WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Water Quality Guidelines for Wetlands

Using the Surface Water Quality Standards for Activities Involving Wetlands

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Prepared by:

Washington State Department of Ecology
Shorelands and Water Resources Program

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If you have comments and suggestions for future revised editions, we welcome them. Please direct them to Jaime Kooser.

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Section 1: Introduction

Wetlands are waters of the state that are important and diverse areas of transition between land and water. Washington has a tremendous range of geomorphology that defines the kinds of wetlands that can be found in our state. Wetlands range from alpine and subalpine meadows in the Cascade and Olympic mountain ranges to salt marshes along the Pacific coast; river mouth estuaries within Puget Sound; and vast areas of freshwater marshes in the Columbia Basin. Although quite variable, wetlands share common characteristics arising from their hydrology, which in turn structures their special soils and vegetation.

Wetlands are integral to the functioning of both surface and groundwater systems. Their position in the watershed allows for stormwater detention and desynchronization; water quality improvement through biofiltration of sediment and pollutants; maintenance of hydraulic interactions between uplands, other wetlands, surface and groundwater within the watershed; low flow augmentation; shoreline stabilization and erosion abatement; and critical food chain support and habitat for both terrestrial and aquatic ecosystems.

Wetland water quality, like other surface waters, is protected by the federal Clean Water Act (CWA; 33 U.S.C. 1251 et seq.) and the state Water Pollution Control Act (Chapter 90.48 RCW). The Surface Water Quality Standards (Chapter 173-201A WAC) are the means for implementing these laws. This guidance document describes Washington's water quality standards and how the standards apply to wetlands.

Ecology staff, in issuing permits and reviewing projects, determine if the project or permit will meet the water quality standards. These guidelines assist the project reviewer in making that determination. Further, the guidelines aim to ensure the equitable and consistent regulation of activities which have the potential to degrade or destroy the water quality of a wetland. Consistent application of the water quality standards on a statewide basis will contribute to the protection of the state's important wetland resource. Just as important as consistency in decision making is flexibility. The guidelines assist Ecology staff in making effective decisions that best protect the resource, and that balance the effects of such actions on the total environment, including economic considerations. We recognize that the guidelines are dynamic, not static; they will change as our information changes.

What Are Water Quality Standards?

Section 303 of the federal Clean Water Act and 40 CFR Part 131 of the Federal Regulations direct states to set water quality standards for all waters of the United States, subject to the review and approval of the Environmental Protection Agency (EPA). Federal regulations include wetlands as "waters of the United States" (40 CFR §122.2). EPA describes the purpose of state water quality standards in the Water Quality Standards Regulations:

> "A water quality standard defines the water quality goals of a water body, or a portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or

welfare, enhance the quality of water and serve the purposes of the Clean Water Act (the Act). 'Serve the purposes of the Act' (as defined in Sections 101(a)(2) and 303(c) of the Act) means that water quality standards should, wherever attainable, provide water quality protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish and wildlife, recreation in and on the water and agricultural, industrial, and other purposes including navigation." (40 CFR §131.2)

The state Water Pollution Control Act directs the Department of Ecology to develop water quality standards to "maintain the highest possible standards for all waters of the state..." (RCW 90.48.035). The water quality standards are reviewed and updated at least every three years to ensure Washington is addressing pollution problems using the best available information on water quality management. This process is known as the triennial review.

Washington's surface water quality standards protect a wide range of beneficial uses. Beneficial uses, called characteristic uses in the standards, include domestic, agricultural and industrial water supplies; recreation and aesthetic values; wildlife habitat; fish and shellfish (migration, rearing, spawning, and harvesting); commerce and navigation; and any other legitimate use of a waterbody. The standards contain chemical, physical, and biological criteria to support these beneficial uses.

How Are the Standards Used?

The water quality standards are used by Ecology to protect and maintain beneficial uses when issuing permits (such as National Pollutant Discharge Elimination System (NPDES) permits that set limits on discharges to surface waters), conditioning permits (such as federal permits affecting state waters), and reviewing proposed projects to ensure that water quality of surface waters is protected. These responsibilities usually are carried out on a site-specific basis when reviewing individual projects or permit applications. These permits and reviews cover a wide range of activities, including discharging wastewater and stormwater, filling wetlands, construction activities requiring short-term standards modifications, aquatic herbicide applications, activities reviewed under the State Environmental Policy Act (SEPA), and activities regulated under the Shoreline Management Act (SMA).

