United States Department of Agriculture
Soil Conservation Service
1220 S.W. Third Avenue
16th Floor
Portland, Oregon 97204

September 13, 1994

TECHNICAL NOTE
190-VI

SUBJECT: BIOLOGY TECHNICAL NOTE NO. 40 WETLANDS AS VARIED AS OUR REGION

Purpose. To transmit to all Oregon offices the above named Technical Note.

Effective Date. Upon receipt.

Filing Instructions. File in correct numerical order in the Biology section of your Technical Note binder. Replace the Table of Contents with updated attachment.

Background. The attached Technical Note is one of a series being produced by the Woodland, Fish and Wildlife Project, a cooperative effort including SCS and other resource related agencies and interest groups in Washington and Oregon. Copies of the first eleven notes have already been transmitted and should be in your Technical Note binder. The State Office still has a limited supply of each. Contact Russ Hatz, State Staff Forester for additional copies.

BOB GRAHAM Acting
State Conservationist

Attachments

DIST: O

Woodland
Fish and Wildlife

June 1994

Wetlands As Varied As Our Region

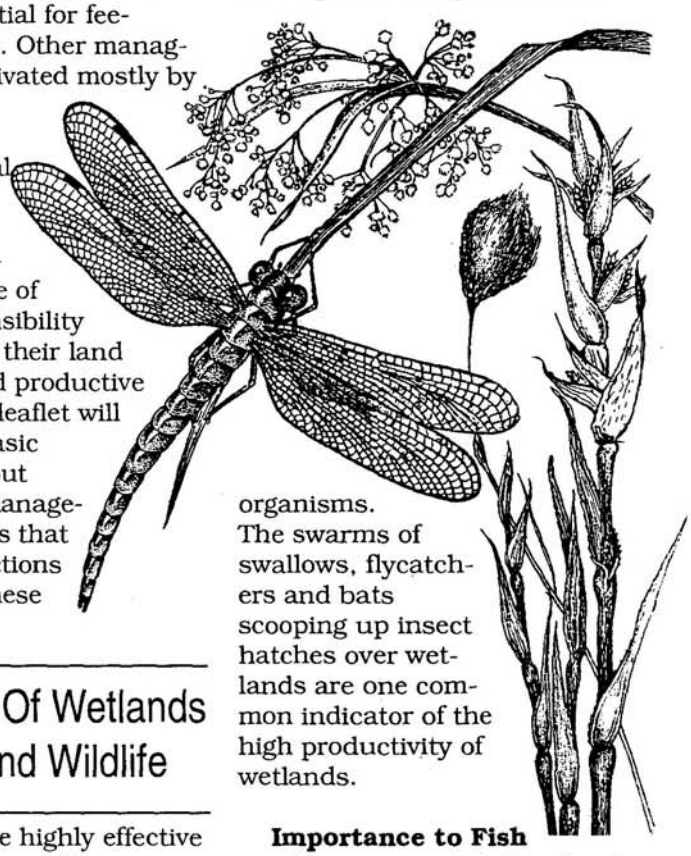
The Pacific Northwest is highly varied geologically and biologically. This leads to an equally diverse range of wetland types, including Sitka spruce/skunk cabbage swamps near the coast; willow-choked stream canyons and seasonally-wet saltgrass flats east of the Cascades; remnant river channels and wet prairies in the Willamette Valley; and lodgepole pine/sedge forests and saturated meadows in the Cascades.

In Oregon and Washington, 40-50 percent of our original wetlands have been lost, mostly by conversion to agricultural or urban uses. Many other wetlands have been severely degraded through poor land use practices. Wetlands, like streams, are very sensitive to surrounding and upslope land uses. Unlike many activities that permanently alter wetlands, forest management can be compatible with good wetland management.

Why would you, as a woodland owner and/or manager, be concerned about wetlands? While the benefits that wetlands provide vary greatly by type, location, and condition, wetlands in general provide a wide range of important functions and values (see box 1, page 2). Many landowners manage and protect wetlands to improve wildlife habitat for the enjoyment of their family or to improve the potential for fee-hunting income. Other managers may be motivated mostly by the desire to comply with state and federal wetland regulations and still others are motivated by a sense of personal responsibility for maintaining their land in a healthy and productive condition. This leaflet will provide some basic information about wetlands and management techniques that protect the functions and values of these lands.

