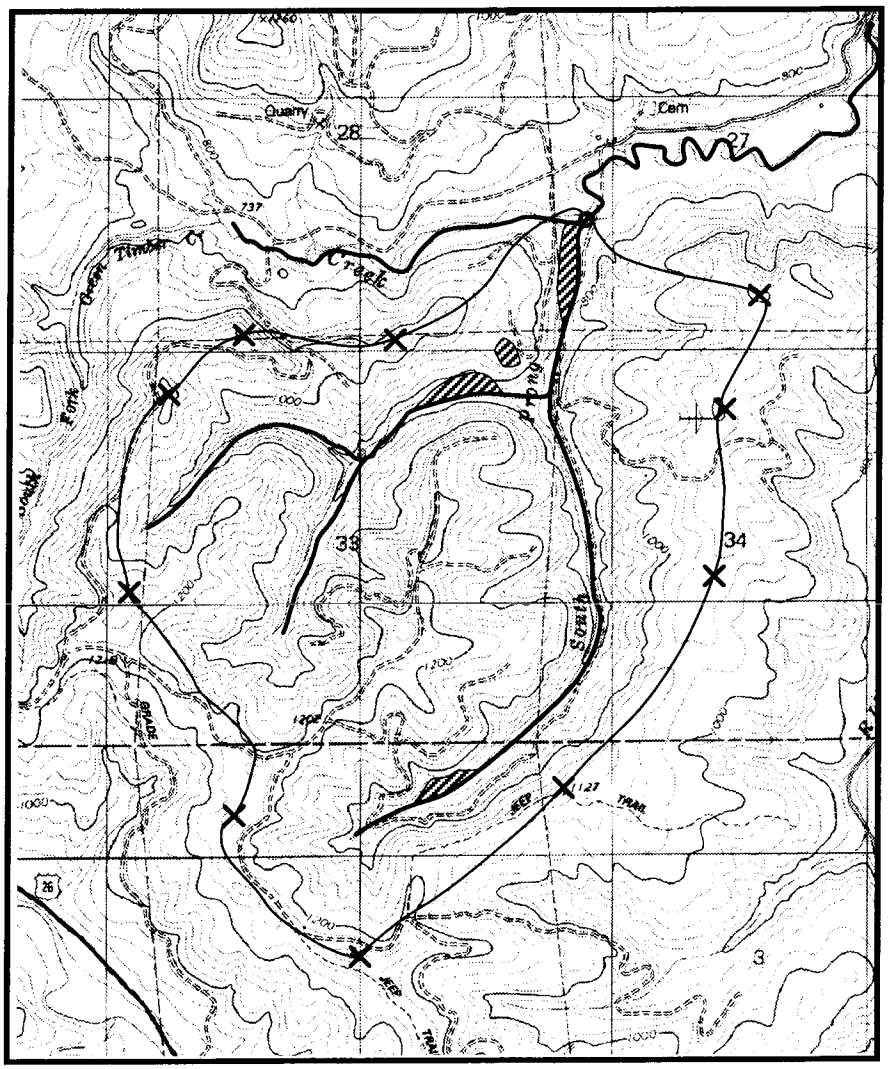


Figure E-5

Notes

4. Continue the line until it passes around the head of the watershed and down the opposite side of the water course. Eventually it will connect with the circle from which you started. At this point you have delineated the watershed of the wetland being evaluated.

The delineation appears as a solid line around the watercourse. Generally, surface water runoff from rain falling anywhere in this area flows into and out of the wetland being evaluated. This means that the wetland has the potential to modify and attenuate sediment and nutrient loads from this watershed as well as to store runoff that might otherwise result in downstream flooding.

How to measure watershed areas

There are two widely available methods for measuring the area of a watershed: the dot grid method, and the planimeter method. Both can be used to measure the area of the wetland itself as well as required by the Oregon Method.

The dot grid method

The dot grid method is a simple technique that does not require expensive equipment. In this method the user places over the map area to be measured a sheet of acetate or mylar that has a series of dots about the size of the period at the end of this sentence printed on it. The user counts the dots that fall within the area to be measured and multiplies by a factor to determine the area. A hand-held, mechanical counting device is available to speed up this procedure.

The planimeter method

The second of these methods involves using a planimeter, which is a small device having a hinged mechanical arm. One end of the arm is fixed to a weighted base while the other end has an attached magnifying lens with a cross hair or other pointer. The user spreads the map with the delineated area on a flat surface. After placing the base of the planimeter in a convenient location the user traces around the area to be measured with the pointer. A dial or other readout registers the area being measured.

Planimeters cost from several hundred dollars up to a thousand dollars or more depending of the degree of sophistication. For the purposes of the Oregon Method, a basic model is sufficient. Dot counting grids are more affordable, and are in the 10- to 20-dollar range. Both planimeters and dot grid sheets are available from engineering and forestry supply companies. Users of either of these methods should refer to the instructions packaged with the equipment they purchase.

Notes

Appendix F
Calculation of the average slope & stream gradient of the watershed

To calculate average slope and stream gradient, you will need:

- A U.S. Geological Survey topographic map or aerial photograph
- Ruler or scale, and
- Pocket calculator

How to calculate the average slope of a watershed

When the average watershed slope is difficult to estimate because of complex topography or lack of sufficient local data, the following method using a grid system on a topographic map may be used.

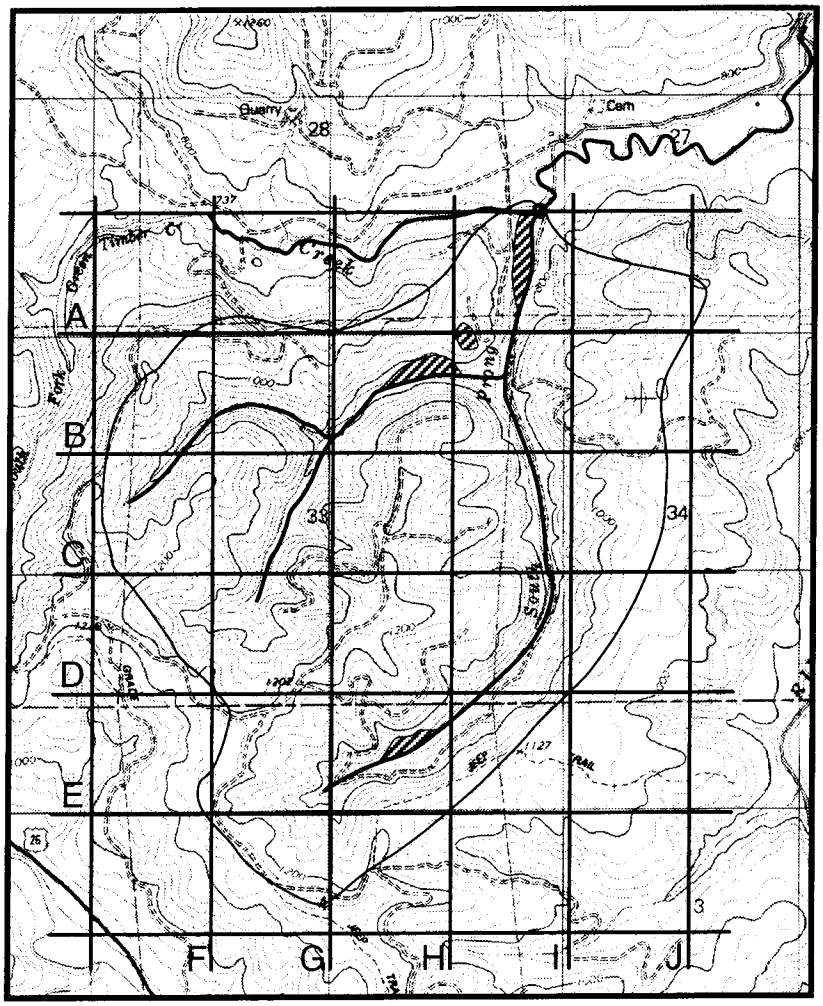
The procedure is as follows:

1. Establish a grid on the contour map on which the watershed has been delineated. The grid is usually laid off on a north-south and east-west line, but this is not essential. At least four grid lines should cross the watershed in each direction (Figure F-1).
2. Measure the length of each grid line in each direction within the watershed boundary. Using the map scale, convert your measurement to feet. The total of these lengths is the denominator (L) in the equation below.
3. Count the number of contour line crossings or points of contact along each grid line. The total number of crossings is N in the numerator in the equation.
4. The value ΔZ in the numerator is the contour interval of the topographic map being used. If you are using a 7.5 minute U.S. Geological Survey topographic map, the contour interval is 20 feet. For 15 minute U.S. Geological Survey topographic maps, the contour interval is 40 feet.
5. The constant 1.57 in the equation is a modifying factor that is related to the angle between the contours and the grid lines.
6. S simply refers to Slope.

The mathematical formula for determining the average watershed slope using the grid system is expressed as:

$$S = \frac{N \times \Delta Z \times 1.57}{L}$$

Notes



Line lengths				Contour crossings			
A =	8,500'	F =	7,000'	A =	34	F =	34
B =	7,500'	G =	7,750'	B =	45	G =	42
C =	8,000'	H =	7,500'	C =	39	H =	42
D =	6,000'	I =	6,500'	D =	25	I =	29
E =	3,250'	J =	1,000'	E =	12	J =	1
	33,250'		29,750'		155		148

Totals:	Length	33,250'	Crossings	155
		+29,750'		+148
		63,000'		303

Figure F-1

Notes

The following example illustrates the procedure.

Problem

Determine the average watershed slope for the watershed already delineated.

Solution

Outline the watershed on a topographic map and lay out a grid system with at least four grid lines in each direction (Figure F-1).

Referring to the map, first calculate the lengths of the grid lines within the watershed boundary, and then count the number of contour crossings or points of contact on the grid in both directions (also within the watershed boundary) as shown in the example (Figure F-1).

Using the equation:

$$S = \frac{N \times \Delta Z \times 1.57}{L}$$

The average slope is:

$$S = \frac{303 \times 40 \text{ feet} \times 1.57}{63{,}000 \text{ feet}} = \frac{19{,}028}{63{,}000} = 0.302$$

Expressed as a percent, S = 30.2%. Round off to 30%.

Calculation of stream gradient

The topography or relief of a basin has an influence on the hydrological response of the drainage basin. The slope (or gradient) of a stream channel, which is determined by topography, affects the velocity (speed) of flow in the channel.

Commonly, only the main stream is considered when describing the stream gradient of a watershed. The longest stream is taken to be the main stream. To obtain the value for the gradient of the stream, it is necessary to measure the total fall in height of the stream from its most distant point in the watershed to the outlet (points A and B respectively in Figure F-2). The blue line marked on the U.S.Geological Survey topographic map is used to measure stream length. The fall in height of the stream is found by considering the contour pattern of the topographic map, and is divided by the length of the stream channel (measured from A to B in Figure F-2) to give a value for gradient. Gradient can either be expressed in feet per mile, or as a percentage (see the following example).

The stream length can be measured either by using a map wheel, or by carefully measuring along each stream length with a length of string (a narrow link gold or silver chain works very well).

1. Establish the highest (point A) and the lowest (point B) contours along the main stream channel within the watershed boundary. Calculate the height difference in feet (A-B).

Notes

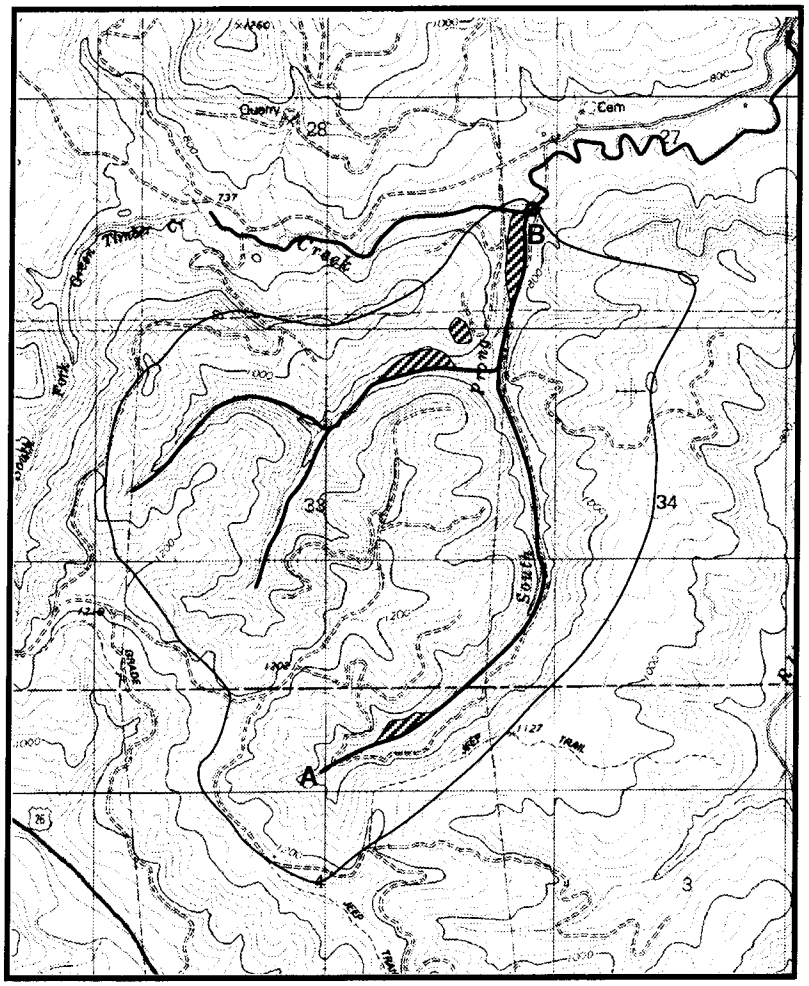


Figure F-2

2. Measure the length of the main stream channel (L) in feet.
3. Divide the answer from Step 1 by the answer from Step 2:

$$\frac{A\text{-}B}{L} = \text{Stream gradient}$$

In Figure F-2
A = 980'
B = 760'
L = 10,500'

$$\frac{980 \text{ feet} - 760 \text{ feet}}{10{,}500 \text{ feet}} = \frac{220}{10{,}500} = 0.02$$

The stream has a 2% gradient. It can also be said that the stream drops 111 feet per mile or 220 feet per 10,500 feet.

Appendix G
Uncommon wetland plant communities in Oregon

Notes

The following section was prepared by John A. Christy of the Oregon Natural Heritage Program

The list of uncommon wetland plant communities present in this appendix was extracted from the 1993 edition of the Oregon Natural Heritage Program's *Classification and catalog of native wetland plant communities in Oregon*, which is available from the Oregon Natural Heritage Program.

The rank assigned to each community follows the standard Heritage Program methodology. Each is given a four-character ranking (e.g., G2S1), which can be decoded using the following legend:

G Global rank indicator; denotes rank based on worldwide status.