The primary permits, certifications and reviews for wetland protection include:

- CWA §401 water quality certifications, given in conjunction with the request for a §404 permit from the Army Corps of Engineers, can be approved, denied or conditioned, so that wetland impacts are mitigated.

- Short-term standards modifications are conditioned to reduce wetland impacts.

- Aquatic herbicide permits are conditioned to reduce wetland impacts.

- In reviewing projects under the Shoreline Management Act, we ensure that projects are consistent with the goals and requirements of shoreline master programs and specify wetland protection measure for conditional use permits and variances. The SMA involves protection of floodplains and associated wetlands.

- Projects are reviewed under SEPA to secure the best wetland protection.

The primary means for protecting water quality in wetlands is through implementing the antidegradation section of the water quality standards. The antidegradation policy in the water quality standards establishes the bottom line for water quality protection in Washington's waters: "Existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed." (WAC 173-201A-070). The beneficial uses of wetlands are many, and the water quality standards are a valuable and effective tool for ensuring the protection of Washington's wetland resources.

Overview of Guidelines

Ecology staff who review and comment on proposed projects which may affect wetlands often cite "best professional judgement" as a deciding factor when making a decision. These guidelines describe the thought process behind a decision based on "best professional judgement" and present a framework for using best professional judgement to make well documented, well informed, and reasonable decisions.

Section 2 describes the surface water quality standards, detailing beneficial uses and the criteria used to protect them. Section 3 specifies how a water quality decision is reached regarding wetlands using the Antidegradation Decision-Making Process. This includes understanding the role of wetland mitigation in meeting the antidegradation requirement. Appendix A, Legal Considerations, presents a detailed description of Ecology's authority to regulate wetlands as waters of the state. Our authority comes from the state Legislature via the state Water Pollution Control Act as well as the federal Clean Water Act. Finally, Appendix B contains a glossary of terms.

Section 2: Surface Water Quality Standards

States are required to establish water quality standards to meet the goals of the CWA. There are three basic elements that are required in each state's water quality standards (40 CFR 131):

- Use designations consistent with the provisions of §101(a)(2) and 303(c)(2) of the CWA
- Water quality criteria sufficient to protect the designated uses
- An antidegradation policy

This section describes these elements of the state surface water quality standards as they relate to wetlands. Other sections of the water quality standards are discussed as necessary.

Characteristic Uses and Beneficial Uses

Federal regulations require states to specify appropriate water uses to be achieved and protected. These designations must be consistent with the provisions of the CWA that all waters support the propagation of fish, shellfish, wildlife, and recreation in and on the water. Federal guidelines refer to these uses as "designated uses" and Washington's water quality standards refer to them as "characteristic uses"; these terms are essentially synonymous. Water uses are, however, most frequently referred to as "beneficial uses". The various water classes in the state water quality standards share many of the same uses:

(i) Water supply.
(ii) Fish and shellfish:
Salmonid migration, rearing, spawning, and harvesting.
Other fish migration, rearing, spawning, and harvesting.
Clam, oyster, and mussel rearing, spawning, and harvesting.
Crustaceans and other shellfish (crabs, shrimps, crayfish, scallops, etc.) rearing, spawning, and harvesting.
(iii) Wildlife habitat.
(iv) Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).
(v) Commerce and navigation.
(vi) Aesthetics.

Water quality protection for wetlands, or any waterbody, is not limited to these uses. The Water Pollution Control Act extends protection to all beneficial uses of a waterbody (RCW 90.48.020), and the antidegradation policy (WAC 173-201A-070) prohibits any degradation of existing beneficial uses of waters of the state.

Because the water quality standards refer to "characteristic uses" and "beneficial uses", it is important to note how the terms are different. Characteristic uses is the term Washington uses to be consistent with the concept of "designated uses" as used in the federal water quality standards rules. Characteristic uses refers only to the specific list of assigned designated uses in the water quality standards. Beneficial uses has a broader meaning, incorporating any attribute of a waterbody that contributes to the economic, social, or natural environment. Although "characteristic uses" is more narrowly defined than "beneficial uses", often the terms tend to be used interchangeably. In these guidelines, we use the term "beneficial uses", except when needing to refer specifically to the list of characteristic uses in the standards. For a more detailed discussion of these terms, as well as "existing uses", please see page 21.