Importance Of Wetlands To Fish and Wildlife

Wetlands are highly effective at converting the sun's energy into food. The plant material and small organisms produced in abundance in wetlands make them an extremely important link in the food chain. That green scum that coats cattail stems and your ankles when wading is teeming with small organisms. The swarms of swallows, flycatchers and bats scooping up insect hatches over wetlands are one common indicator of the high productivity of wetlands.



Importance to Fish

Stream-associated wetlands provide essential fish habitat. Plant material and organisms

Box 1

Number of wildlife species using riparian zones or freshwater wetland habitats.

Source: Brown, 1985. Volume 2, appendix 8 gives specific information on these 414 species, including their use of different wetland types for breeding, resting, and/or feeding, and whether the wetland type is a primary or secondary habitat. See reference section for full citation.

Class	Number of westside wildlife species	Number of species using riparian or wetland plant communities	Number of species using riparian zones or wetlands as a speciailized habitat but not using plant communities	Total number of species using riparian zones or wetlands
Amphibians & Reptiles	44	35	2	37
Birds	267	192	38	230
Mammals	103	91	1	92
Total	414	318	41	359

produced in stream-associated wetlands are important food sources for fish. Also, side channels and backwater pools are used by fish as rearing grounds and as "refuge" areas during high stream flows.

Young cutthroat trout and coho salmon grow many times faster in a stream-associated wetland than in the main stream. This is because fish reared in calm waters of wetlands use most of the food they consume for growth, whereas fish reared in stream currents must convert a large portion of the food they consume into energy. Also, wetland habitats such as beaver ponds, side channels, and seasonal swamps are critical to salmonids for winter survival. One study found that 15% of a watershed's coho production came from fish that overwintered in wetlands that are dry during the summer. The survival rate of coho salmon that overwinter in abandoned beaver ponds that are dry in the summer was about twice as

Box 2

Wetland Functions and Values

Wetlands vary greatly in location and type, and therefore not all provide the same functions. This is a list of some of the functions and values that wetlands in general are known to provide.

Flood Storage and Stream Flow Augmentation—Stream-associated wetlands store water during high flows, reducing flood peaks. Then the areas augment summer stream flows by slowly releasing stored water back into the stream system.

Food Chain Support—Because of their high productivity, wetlands provide essential food chain support.

Fish and Shellfish Production—Wetlands are important spawning and nursery areas for fin and shellfish.

Timber Production—Forested wetlands are a source of commercially valuable timber.

Erosion and Sediment Control—Wetlands reduce flood velocities, reduce erosion, and trap water-borne sediments.

Wildlife Habitat—Wetlands provide essential water, food, cover, and reproductive areas for wildlife. Millions of waterfowl, shorebirds, and other birds depend on wetlands. In semi-arid areas, riparian wetlands are crucial to the survival of many wildlife species.

Recreation and Education—Wetlands provide opportunities for fishing, hunting, boating, plant identification, scientific study, and wildlife observation.

Open Space and Aesthetic Values—Wetlands are pleasing and biologically diverse, and are often the last remaining natural features in highly altered areas.