S State rank indicator; denotes rank based on status within Oregon.

1 Critically imperiled because of extreme rarity; 5 or fewer occurrences or very few remaining acres.

2 Imperiled because of rarity; 6-20 occurrences or few remaining acres.

3 Either very rare and local throughout its range or found locally in a restricted range; uncommon; 21-100 occurrences.

4 Apparently secure, though it may be quite rare in parts of its range, especially at the periphery; many occurrences.

5 Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery; ineradicable under present conditions.

U Unknown

Palustrine aquatic bed: freshwater

Myriophyllum hippuroides

G5S2 Western water-milfoil bed

Scirpus subterminalis

G3S1 Water clubrush bed

Palustrine emergent wetland: serpentine fens

Darlingtonia californica

G2S2 Darlingtonia serpentine fen

Notes

Palustrine emergent wetland: alkaline marshes and playas

Carex douglasii-Deschampsia cespitosa

G1S1 Tufted hairgrass-Douglas sedge alkaline meadow

Elymus triticoides-Poa juncifolia

GUS2 Creeping wildrye-alkali bluegrass playa

Poa nevadensis-Puccinellia lemmonii

G2S1 Nevada bluegrass-Lemmon alkaligrass playa

Palustrine emergent wetland: vernal pools and snowbed depressions

Alopecurus saccatus-Plagiobothrys

GUS2 Foxtail-popcorn flower vernal pool

Danthonia unispicata-Deschampsia danthonioides

GUS2 Oatgrass-hairgrass vernal pool

Downingia-Eleocharis

G2S2 Downingia-spikerush vernal pool

Myosurus minimus-Plagiobothrys

GUS2 Mousetail-popcorn flower vernal pool

Navarretia intertexta-Polygonum kelloggii

GUS2 Navarretia-popcorn flower vernal pool

Plagiobothrys-Veronica peregrina

GUS2 Popcorn flower-veronica vernal pool

Palustrine emergent wetland: coastal fresh-water fens, marshes, and deflation plains

Calamagrostis nutkaensis

G3S1 Pacific reedgrass fen

Palustrine emergent wetland: low- to mid-elevation western Oregon fens, marshes

Carex aperta

G1S1 Columbia sedge marsh

Carex unilateralis-Hordeum brachyantherum

G2S2 One-sided sedge-meadow barley marsh

Deschampsia cespitosa (interior valley association)

G2S2 (interior valley association) Tufted hairgrass prairie

Ludwigia palustris-Polygonum hydropiperoides

G2S2 Water purslane-waterpepper marsh

Sagittaria latifolia

G4S2 Wapato marsh

Palustrine emergent wetland; montane fens, etc.: spikerush dominated

Eleocharis pauciflora/Hamatocaulis vernicosus

G3S2 Few-flowered spikerush/brown moss fen

Palustrine scrub-shrub wetland: serpentine fens

Rhododendron occidentale/Camassia quamash

G2S2 Western azalea/camas shrub swamp

Palustrine scrub-shrub wetland: coastal shrub swamp, bog and brush prairie

Ledum glandulosum/Sphagnum

G2S2 Labrador-tea/sphagnum bog

Ledum glandulosum/Darlingonia californica/Sphagnum

G2S2 Labrador-tea/darlingtonia/ sphagnum bog

Ledum glandulosum-Myrica gale

G1S1 Labrador tea-sweet gale heath

Vaccinium uliginosum/Deschampsia cespitosa

G2S2 Coastal bog blueberry/tufted hairgrass brush prairie

Palustrine scrub-shrub wetland: low- to mid-elevation western Oregon shrub swamp, brush prarie and riparian

Rosa nutkana/Oenanthe sarmentosa

G2S2 Nootka rose/water parsley shrub swamp

Rosa nutkana/Deschampsia cespitosa

G2S2 Nootka rose/hairgrass brush prairie

Salix geyeriana-Salix piperi

G1S1 Geyer willow-Piper willow shrub swamp

Salix lasiandra/Urtica dioica

G3S2 Pacific willow shrub swamp

Salix piperi-Salix sitchensis

G2S2 Piper willow-Sitka willow shrub swamp

Notes

Notes

Vaccinium caespitosum

G3S1 Dwarf blueberry brush prairie

Palustrine scrub-shrub wetland: montane (Cascade and eastern Oregon) shrub swamp and riparian

Salix boothii-Salix drummondiana

G3S1 Booth willow-Drummond willow shrub swamp

Salix boothii-Salix eastwoodiae

G3S2 Booth willow-mountain willow riparian

Salix boothii-Salix lemmonii

G3S2 Booth willow-Lemmon willow riparian

Salix drummondiana

G3S1 Drummond willow shrub swamp

Salix geyeriana-Salix lemmonii

G3S2 Geyer willow-Lemmonwillow riparian

Salix geyeriana-Salix rigida

G3S2 Geyer willow-rigid willow riparian

Vaccinium occidentale/Sphagnum fuscum

G1S1 Bog blueberry/sphagnum shrub swamp

Palustrine scrub-shrub wetland: low- to mid-elevation eastern Oregon riparian

Salix amygdaloides-Salix exigua

G3S2 Peachleaf willow-coyote willow

Salix exigua

G3S2 Coyote willow riparian

Salix exigua-Salix lasiandra

G3S2 Coyote willow-Pacific willow riparian

Salix exigua-Salix rigida

G3S2 Coyote willow-rigidwillow riparian

Salix lasiandra-Rosa woodsii

G3S2 Pacific willow-Woods rose riparian

Salix rigida-Ribes aureum

G3S2 Rigid willow-golden currant riparian

Palustrine forested wetland: serpentine fens and riparian

Chamaecyparis lawsoniana/Rhododendron occidentale/Darlingtonia californica

G2S2 Port Orford cedar-western azalea/darlingtonia riparian

Palustrine forested wetland: coastal swamps and muskeg

Picea sitchensis/Cornus stolonifera

G3S1 Old-growth Sitka spruce/creek dogwood tideland swamp

Picea sitchensis/Rubus spectabilis/Lysichitum americanum

G3S1 Old-growth Sitka spruce/salmonberry/skunkcabbage swamp

Pinus contorta/Carex obnupta

G2S1 Shore pine/slough sedge vernal pool

Pinus contorta-Thuja plicata/Ledum glandulosum

G3S1 Shore pine-red cedar/Labrador tea muskeg

Palustrine forested wetland: low- to mid-elevation western oregon swamps and riparian