For wetlands it is necessary to clarify two more terms: functions and values. These terms are used almost universally when discussing wetland processes and wetland regulation. Wetland functions are the physical, chemical, and biological processes that occur in a wetland, or under the direct influence of a wetland. They include hydrologic functions such as the conveyance or storage of flood water, chemical functions such as biogeochemical cycling, and biological functions such as primary and secondary productivity. Many of the functions performed by wetlands result in direct or indirect benefits and services to society. These benefits and services have been called wetland values. Perceived values arise out of the functional ecological processes wetlands perform, but they are determined also by the location of a particular wetland, the human population pressures on it, and the extent of the wetland resource (Mitsch and Gosselink, 1986).

Two examples of the distinction between wetland functions and values can be made easily with two functions wetlands perform: temporary water storage and trapping of suspended materials. By itself, temporary water storage is simply a physical process that occurs in a wetland. But this process becomes important because of the value to society that results from it. Flood water attenuation and groundwater recharge are extremely valuable services provided to society by the water storage function. The same is true for the process of trapping suspended material in a wetland; the water quality improvement that results from that process is the value provided to society.

Simply put, wetland functions and values are roughly equivalent to the beneficial uses of a wetland. For consistency, these will be collectively referred to as beneficial uses. With wetlands, as with other surface waters, it is necessary to understand the biological processes and the resultant benefits to ensure effective protection of the beneficial uses.

Using the water quality standards for wetland protection requires that these beneficial uses be identified in order to be protected. The characteristic uses listed in the water quality standards for Class AA and Class A waters apply to wetlands because wetlands are generally classified waters (see page 20). However, the protective umbrella of the water quality standards is not limited to only those uses listed; the antidegradation policy extends to all existing beneficial uses, whether or not they are listed.

It is important to identify and evaluate beneficial uses which are occurring in a wetland because the uses need to be protected whether they are listed in the standards or not. One way to do this is to determine if a wetland is likely to perform a function that is an attribute of a particular beneficial use. For example, for a wetland to provide stormwater attenuation, it would be necessary for the wetland to have the necessary vegetation density and type as well as depressional storage.

Another reason for determining which functions a wetland is performing is to ensure that a beneficial use is not exploited to the point where the beneficial use is not being maintained and protected. A wetland may be contributing to the water supply by providing nutrient or sediment removal of stormwater runoff. However, by exploiting that use, the natural capacity of the wetland to filter sediment could be quickly overwhelmed. The water quality standards are, therefore, used to protect and maintain the natural qualities of a wetland.

Wetland Beneficial Uses

This section 1) describes each of seven beneficial uses in general terms and how wetlands directly or indirectly support that use (because these are the uses listed in the standards, they are correctly called characteristic uses), 2) describes the specific indicators of the functions wetlands perform and how the resultant values directly or indirectly support a particular beneficial use; and 3) describes the potential impacts to the beneficial use when a wetland's ability to function has been degraded or destroyed. The uses are listed here with a discussion of their relevance to wetlands.

In the discussion of impacts to beneficial uses, note that filling a wetland will completely eliminate most, if not all, the beneficial uses. Therefore, filling a wetland is not addressed directly in this section. However, the complete loss of a beneficial use is certainly considered a significant impact and must be addressed as such.

Water Supply (domestic, industrial, agricultural)

Description

Water is the most critical feature that defines a wetland. The water regime in a wetland is usually referred to as hydroperiod. Hydroperiod is defined as the periodic or regular occurrence of flooding and/or saturated soil conditions; it encompasses depth, frequency, duration, and seasonal pattern of inundation. Different hydroperiods will usually create different types of wetlands (tidal, nontidal, semipermanently flooded, permanently flooded) and will require that certain water quality characteristics be evaluated differently.

One way to look at water supply as a protected, beneficial use is the maintenance of the water in the wetland itself. It is first necessary to maintain the water in the wetland in order for the wetland to provide some water supply benefit to the public. In fact, most wetland water quality functions are tied directly or indirectly to the hydroperiod, and many impacts to wetlands directly or indirectly affect the hydroperiod of the wetland (Nelson and Randall, 1990). This makes all aspects of wetland hydrology extremely important for the purposes of the water quality standards.

AR 030816

Indicators

There are water quality and water quantity indicators for water supply; wetlands provide support for both aspects. Wetlands receiving surface water flow will have the greatest opportunity to provide this beneficial use. Wetlands act as natural water purification mechanisms. They remove silt and filter out, transform, and absorb nutrients and many pollutants such as waterborne toxic chemicals. Wetlands serve to maintain water supplies by functioning as groundwater recharge sites and augmenting low flows in adjacent streams and lakes.