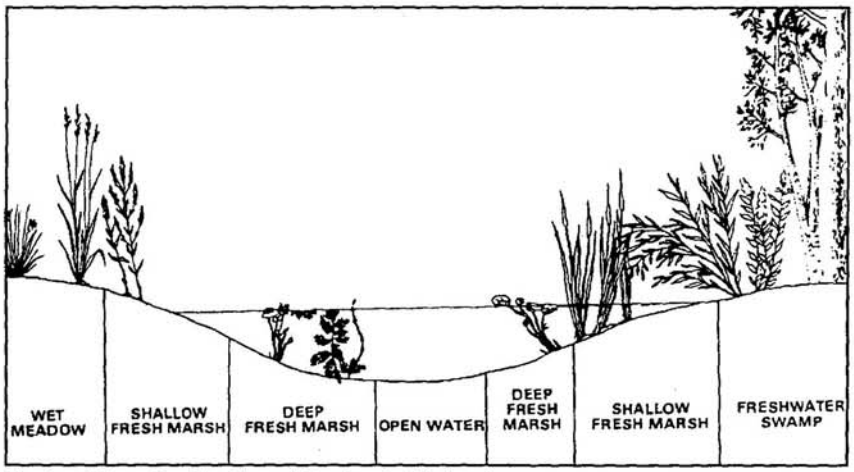
Water Quality Improvement—Wetlands are very effective at removing nitrogen, phosphorous, certain chemicals, and heavy metals from water. For this reason, the development of artificial wetlands is being explored for cleaning stormwater runoff and the treatment of wastewater.

high as the survival rate for the overall stream system.

Importance to Wildlife

As are streamside riparian areas, wetlands are crucial to the survival of many wildlife species. Wetlands provide food in abundance, water, refuge from summer heat, shelter from winter cold, hiding cover, late-summer green forage when upland areas are dry, and critical breeding and rearing habitats.

Despite comprising a relatively small portion of the landscape, wetlands and riparian areas are relied on heavily by nearly all of the wildlife in Oregon and Washington. Of 414 western Oregon and Washington wildlife species, 359 use riparian zones or wetlands during some seasons or parts of their life cycle. (See Box 1 Page 2) The situation is similar east of the Cascades. Of 378 terrestrial species in the Blue Mountains, 285 are either directly dependant on wetlands and riparian areas or utilize them more than other habitats.



Idealized Cross Section View of Freshwater Wetland

How To Recognize Wetlands

What are Wetlands?

Although there are many types of wetlands in the Pacific Northwest, they share three common characteristics. **Most important is an abundance of water.** Whatever the water source—high water table, rainwater "perched" on impervious layers in the soil, frequent flooding, or groundwater seeps—**prolonged saturation is what creates the wetland.** Saturated soils form distinctive, visible physical characteristics and are called **hydric soils.** Most often, these saturated conditions support a plant community dominated by **hydrophytes,** or plants that survive in permanently or seasonally saturated soils.

WETLAND DEFINITION

Wetlands are areas inundated by surface or ground water at a frequency and duration sufficient to support, and that normally do support, mostly vegetation adapted for life in saturated soil.

However, plants, like animals, have varying degrees of specialization. Some species adapt readily to a wide variety of conditions and may be referred to as "generalists" (weeds are prime examples). Other plants are specialists and thrive in a very specific habitat. For this reason, some plant species are better indicators of wetlands than others. The U.S. Fish and Wildlife Service has compiled a list of plants that grow in wetlands. Each species is given a wetland indicator status based on the frequency with which it occurs in wetlands. For example, skunk cabbage is an **Obligate Wetland species** and is found *only* in wetlands. **Facultative-Wetland species** occur in wetlands 66-99% of the time; they are found in either permanent or seasonal wetlands and can be used to identify seasonal wetlands during the dry time of year. **Facultative species** are often the generalists—they occur in a wide variety of sites, including seasonal wetlands, and are especially common in

areas disturbed by farming, grazing, or other activities. As generalists, they are the least reliable "indicators" of wetlands.

Where Will You Find Wetlands?

Wetlands are usually found in the lowest portion of the landscape. They may be stream-associated or "isolated." Landscape position, climate, and soil type all influence wetland formation. Expect to find wetlands:

- in low areas with a very high water table
- in valley flats or depressions where impervious soil layers create a "perched water table"
- near rivers and streams
- low on slopes where groundwater breaks out as springs or seeps
- in mountain meadows watered by gradual snowmelt
- in broad river valleys with side channels or abandoned stream channels

Types of Wetlands

There are many types of wetlands and many terms used to describe them. Terms such as "swamps," "bogs," "marshes," and "wet meadows" all refer to types of wetlands. Wetland scientists have developed formal terms that are used to classify and map wetlands, lakes, streams, and estuaries. Types of wetlands are grouped mainly by their vegetative characteristics (See box #3, right). For example, wetlands dominated by trees are classified as **Forested Wet-**