Fraxinus latifolia/Urtica dioica

G3S2 Oregon ash/nettle woodland

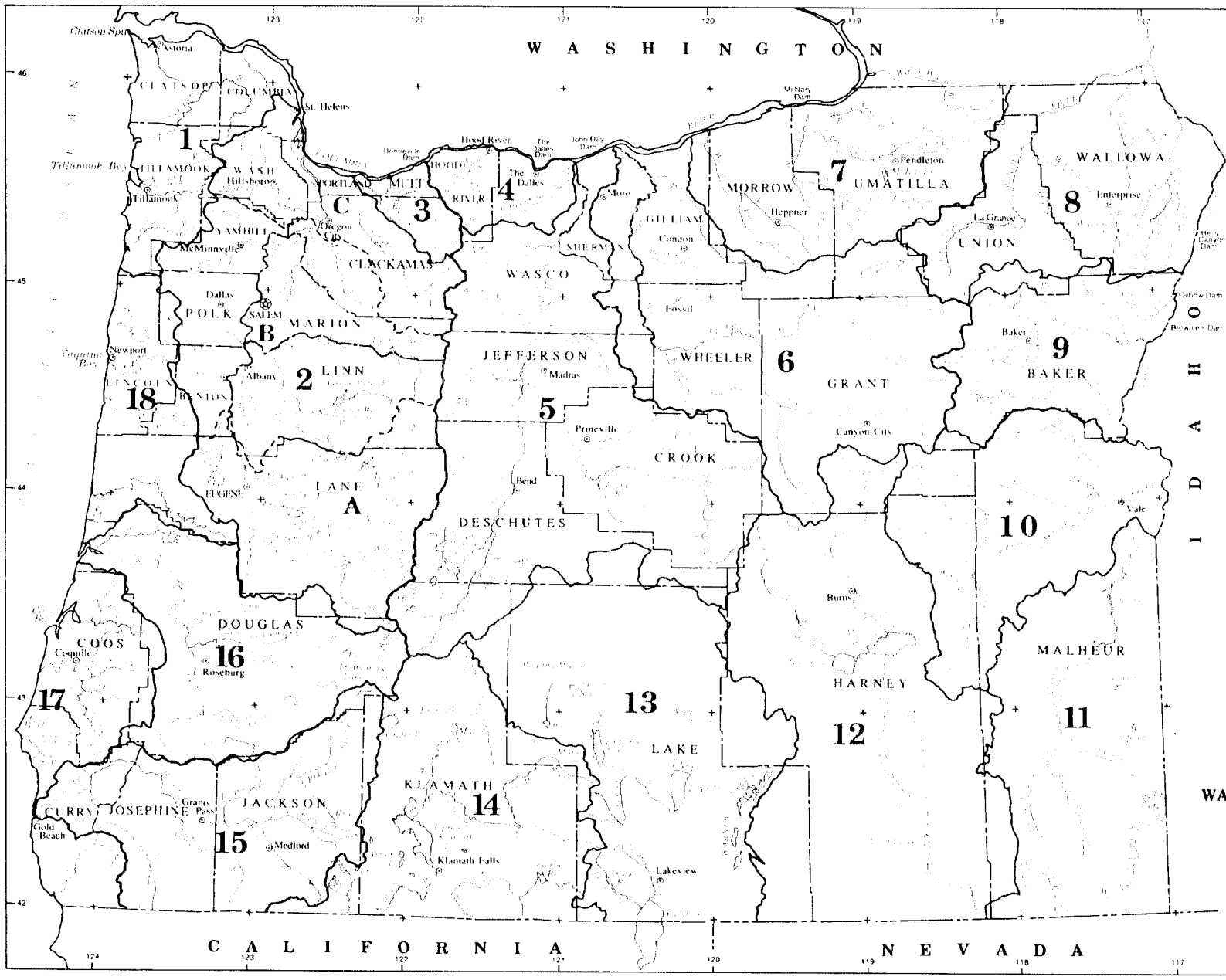
Thuja plicata/Lysichitum americanum

G3S1 Old-growth red cedar/skunk cabbage swamp

Notes

Appendix H
Basin Map

Notes



N

BASINS

1	NORTH COAST	1972
2,3	WILLAMETTE/SANDY	1989
2A	UPPER WILLAMETTE	1976
2B	MIDDLE WILLAMETTE	1977
2C, 3	LOWER WILLAMETTE, SANDY	1978
4	HOOD	1975
5	DESCHUTES	1973
6	JOHN DAY	1986
7	UMATILLA	1988
8	GRANDE RONDE	1975
9	POWDER	1979
10	MALHEUR	1983
11	OWYHEE	1967
12	MALHEUR LAKE	1966
13	GOOSE & SUMMER LAKES	1989
14	KLAMATH	1971
15	ROGUE	1980
16	UMPQUA	1974
17	SOUTH COAST	1971
18	MID COAST	1972

Drainage Basin Maps are available at $4.00 each. A handling fee of $2.50 for maps mailed in tubes and $1.00 for folded maps will be charged. Prepayment required. Dates indicate most recent map edition

WATER RESOURCES DEPARTMENT
3850 PORTLAND RE. N.E.
SALEM, OR 97310
Phone: 378-3671

0 10 20 30 40
Miles

State of Oregon

WATER RESOURCES DEPARTMENT
1991

OREGON DRAINAGE BASINS

Appendix I
Wetland fact sheets

Notes

The following inserts are wetland fact sheets published by the Oregon Division of State Lands Wetlands Program. They are intended as background material.

JUST THE FACTS . . .

ABOUT THE NATIONAL WETLANDS INVENTORY

What is the National Wetlands Inventory?

In 1974, the U.S. Fish and Wildlife Service (FWS) was directed to conduct an inventory of the nation's wetlands. The goal of the National Wetlands Inventory (NWI) is to classify and map the nation's wetlands and evaluate wetland status and trends. NWI maps contain information on the location and classification (Cowardin et al. 1979) of wetlands and deepwater habitats (streams, lakes and estuaries). This information is overlaid on 7.5 minute (1:24,000) U.S. Geological Survey topographic maps.

In 1989, Oregon entered into a cost-share agreement with the FWS to speed completion of the 1,869 maps required to cover the state. The entire state has been completed, although many maps will be in draft form for some time. Not all of Oregon's maps are the same type or of equal quality. Contact the Division of State Lands (DSL) for information on specific maps.

Important Points to Keep in Mind as You Use the Maps

☐ NWI maps are based upon interpretation of high-altitude aerial photographs. Because of this:

- Most wetlands on the map are not field-verified; although the maps are very good, expect some errors.
- The minimum required mapping resolution is 2 acres; many smaller wetlands will not appear on the map.
- The mapped wetland is the approximate wetland location with respect to geographic features such as roads. Inventory methods and map scale prevent greater mapping accuracy than 30-50 feet.

☐ Maps are a snapshot in time, reflecting conditions at the time the source airphotos were taken. This is especially important to remember for dynamic systems like wetlands, which may vary seasonally and annually.

- Most airphotos were taken in July or August; this means that seasonal wetlands or small wetlands obscured by tree canopy may be especially difficult to identify and map.
- The month and year of the airphoto is noted on each map.
- Changes (natural or otherwise) after that date will not be reflected on the map.

☐ **The National Wetlands Inventory was not designed to be a map of regulated wetlands and waterways**, and there is a note to that effect at the bottom of each map. Reasons include:

- Wetland regulations vary across the nation and are subject to change.
- Wetlands that are cultivated and cropped are not included on NWI maps but may be regulated. For information on agricultural wetlands, contact the U.S. Soil Conservation Service, Army Corps of Engineers, or DSL.
- Due to scale and methodology, small, seasonal, and/or tree-obscured wetlands are easily missed.
- Airphoto interpretation methods rely on visible hydrology and/or wetland vegetation, whereas jurisdictional (e.g., regulated) wetlands are determined by on-the-ground examination of hydrology, vegetation and soils.
- Because of this, on-the-ground investigation is generally required to verify mapped wetlands and make a jurisdictional wetland determination.

Over ☛

THE NATIONAL WETLANDS INVENTORY

☐ All wetlands and other waters of the state, mapped or not, may be subject to local, state, and/or federal regulation.

- ✔ Questions about regulations should be directed to your city or county planning department, DSL, and/or the Army Corps of Engineers.

☐ The NWI forms the basis of the statewide wetlands inventory, which includes two types of large-scale inventories.

- ✔ See *Just the Facts #2* or contact DSL for more information about Local Wetlands Inventories (LWIs) and Wetland Conservation Plan Inventories (WCPIs).