BOX #3

EXAMPLES OF WETLAND TYPES AND TYPICAL VEGETATION

Open Water Wetlands:
water lily
pondweed
duckweed
bladderwort
water-cress

Marsh:

common cattail	wapato
hardstem bulrush	slough sedge
yellow iris	bur-reed
spike rush	rice cutgrass
reed canarygrass	marsh speedwell
water parsley	water plantain

Wet Meadows:

creeping buttercup	nodding beggars-tick
willow dock	American sloughgrass
giant horsetail	fragrant popcorn flower
sedges	tufted hairgrass
gum-weed	soft rush

Shrub Wetlands:

Pacific willow	red-osier dogwood
Douglas' spirea	alpine bog laurel
sweetgale	bog birch

Forested Wetlands

Overstory	**Overstory**
red alder	lodgepole pine
Oregon ash	quaking aspen
Sitka spruce	Engleman spruce
western redcedar	
Typical Understory	**Typical Understory**
lady fern	aquatic sedge
water parsley	widefruit sedge
slough sedge	Baltic rush
skunk cabbage	Douglas' spirea
Douglas' spirea	bog blueberry
large-leaf avens	

lands, while those dominated by sedges and grasses are classified **Emergent Wetlands**. One wetland can be a mix of various types.

Forested wetlands may be particularly difficult to identify because many of the trees in forested wetlands are classified as "facultative," that is, they are generalists that occur in both wetlands and uplands. Therefore, the presence of these tree species does not mean the area is or is not a wetland. For forested wetlands then, the understory species as well as the soil characteristics and the hydrology of the site provide the needed clues for wetland identification. In addition, well devel-

Box 4

Are There Wetlands On Your Land?

A YES answer to any of the questions may indicate that the site is a wetland.

Yes	No	
❑	❑	Are there natural drainage channels or swales?
❑	❑	Is the ground soggy under foot in the spring?
❑	❑	Are there depressions where water pools for several consecutive days in the spring?
❑	❑	Do you avoid the area with heavy equipment for fear of getting bogged down?
❑	❑	Has the site been ditched to dry it out?
❑	❑	Are seeps or springs present?
❑	❑	Are there sediment deposits on fallen leaves?
❑	❑	Is the soil dark or light gray rather than brown or reddish brown?
❑	❑	Dig a shallow hole and remove a clump of soil. Are there rusty red mottles against a gray background? If you remove a live root from the clump surface, does it leave a rusty line?
❑	❑	Is there evidence of surface scour from running water?
❑	❑	Do you see many clumps of rushes (round stems), sedges (triangular stems), skunk cabbage, willows, or Oregon ash? (These are just a few of the many plants that grow in wetlands.)
❑	❑	In forested areas, are there large hummocks, trees with fluted bases, and trees grown on nurse logs?

A Word of Caution - **Seasonal wetlands may look very dry in mid-to-late summer. Use the checklist to evaluate your land, and consult a specialist before doing work in an area that may be a wetland. Many activities in wetlands are regulated by state and federal law.**

oped forested wetlands often exhibit a hummock and hollow topography, with trees restricted to the hummocks.

Some wetlands are agriculturally managed having been used for many years for grazing or to grow crops. Some of these have been ditched, drained or diked to remove the water, thus converting them to non-wetland. Others, however, still have wetland hydrology and still pond water for several days in the spring. When cropped, these agricultural wetlands may not look at all like wetlands; when abandoned, however, the wetland plant species gradually reappear.

There are a number of regional publications that serve as excellent guides to wetland types and identification in Oregon and Washington (see reference section).