☐ DSL uses the same map name as the USGS topographic map (which forms the base map for most wetlands maps). Frequently, the name on your map (upper left or lower right corner) will not match the map name you ordered. This is because many of the wetlands maps have "old" map names.

State Distribution Center Services and Products

The Division of State Lands is the lead state agency for wetlands and is the State Distribution Center for National Wetlands Inventory (NWI) maps.

Services and Products Include:

- ❍ NWI, LWI or WCPI map sales
- ❍ Assistance with using the NWI
- ❍ Developing and distributing wetlands inventory information
- ❍ State or county index maps showing location, type and name of NWI maps for area*
- ❍ Wetlands Inventory User's Guide
- ❍ Map fact sheets
- ❍ MAPTRACK – a database of information about individual maps (quads). MAPTRACK is available on diskette to agencies and organizations that need wetland information on a statewide basis.*
- ❍ Digital wetlands maps for some areas
- ❍ Coordinating digital wetlands inventory data
- ❍ NWI digitizing standards
- ❍ Compiling Local Wetlands Inventories (LWI & WCPI)
- ❍ Technical assistance for LWI/WCPI planning and completion
- ❍ Guidelines, rules and standards for state-approved LWIs/WCPIs
- ❍ Developing and maintaining the Statewide Wetlands Inventory

If you would like more information, photocopy this page, check items of interest, complete request form and mail to DSL.

Name _____

Organization _____

Mailing Address _____

_____

Daytime Phone # ( ) _____

*Funded by Environmental Protection Agency SEDM grant.

Oregon Division of State Lands
775 Summer St. NE, Salem, OR 97310
(503) 378-3805

ABOUT LOCAL WETLANDS INVENTORIES

Why Develop a Local Wetlands Inventory?

√ The City of Lebanon wants to know which industrial-zoned lands are ready for immediate development.

√ A Medford developer is considering several sites adjacent to Larson Creek for a planned unit development and golf course.

√ Citizens and planners in Lake Oswego want to adopt ordinances protecting streams and certain wetlands.

In each of the above scenarios, a detailed wetlands inventory would provide much-needed information. To help meet such needs, the 1989 Oregon state legislature authorized the Division of State Lands (DSL) to develop a statewide wetlands inventory suitable for planning and regulatory purposes. Community-based Local Wetlands Inventories, conducted according to DSL standards, are an important element of the statewide wetlands inventory. Local Wetlands Inventories provide a planning tool for balancing the protection of wetland functions that are of value to a community with economic needs. Advance information on the location and type of wetlands also helps to avoid last minute delays when planning development or conducting real estate transactions.

What is a Wetlands Inventory?

A wetlands inventory is a systematic survey of a fairly large geographic area to locate and map wetlands and classify them by type. Many different inventory methods may be used, ranging from remote sensing (using aerial photography or satellite imagery) to on-the-ground surveys. The appropriate type of inventory depends upon the intended uses, size of area to be covered, and available funds.

Overview of Inventory Types

There are two types of wetlands inventories that comprise the statewide wetlands inventory---the National Wetlands Inventory (NWI) and the Local Wetlands Inventory.

National Wetlands Inventory

The NWI was developed by the U.S. Fish and Wildlife Service and covers the entire country (see *Just the Facts #1)*. While the NWI is extremely useful for many resource management and planning purposes, its small scale, accuracy limitations, and absence of property boundaries make it unsuitable for parcel-based decision making.

Local Wetlands Inventories

To augment the NWI in areas where more detailed inventory information is needed, DSL developed guidelines and rules for the **Local Wetlands Inventory (LWI).** A LWI aims to map all wetlands 0.5 acres or larger at an accuracy of approximately 25 feet on a parcel-based map. Accuracy may be less in areas that could not be field verified. If ground-altering site work is proposed, a more precise wetland boundary may need to be located to know where Removal-Fill Law regulations apply. The LWI maps and report provide information about the inventory area and the individual wetlands, including:

- acreage of wetlands in the inventory area
- acreage of each wetland type in the inventory area
- location, approximate size, and classification, and description of each wetland
- all tax lots containing wetlands

LOCAL WETLANDS INVENTORIES

Who Conducts the Inventory, and What is the Process?

An inventory may be initiated by a local government or by the state. Most local governments contract with a wetland consultant or other expert to conduct the technical aspects of the inventory. *Typical steps in the inventory process are:*

- √ Contact DSL for inventory requirements and guidelines
- √ Select the inventory area and prepare a work plan
- √ Obtain funding (most range from $15,000-$30,000 or more)
- √ Conduct a public meeting; notify landowners of the impending inventory
- √ Conduct fieldwork and prepare draft inventory (consultant)
- √ DSL conducts a field review of draft maps
- √ Hold public meeting to review draft maps
- √ Prepare final inventory maps and report (consultant)
- √ DSL reviews and approves final inventory
- √ Local government notifies landowners of properties with wetlands mapped
- √ Local government adopts inventory

What are the Regulatory and Planning Implications?

Once an inventory is completed and approved by DSL, there are certain requirements and implications:

- ❑ An approved LWI is incorporated into the statewide wetlands inventory and is made available by DSL to other agencies and the public.

- ❑ Wetlands and waterways, regardless of whether they are mapped, may be regulated by the State Removal-Fill Law. Compliance with wetland and waterway regulations remains the responsibility of the landowner.

- ❑ Under Statewide Planning Goals 5 and 17, cities must conduct an LWI and wetland function and value assessment then identify locally significant wetlands. A protection program is then adopted by the local government to further guide the management of locally significant wetlands. (Contact the Department of Land Conservation and Development for details.)

- ❑ An approved LWI (in place of the NWI) must be used by the local government for the Wetland Land Use Notification process (a local-state coordination process).

CONTACT DSL FOR	• Purchasing NWI and LWI maps • Guidelines and rules for Local Wetlands Inventories and wetland planning • Location and status of existing Local Wetlands Inventories • Availability of grants for conducting Local Wetlands Inventories • Technical assistance with conducting LWI's and function/value assessment • Availability of digital wetlands data • Further information on wetland and waterway regulations

JUST THE FACTS . . .

HOW ARE WETLANDS AND WATERWAYS REGULATED?

Activities in wetlands and waterways are regulated by:

- The Division of State Lands (DSL) under the state Removal-Fill Law
- The Army Corps of Engineers (Corps) under the federal Clean Water Act and Rivers & Harbors Act
- The State Department of Forestry under the Forest Practices Act
- The U.S. Natural Resources Conservation Service under the federal Farm Bill
- Some city and county land use ordinances

Because many local governments regulate activities in and adjacent to wetlands and waterways, your city or county land use planning department is a good first contact. Be aware, however, that whether or not a local permit is required, a state and/or federal permit may be required. Sound complicated? It is, but this fact sheet will give you the basic information you need to determine if the activity you propose may require a state (DSL) or federal (Corps) permit.

What Areas Are Regulated?

- Rivers, streams, and most creeks
- Estuaries and tidal marshes
- Lakes and some ponds
- Permanent and seasonal wetlands
- Regulations apply to all lands, public or private
- A wetland does not have to be mapped by the state or otherwise "designated" to fall under the regulations
- If you are uncertain if there are regulated wetlands on your property, contact DSL for assistance

What Activities Are Regulated?

- Placement of fill material
- Alteration of stream banks or stream course
- Ditching and draining
- Bank stabilization
- Excavation or dredging of material
- In-water construction (may also require a lease from DSL)
- Stump removal (some large land clearing projects)
- Commercial timber harvest (State Dept. of Forestry)

What Activities Are Exempt?

- Some routine maintenance activities
- Established, ongoing agricultural activities like plowing, harvesting & grazing
- Some minor projects involving small amounts of fill or removal

Contact DSL and the Corps for details and clearance to proceed with your project.

Confused?

For non-forest or non-farm activities

- First contact: City or county planning department
- Next contact: DSL (503) 378-3805 and Corps of Engineers (503) 808-4373

For agricultural activities

- First contact: Natural Resources Conservation Service for your area
  (in phone book under U.S. Government, Dept. of Agriculture)
- Next contact: DSL and Corps
  (Some activities are regulated by all three agencies)

For commercial forest operations

- First contact: Oregon Dept. of Forestry, forest practices section (503) 945-7470
- If change in land use planned, also contact: local planning department, DSL and Corps

Over ☛

Oregon Division of State Lands
775 Summer Street NE, Salem, OR 97310
(503) 378-3805

Wetlands Program
Just the Facts #3
March 1999

HOW ARE WETLANDS AND WATERWAYS REGULATED?

How Can You Avoid the Permit Process?

If you know with certainty the boundaries of any wetlands or waterways and can avoid those areas with your project, no state or federal permit is required. However, it is important to contact your local planning department, as some local governments have setback requirements.

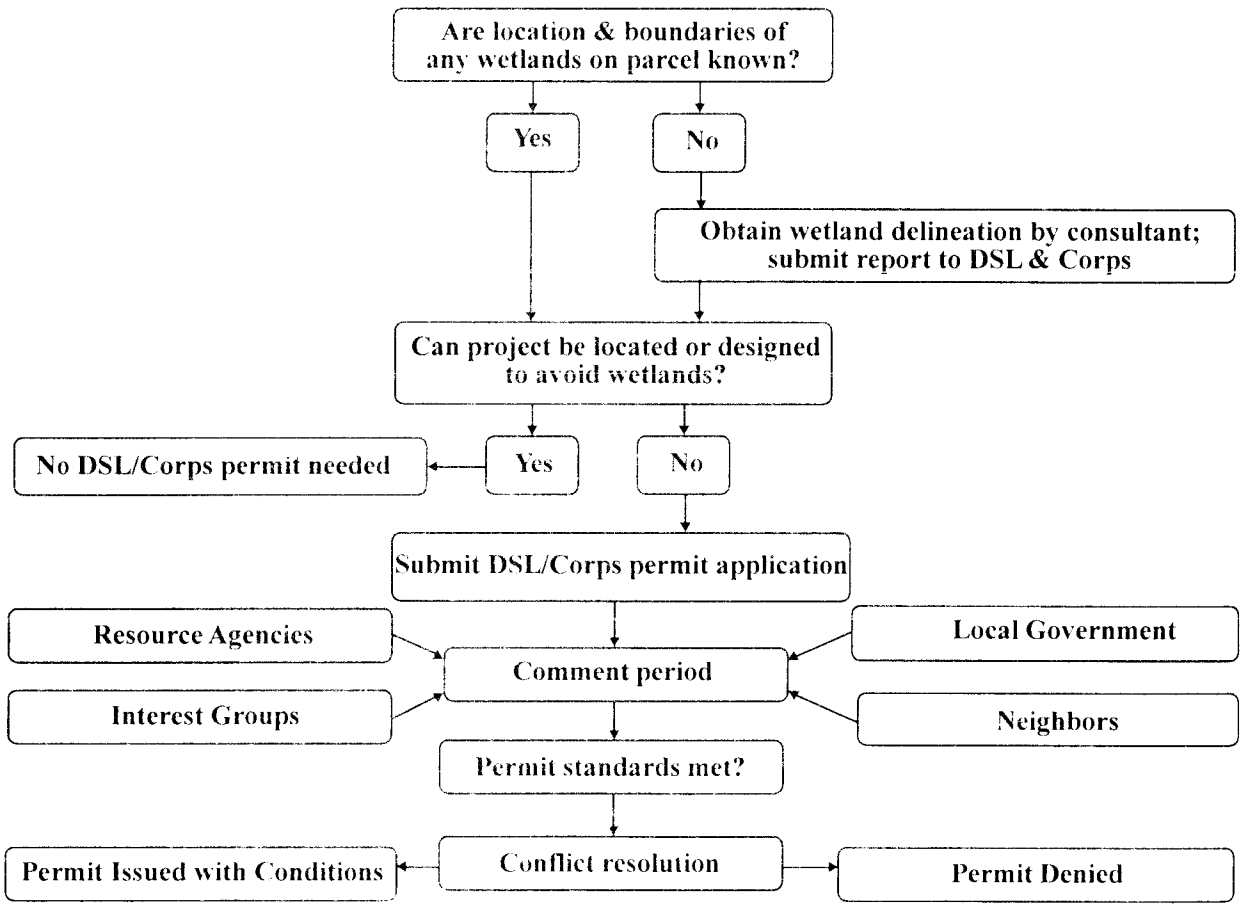
How Does One Obtain a Permit?

A joint application form may be obtained from either DSL or the Corps. During the comment period, your application will be circulated to a variety of agencies and other parties. Of particular importance are comments from the Department of Fish and Wildlife and the local government. No permit is issued that is inconsistent with the local land use plan or does not comply with Oregon's water quality standards. Proposed projects must also be consistent with the state's responsibility to protect the public interest and best use of waters of the state. Applicants must establish that alternative, non-wetland sites are not readily available and must design projects to minimize impacts. In most cases, unavoidable impacts must be compensated for through wetland restoration or creation.

How Are the Laws Enforced?

The best enforcement is to prevent illegal wetland alterations through information and education. However, when violations do occur, a variety of enforcement tools may be used, including restoration orders, fines of up to $10,000 per day (DSL), civil charges and/or criminal charges.

STATE & FEDERAL PERMIT PROCESS



JUST THE FACTS . . .

WETLAND FUNCTIONS AND ASSESSMENT

"Damp, insect-ridden, often foul-smelling and mysterious area of muddy soils and relatively still water where strange and different animals and plants reside."

-wetland definition, 1800's

For much of our nation's history, wetland descriptions like the one above formed our perception of wetlands as disease-ridden, sinister wastelands. With the help of government programs, we drained, ditched and filled wetlands to convert them to "more productive" uses, and we were highly successful! In California, for example, nearly 90 percent of original wetlands are gone. In Oregon, about 38 percent of our wetlands have been converted.

Changing Perceptions

Finally, we realized that as wetlands disappeared, ducks and geese disappeared—as did many of the "strange and different" animals and plants that reside only in wetlands. Researchers also discovered that wetlands provide many valuable ecological functions and social benefits, such as flood control and water quality improvement.

Today, learning from our mistakes, state and federal programs are turning their efforts toward wetland protection, wetland restoration, and comprehensive watershed management. Similarly, citizen groups are springing up to spearhead local efforts to restore neighborhood streams and wetlands, and educate citizens about the "free" services that wetlands provide the community.

The many functions that wetlands provide make protection, restoration, and wise management of wetlands important to landowners and the general public. Many functions and values—notably wildlife habitat, water quality improvement, and flood storage—are public trust values that extend beyond property boundaries.

Assessing Wetland Functions and Values

Because wetlands vary greatly by type and location, not all provide the same functions and not all are equally valued by society. Wetland assessment methodologies, like the *Oregon Freshwater Wetland Assessment Methodology*, allow us to evaluate the extent to which a specific wetland may perform any given function. Additionally, these methodologies help us to compare wetlands and evaluate their relative importance.