Management Considerations

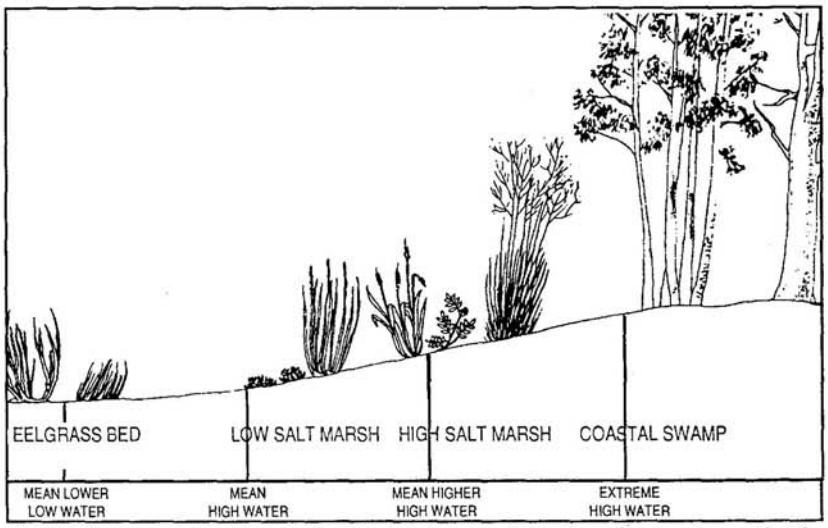
The many functions that wetlands provide make protection, restoration, and wise management of wetlands important to landowners and the general public. Forestry can be compatible with sound wetland management. While most forestry activities may alter the wetland, they need not convert it to an upland. The goal in managing woodlands and wetlands, then, is to avoid activities that may convert the wetland to upland and to manage site alterations to retain the benefits provided by the wetland.

Wetlands change in a variety of ways. Some change is inevitable, as landscapes are changing all the time. While some change is natural, other change is not, or is accelerated by the activities of people. The key to managing wetlands and woodlands is to plan carefully and thoughtfully, and to be aware of the affects your activities will have on the landscape. *Some wetland sites may be so sensitive, and so difficult to reforest, that you may want to consider excluding them from your harvest plans.*

The amount and duration of water on a site affects soil development. Soil development, in turn, affects the plant community characteristics. Just as specific water, soil, and vegetation characteristics define a wetland, it is these characteristics that we must manage with care in order to maintain the functions and values of wetlands. Some potential forest practices disturbances to wetlands are: Alteration of hydrologic functions; Soil disturbance; Introduction of invasive plant species; Changes in the microclimate due to vegetation removal in and around the wetland; Alteration of habitat through the removal of vegetation, snags, and downed wood; Reduction of woody species or woody debris that simplify the composition, structure, and stability of wetlands.

Management Techniques

Forestry activities that demand careful planning to minimize damage to wetlands include road and landing construction, heavy equipment use in and around wetlands, reforestation, and harvesting.



Idealized cross sectional view of spatial and vertical relation of estuarine wetland types.

Roads and Landings

Road building and landing construction are activities that may require filling. These activities should be avoided in wetlands, as they may seriously or permanently alter the wetland. When deciding on road or landing locations, conduct an inventory of all sensitive areas (wetlands, riparian areas, sensitive wildlife sites, high risk sites etc.) and outline operational considerations. Weigh all of these factors before deciding on a road or landing location.

If you must build a road in or near a wetland, minimize its impact. Use clean, temporary fills, minimize the amount of fill you use, and minimize the road width. Give careful consideration to the size, spacing, and orientation of culverts, particularly in systems with wide water table fluctuations or with seasonal flows. Use adequate culvert sizes and increase the frequency of culvert spacing.

Equipment Use

Excessive soil disturbance can reduce site productivity, alter drainage patterns, and prepare seed beds for invasive plant species which are adapted to disturbed sites. These pest species, such as reed canarygrass and purple loosestrife, are very aggressive and hardy, can clog culverts and streams, are of low value to wildlife, and displace native vegetation.

Wetland soils may not be wet year-round. In fact, during some parts of the year, they may be quite dry. These soils can be sensitive to disturbance and the use of heavy equipment on these sites should be avoided. If heavy equipment must be used in wetlands, confine its use to dry periods, and, even then, keep the equipment on any available high spots. Low ground pressure equipment can be very effective in protecting wetland sites.