It is far too difficult and expensive to conduct a detailed study of every wetland. Therefore, wetland assessment methodologies rely on the presence or absence of various characteristics that are known to correspond with certain functions. For example, certain wetland characteristics are "indicators" of good migratory bird habitat. Another set of characteristics may "indicate" that a wetland is good at removing pollutants from water.

How is Assessment Information Used?

In Oregon, wetlands are assessed to obtain resource quality information as part of the statewide land use planning process (Goal 5 or 17). This information helps to identify the highest value wetlands in communities. Wetlands are also assessed as part of watershed assessment plans. Assessing wetland functions and characteristics also helps us to:

- Make better decisions when evaluating wetland fill permit applications
- Incorporate landscape-scale wetland functions into land use plans
- Identify exceptional wetlands for acquisition from willing landowners
- Develop better resource management plans

Over ☛

Oregon Division of State Lands
775 Summer Street NE, Salem, OR 97310
(503) 378-3805

Wetlands Program
Just the Facts #5
March 1999

WETLAND FUNCTIONS AND ASSESSMENT

Flood Storage and Water Supply

Many floodplain and stream-associated wetlands absorb and store storm water flows, which reduces flood velocities and stream bank erosion. Preserving these wetlands reduces flood damage and the need for expensive flood control devices such as levees. When the storms are over, many wetlands augment summer stream flows when the water is needed, by slowly releasing the stored water back to the stream system.

Food Chain Support

Because of their high productivity, wetlands provide essential food chain support. That green scum that coats cattail stems and ankles provides food for an abundance of tiny organisms that, in turn, feed fish, wildlife, and humans.

Wildlife and Fish Habitat

Wetlands provide essential water, food, cover, and reproductive areas for many wildlife species. For example, nearly two-thirds of the commercially important fish and shellfish species are dependent upon estuarine wetland habitats for food, spawning, and/or nursery areas. Similarly, millions of waterfowl, shorebirds, and other birds depend on wetlands. In semi-arid eastern Oregon, riparian (stream-associated) wetlands and springs are crucial to the survival of many birds, amphibians and mammals.

Rare and Endangered Species

As the old wetland definition suggests, wetlands are full of "strange and different" animals and plants. Take the carnivorous pitcher plant, for instance, a bog plant with a cobra-like hood that traps insects. Nationally, nearly 35% of all rare and endangered animal species depend on wetlands, even though wetlands comprise only about 5% of the land area.

Water Quality Improvement

Wetlands are highly effective at removing nitrogen, phosphorous, some chemicals, heavy metals, and other pollutants from water. For this reason, artificial wetlands are often constructed for cleaning stormwater runoff and for tertiary treatment (polishing) of wastewater. Wetlands bordering streams and rivers and those that intercept runoff from fields and roads provide this valuable service free of charge.

Aesthetics, Recreation and Education

Depending on their type and location, wetlands provide opportunities for fishing, hunting, plant identification, and wildlife observation. They are also visually pleasing, interesting elements in the landscape, often providing some of the last open space in urbanized areas. Wetlands are wonderful outdoor classrooms and laboratories.

For Better or For Worse® **by Lynn Johnston**

FOR BETTER OR FOR WORSE copyright 1991 Lynn Johnston Prod., Inc. Reprinted with permission of UNIVERSAL PRESS SYNDICATE. All rights reserved.

About Compensatory Mitigation for Wetland Impacts

When people apply for a permit to place fill in a wetland, they discover immediately that they must follow a process to "mitigate" the negative impacts to the wetland. Often, applicants start with the assumption that mitigation only means that they will be issued a permit if they are willing to replace the wetland area that they propose to impact. However, there's much more to it than that! This fact sheet explains the mitigation process and the different compensatory mitigation options that may be available to the permit applicant. More detailed information in the form of rules is available from the Division of State Lands (DSL).

What Does Mitigation Mean?

The dictionary definition of mitigation is "to reduce the effect of an action." In wetland regulations, the term has the same meaning—to reduce the negative effects of a proposed project. The main point to remember is that mitigation is a *process*. It starts with evaluating how wetland impacts can be avoided. If the impact cannot be completely avoided, the next step is to look at ways to minimize "unavoidable" impacts. Only after a legitimate effort has been made to avoid and minimize impacts does "compensatory mitigation" come into play. This sequential process is established in both state and federal law.

What Is Compensatory Mitigation?

Compensatory mitigation is creating, restoring or enhancing wetlands to replace or "compensate" for the wetland area and functions lost through the permitted alteration. Constructing a wetland in an area that never supported wetlands historically is called *creation*. Wetland creation is often difficult because the upland soils are not good at retaining water. *Restoration* means re-establishing wetland vegetation and hydrology to a site that was historically wetland but has been dried out by diking, draining, or filling. *Enhancement* is improving an existing but badly degraded wetland by correcting the conditions that cause it to be degraded. This might include providing more water to the site or restoring native plant communities. The enhancement goal is to greatly improve the condition and functions of the wetland.

When Is Compensatory Mitigation Required?

Compensatory mitigation is required as a condition of any state permit to place fill or excavate in a wetland. When a permit application is received by DSL, the permit coordinator determines if the applicant has adequately explored project alternatives that would avoid wetland impacts completely and also those that would minimize impacts. If there are practicable alternatives with no or minimal wetland impact, those alternatives must be pursued. Compensatory mitigation is required for the unavoidable impacts.

Basic Mitigation Process Steps

Steps taken before compensatory mitigation is considered

- Delineate wetland boundaries on development site and obtain DSL/Corps of Engineers concurrence
- Analyze development needs for the site
- Determine if project can be completed without any impact to the wetlands
- If not, identify project alternatives that will minimize wetland impacts
- Finalize development/project plans that avoid and minimize wetland impacts; consult with DSL/Corps and prepare permit application

Steps taken after alternatives are fully explored and impacts minimized

- Evaluate project impacts on wetland acreage and functions
- Develop compensatory mitigation plan that meets minimum ratios and replaces lost functions
- Obtain DSL/Corps approval of mitigation plan
- Construct mitigation project before or at the same time (same growing season) that development project is constructed
- Monitor mitigation project for required period of time (usually 3-5 years) and take corrective action to ensure project success, as necessary

Over ☛

Compensatory Mitigation for Wetland Impacts

Must Wetlands Be Replaced On An Acre-For-Acre Basis?

Not necessarily. DSL's rules set minimum ratios that vary by the type of compensatory mitigation proposed, as follows:

- Restoration ratio is 1:1 (1 acre restored for every 1 acre lost)
- Creation ratio is 1.5:1 (1½ acres created for every 1 acre lost)
- Enhancement ratio is 3:1 (3 acres enhanced for every 1 acre lost)
- Enhancement of cropped wetlands is 2:1 (2 acres enhanced for every 1 acre lost)

The ratios reflect both the probability of mitigation project success and the state's mandate to maintain wetland acreage and functions.

Compensatory Mitigation Options

Onsite mitigation is the customary option. It refers to conducting the compensatory mitigation project on the same parcel where the wetland impact will occur. This is frequently the easiest option and may be the best one for minimizing the cumulative impacts of developments in a given area. Sometimes, however, it is not practicable and often it is not the best option for replacing ecological functions. If DSL staff determines that the onsite option is not feasible or is not ecologically preferable, other options may be pursued.

Offsite mitigation is when the mitigation site is not adjacent to the development site. Generally, the mitigation project will be constructed within the same drainage basin—again, this is to control cumulative impacts in an area and ensure that problems such as flooding are not shifted from one basin to another.