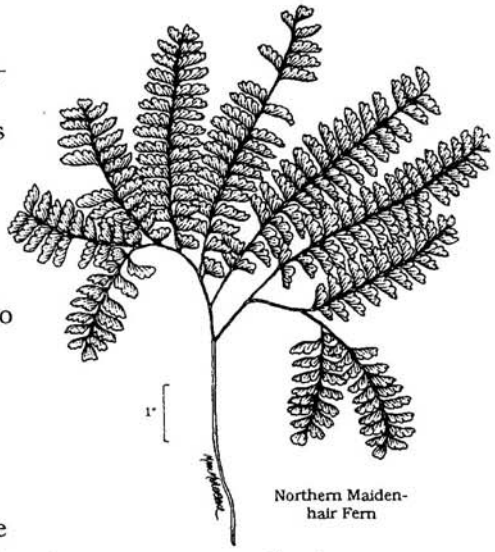
Reforestation

The key to successful reforestation is to plan before harvest begins. Many forested wetlands have developed over a long period of time under limiting conditions. For instance, in forested wetlands with hummock and hollow topography, regeneration may be confined to the hummocks. Similarly, in some spruce swamps, the existing trees became established on nurse logs, and in order for seedlings to become established again, the seed source must be good and nurse logs must be available. Prior to harvesting, land managers should develop a plan to provide these special components.

Harvesting

For harvest operations involving wetlands, managers should consider soil moisture, proximity to water, regeneration problems, potential for windthrow of residual trees, and wildlife habitat.

If the wetland is associated with a stream, harvesting operations should plan for the retention of leave trees near the stream to provide for shade, canopy, and future large woody debris contribution to the stream system. For wetland sites away from streams, leaving snags, downed wood and leave trees of varying sizes and species provides essential and diverse habitat for many species of birds, small mammals and big game. Generally, leaving trees that are representative of the stand, both in species and size class, will benefit the wetland. It is important to retain trees, particularly conifers, even on small wetlands. Also, remember to retain downed logs as nurse logs and for wildlife habitat.



Northern Maidenhair Fern

Vegetation left around wetlands can accomplish several things. It can protect the site from sedimentation. Also,

vegetation will help regulate temperature and moisture conditions by providing windbreaks and shading, provide a buffer between human activities and wetlands, and provide for thermal cover, browse, and other habitat components for many wildlife species. The optimal size of a leave tree area varies in relation to a number of factors including slope, erodibility of uplands, the stocking level of the stand, and the potential for windthrow.

Wetlands vary greatly by species composition, region, land use, and other site specific variables. It is advisable to consult a local biologist for ideas and management advice.

Related Land Uses

Grazing and other agricultural activities can also alter wetlands substantially. Heavy livestock grazing in and around wetlands can change the plant species composition and break down the banks of adjacent water bodies. Controlling the number of animals and the timing of the grazing in sensitive areas can alleviate much damage, often bringing improvements to forage and moisture conditions. Consider fencing some of the more sensitive areas.

For forest management advice on wetlands, contact the Oregon Department of Forestry or the Washington Department of Natural Resources. Before beginning any ditching, draining, filling, clearing or other alteration of wetlands, consult your county Extension agent, Department of Agriculture representative, and/or the wetland regulatory agencies. Anyone receiving U.S. Department of Agriculture benefits should consult the Soil Conservation Service prior to altering wetlands. Penalties for wetland conversion may include loss of benefits and/or fines.

Incentive Programs and Regulations

Landowner Incentive Programs

Assistance is available to landowners who wish to improve wildlife or fisheries habitats on their land. For information and assistance, contact:

- the Oregon or Washington Department of Fish and Wildlife
- the U.S. Fish and Wildlife Service
- your local Soil and Water Conservation District
- the U.S. Soil Conservation Service
- the Agricultural Stabilization and Conservation Service
- Service Foresters of the Oregon Department of Forestry or the Washington Department of Natural Resources.

Wetland Regulations

Many activities in or adjacent to wetlands are regulated by local, state, and/or federal laws. (See Agencies under Information Sources.) Activities in wetlands or streams that may be regulated include:

- Filling
- Excavation
- Timber harvest
- Stump removal
- Bulldozing or grading
- Alteration of stream banks or stream course
- Plowing or discing non-farmed wetlands
- Ditching
- Construction
- Draining

Oregon

In Oregon, commercial forest operations conducted on private land are regulated by the Oregon Department of Forestry under the state Forest Practices Act (FPA). Activities in or near wetlands that are part of a commercial forest operation and comply with the FPA do not require a separate permit from the Oregon Division of State Lands (DSL) or the Army Corps of Engineers. However, it is important to remember that if the timber harvest activity is related to a change in land use (to a non-forestry use), a DSL and/or Corps of Engineers permit may be required for subsequent activity, including stump removal. Wetland fills or alterations not directly related to forest management are generally regulated by DSL and the Corps of Engineers.

Washington

In Washington, commercial forest operations on private land are regulated by the Washington

Department of Natural Resources (DNR) under the state Forest Practices Act. The Department of Ecology also has regulatory authority over those forest practices which can affect water quality. Activities in or near wetlands on forest land are regulated by the forest practices permit application, which is processed by the DNR and distributed to other agencies.

When a change in forest land use (to a non-forestry use) is proposed, city or county government may require compliance with a clearing and grading ordinance or Shoreline Master Program. The Corps of Engineers may require another permit. Local planning and public works agencies can assist with determining local requirements.

INFORMATION SOURCES

References

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Washington State Department of Natural Resources, Forest Land Management Division. Richard Bigley and Sabra Hull. Recognizing Wetlands and Wetland Plant Indicators. July 1992. Olympia.

Tools

National Wetlands Inventory

National Wetlands Inventory (NWI) maps are produced by the U.S. Fish and Wildlife Service

INFORMATION SOURCES

and are available for all of Oregon and Washington. Most NWI maps are at a 1:24,000 scale. Wetland information is displayed on a USGS topographic base map. The mapping is based on aerial photograph interpretation, with limited field checking. The inventory in itself is not sufficient to determine the precise boundaries or the resource values of a particular wetland. The NWI is perhaps least reliable in identifying forested wetlands, as these are among the most difficult to identify through air photo interpretation. The minimum size area mapped by the NWI is one to five acres, depending on cover type and topography.

USGS Topographic Maps
These maps, at a scale of 1:24,000 or 1:62,500, are a source of topographic clues for wetlands identification.

Aerial Photographs
Aerial photographs are frequently very useful in identifying the boundaries of wetlands and are an important tool for evaluating large areas.

County Soil Survey
County soil surveys are available for much of Oregon and Washington. Soil surveys include maps of major soil units and a vast amount of information about the soils. Hydric (wet) soil types are a clue in wetlands identification. Your county Soil Conservation Service office can provide you with a survey (if available) and assist you in using it. They can also provide you with a list of hydric (wet) soils.

Oregon Agencies

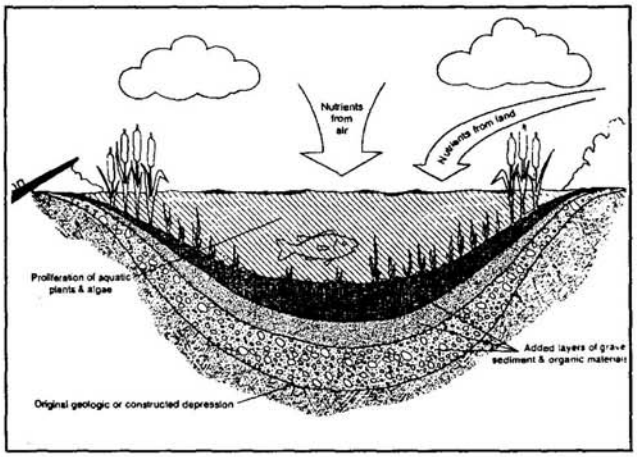
Department of Forestry
2600 State St., Salem 97310
Phone: 503/945-7200
- Administers Forest Practices Act
- Provides forest management assistance

Division of State Lands
775 Summer Street NE, Salem 97310
Phone: 503/378-3805
Eastern Region Office, Bend
Phone: 503/388-6112
- Administers State Removal-Fill Law
- Source for National Wetlands Inventory maps
- Wetland identification assistance