Payment to provide mitigation—in limited cases such as for small impacts, an applicant may be allowed to make a payment to DSL rather than construct the mitigation project his or herself. DSL determines the amount of the payment based upon estimated costs to acquire a site and construct, plant and monitor the mitigation project, and seeks out projects that will provide the necessary compensatory mitigation.

Purchase credits from a mitigation bank—a mitigation bank is a large wetland mitigation project constructed by a public or private party to compensate for future wetland impacts. DSL has specific rules for how a mitigation bank will be developed, operated and monitored. "Credits" are the units of exchange. They are usually based on acre units (one acre impact = one credit) and their value is determined by the actual cost of creating the credit in the bank. Private bank sponsors will also figure in a margin of profit. DSL staff may approve purchase of credit from a bank if onsite mitigation options are not practicable or not ecologically preferable. Mitigation banks can provide many practical and ecological benefits over small, onsite mitigation projects.

Does Compensatory Mitigation Really Work?

There have been many studies throughout the U.S. on how well created or restored wetlands perform. The "success" of a mitigation project depends upon multiple factors including appropriate siting, adequate water source, and the site's ability to be self-maintaining. In general, restoration of former wetlands has a higher likelihood of success than creation or enhancement. DSL has conducted studies of mitigation compliance with permit conditions and has found that:

- Most compensatory mitigation projects required by a permit were completed
- There were often significant differences in what was proposed and what was completed, resulting in a small net loss of wetland acreage
- Most wetland impacts and mitigation projects are less than one acre in size
- There is limited data with which to evaluate the functional success of mitigation projects

Project evaluation helps DSL improve mitigation project design, monitoring requirements and overall mitigation project success.

Just the Facts—Choosing and Using a Wetlands Consultant

When Do You Need a Wetlands Consultant?

If you are a realtor with undeveloped land on the market, a developer, a public works director developing a stormwater management plan, or someone who for any reason might need a wetland permit, chances are you will need the specialized expertise of a wetlands consultant. Wetlands staff at the Division of State Lands (DSL) can help landowners, developers and local governments determine whether or not there may be wetlands on a parcel and what permit requirements might apply. In addition, a qualified wetlands consultant can provide a number of helpful or essential services.

Typical Services a Consultant Can Provide

- Conduct a preliminary site reconnaissance to determine if wetlands are present, their approximate extent, and whether a full wetland delineation is needed
- Conduct a wetland boundary delineation to identify and accurately map areas subject to wetland permit requirements
- Prepare or contribute to site development designs that integrate development goals with wetland and stream protection
- Advise you on state and federal wetland permit requirements and options
- Handle all technical aspects of a permit application, including the alternatives analysis and compensatory mitigation plan
- Implement the mitigation plan, including instructing and monitoring heavy equipment operators, planting, annual monitoring, and preparing monitoring reports for DSL and the Corps of Engineers

General Qualifications

A wetlands consultant should have:

- An educational background in science, ecology and wetland-specific training, including a wetland delineation course
- A thorough knowledge of local, state and federal permit requirements and processes

Continued on back

Wetland Delineation Approval Process

A wetland delineation report and map is often the first step in planning a development project on a site that contains wetlands. Although the report may be submitted to DSL at the same time as a removal-fill permit application, we strongly recommend that the wetland delineation be conducted and submitted to DSL well in advance of detailed project planning. Until the wetlands are located and their boundaries mapped, appropriate measures to avoid and minimize impacts as required by state and federal law cannot be taken. If considerable expense has already been incurred for site planning and local government approvals have been obtained, agency requirements to further reduce wetland impacts can cause substantial additional cost and delay. Note: the Corps of Engineers will generally review a delineation report only when it is submitted along with a permit application; they may rely upon DSL's delineation concurrence but are not bound to do so.

When a wetland delineation report is submitted to DSL for approval, it is reviewed by staff for technical accuracy. If the report meets applicable standards and provides sufficient information for DSL to make a determination of which areas (if any) meet wetland criteria and are subject to permit requirements, the staff member approves the report. DSL staff may request additional or clarifying information and/or conduct an onsite inspection. Because delineating wetland boundaries requires data interpretation and professional judgment, many reports—even from experienced consultants—are revised prior to acceptance by DSL. **Do <u>not</u> count on the accuracy of a wetland delineation until you get a concurrence letter from DSL!**

Oregon Division of State Lands
Wetlands Program
775 Summer St. NE, Suite 100, Salem, OR 97301-1279
503-378-3805; http://statelands.dsl.state.or.us

Just the Facts #7
May 2000

- An understanding of development standards and options
- The ability to help develop workable solutions for challenging sites
- Good communication skills and professional ethics
- Good working relationships with permit agency staff

Selecting a Consultant

A good, experienced consultant can facilitate the wetland permit process with minimal delays. In contrast, an inexperienced or less-than-competent consultant who submits unclear or inaccurate information, or provides their client with misinformation about regulatory requirements, can cause frustration and waste time and money for their client and agency staff. There are many ways to locate a wetlands consultant, including:

- ***Word of mouth***—find out who does a consistently good job for others and has a good professional and ethical reputation.
- ***DSL's Consultants List***—the list is maintained by DSL as a public service. Because there are no criteria for inclusion on the list, it is **not** a list of recommended firms.

  In all cases, follow the recommendations below!
- Contact at least three firms for a cost estimate
- Ask for a resume or the firm's Statement of Qualifications
- Ask about any professional certification the firm's individuals have (see box)
- If it's a larger firm, ask about the specific person who will be doing the work for you
- Ask about firm's experience with the specific services you want (i.e., wetland delineation; permit application; mitigation design and construction) or any specialized experience needed, such as agricultural wetland delineation
- Talk to their references about the firm's performance with respect to work quality, staying within budget, innovation, meeting deadlines, communication throughout the project, and follow-through on agency or client requests and requirements

Professional Certification

The Society of Wetland Scientists administers a professional certification program whereby individuals who meet specific educational and experience requirements may be certified as a Professional Wetland Scientist (PWS). The certification program does not guarantee that an individual is qualified to provide a specific service; for example, it is not a "wetland delineator" certification. Likewise, certification does not guarantee the quality of work, but it does identify those individuals who have the necessary academic background and wetland-specific experience to provide good service. Wetlands specialists come from a variety of academic disciplines including botany, soil science, environmental studies, and wildlife management. Therefore, some may have additional professional certification, such as Professional Soil Scientist.

Working With Your Consultant and Permitting Agencies

Selecting the right consultant is the first step toward a successful project, but the subsequent working relationship is of equal importance. Ideally, this is a partnership, with all parties working in an efficient manner toward a good development project with minimal environmental impacts. Some tips and reminders:

- Good communication is essential. Depending on the scope of the project, an initial meeting may be needed to set the project off on the right track.
- Plan ahead! A wetland delineation typically takes several months from initiation to DSL approval, and permit applications typically take 90 days. Rush jobs can lead to errors, slowing rather than speeding the process.
- At the outset, give the consultant all pertinent information about the site and the project, including legal description, any previous studies, previous land uses, development objectives.
- The landowner or applicant is the legally responsible party for meeting permit requirements and conditions. Because the consultant is often the "intermediary" and the person who is communicating directly with agency staff, the consultant is responsible for keeping their client informed and getting the OK for major changes or commitments.
- If you experience unusual delays or problems that your consultant does not adequately explain, phone the agency staff person working on your project. It could be an agency problem, but sometimes agency staff have problems getting adequate information or products from the consultant.