Department of Fish and Wildlife
2501 SW 1st Street, Portland 97201
Phone: 503/229-5400
- Assistance with management plans and habitat enhancement
- Wetland identification assistance
- Assistance with wetland restoration
- Administers State Endangered Species Act for wildlife and fish

Soil and Water Conservation Districts, county offices
- Assistance with conservation projects

Department of Agriculture, Natural Resources Division
635 Capitol Street, NW, Room 212, Salem 97310
Phone: 503/378-3810
- Assistance with land management practices
- Administers State Endangered Species Act for plants



INFORMATION SOURCES

Oregon State University, Extension Forestry
Peavy Hall 119, College of Forestry
Oregon State University, Corvallis 97331
Phone: 503/737-3700
• Technical assistance, publications, videos

Washington Agencies

Department of Natural Resources
Division of Forest Practices
1111 Washington St. SE
P.O. Box 47012
Olympia, WA 98504-7012
Phone: 206/902-1400
* Administers Forest Practices Act (FPA)
* Provides forest management assistance

Department of Ecology
Water Quality Program
P.O. Box 47600
Olympia, WA 98504-7600
Phone: 206/493-9496
* Administers water quality provisions of the FPA.

Department of Fish and Wildlife
115 General Administration Building
Olympia, WA 98504-3135
Phone: 206/753-6600
* Protects food fish and their habitat
* Protects wildlife, gamefish and bullfrogs and their habitat

Federal Agencies

U.S. Army Corp of Engineers
Portland District, Regulatory and Resources Branch
P.O. Box 2946, Portland, OR 97208-2946
Phone: 503/326-6995

Seattle District, Regulatory Branch
P.O. Box 3755, Seattle, WA 98124
Phone: 206/764-3495

• Administers federal Clean Water Act (wetland regulations)

U.S. Fish and Wildlife Service
Portland Field Office
2600 SE 98th, Suite 100, Portland, OR 97266
Phone: 503/231-6179

Olympia Field Office
3704 Griffin Lane SE, Suite 102, Olympia, WA 98501-2192
Phone: 206/753-9440

• Assistance with habitat improvements and wetland restoration

U.S. Soil Conservation Service
Oregon State Office
1220 SW Third Ave., Room 1640
Portland, OR 97204-2881
Phone: 503/326-2751

Washington State Office
West 316 Boone Ave., Suite 450
Spokane, WA 99201-2348
Phone: 509/353-2337

• Assistance with conservation programs
• Assistance with soils

Illustrations Courtesy of Oregon Department of Fish and Wildlife and U.S. Army Corps of Engineers

Our Purpose...

This leaflet was written by Rosemary Mannix, of the Oregon Department of Forestry and Janet Morlan, Oregon Division of State Lands.

The Woodland Fish and Wildlife Project is a cooperative effort among the World Forestry Center, Oregon State Department of Forestry, Washington State Department of Natural Resources, Oregon State University Extension Service, Washington State University Cooperative Extension, University of Washington Center of Streamside Studies, Oregon Association of Conservation Districts, Oregon Small Woodlands Association, Washington Farm Forestry Association, Oregon Department of Fish and Wildlife, Washington Department of Fisheries, Washington Department of Wildlife, Oregon Soil Conservation Service, Washington Soil Conservation Service and the USDA Forest Service. The World Forestry Center serves as the coordinating organization for the project.

The Woodland Fish and Wildlife Project was initiated to provide information on fish and wildlife management to private woodland owners and managers. It is the intent of the organizations involved in this project to produce publications that will serve as practical guides to woodland owners.

Each publication is intended to be complete in itself. Users may find it convenient to collect all publications in this series in a three ring binder to form a permanent reference file. Woodland Fish and Wildlife Project publications range from an overview of fish and wildlife opportunities on woodland properties to specific publications concerning techniques for managing individual species.

These publications can be obtained from any of the cooperating organizations or by contacting the World Forestry Center, 4033 SW Canyon Road, Portland, OR 97221, (503) 228-1367.

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