Wetlands play an important role in the landscape through their ability to improve water quality and thereby protect the water supply in adjacent rivers, lakes, streams and marine waters. This buffering function, however, can be overused, leading to the degradation of beneficial uses in wetlands (Robb, 1992). Wetlands maintain the water quality of receiving waters by removing nutrients. Nutrients can be removed from the water column into plants and sediments. This process is usually referred to as nutrient removal/transformation. This function involves the retention of nutrients, the transformation of inorganic nutrients to their organic forms, and the transformation of nitrogen into its gaseous form. Nitrogen and phosphorus are probably the most significant nutrients in terms of wetland process and potential impact.

There are several biological, chemical, and microbial processes which function to remove or transform nutrients in wetlands. Nutrients can be taken up and stored by wetland vegetation. Once the plants die or defoliate, the nutrients are either returned to the water and sediment or flushed to downstream waters (this process is described later; see fish and shellfish support). Nutrients also bond to wetland sediments.

Denitrification is the conversion of dissolved nitrogen to gaseous nitrogen by microbes under anaerobic conditions. Because it is dependent upon nitrate formed under aerobic conditions, this process proceeds most rapidly with fluctuations in or in close proximity to oxygenated and anoxic conditions. Nitrogen fixation is the opposite of denitrification, and may be the source of significant nitrogen for some wetlands. Nitrogen fixation involves the conversion or fixation of gaseous nitrogen into organic forms by bacteria, blue-green algae, and some plants, e.g., red alder, *Alnus rubra*. Ammonium volatilization also involves the removal of nitrogen from wetlands. Ammonium volatilization is an abiotic process that results in the removal of ammonium by evaporation. The process occurs at high temperatures and at a pH of greater than 7.5 (Marble, 1992).

The efficiency of nutrient removal and transformation is greater with longer retention times and relatively low loading rates. A wetland that functions to retain and transform nutrients must be capable of physically detaining the nutrients. This is accomplished when the water velocity entering a wetland slows so that nutrients have time to react. The density and type of vegetation in the wetland greatly influences this function; the more dense the vegetation is, the greater the wetland's ability to remove and store nutrients. Water detained for a long period of time has greater potential for biological processing of nutrients. Biological processes, however, may be limited by the oxygen content of the water.

Soil conditions also determine the degree to which a wetland removes nutrients. Permanently saturated or flooded wetland soils favor phosphorus retention. Phosphorus is also most easily removed by complexing with aluminum, calcium, and iron in wetland sediments, and the rapid fluctuation between anaerobic and aerobic conditions favor nitrogen removal (Marble, 1992).

Sediments frequently contain chemically and physically attached contaminant materials such as heavy metals, pesticides and other organic toxicants. Toxicants associated with sediments can be removed temporarily or permanently from the water column by sediment deposition. Toxicants carried by sediments into the wetland can be removed by burial, chemical breakdown, and/or assimilation into plant and animal tissues. Sediments may be temporarily retained by a wetland before moving further downstream. The longer the retention time in the wetland, the more the sediments are likely to settle. Lighter particles, such as colloidal clays, have the longest sedimentation rate. The wetland type is important in determining the sediment trapping ability. Estuarine wetlands encourage the flocculation of clays at the freshwater/salt water interface.

Wetlands with organic soils are more likely to complex with metals and synthetic organic toxicants. Minimal fetch and exposure of the wetland to wind and wave action will discourage the resuspension and transport of sediment out of the wetland and encourage the retention of sediments for long periods of time. Wetland vegetation also contributes to the organic content of the bottom sediments which in turn helps retain toxicants associated with sediments.

Wetlands also provide support for water supplies by maintaining water quantity. Primarily this is through augmentation of stream flows during low flow periods and other surface waters and groundwater augmentation. By their very nature, wetlands are able to retain water for long periods of time; obviously, the quantity of water stored is dependent on the size and type of wetland. The slow release of these stored waters into other surface water or groundwater is critical to the maintenance of many other water bodies.

Impacts and Effects

Water clarity, nutrients and chemical content, physical and biological content, dissolved gas levels, pH, and temperature contribute to a wetland's life-sustaining capabilities. Changes in the clarity, color, odor, and taste of water through the addition of contaminants such as suspended particulates and dissolved materials can reduce or eliminate the suitability of a wetland for direct or indirect maintenance of water supply.

Loading rates of incoming water should not exceed the wetland's ability to assimilate sediments, nutrients or toxicants. The introduction of nutrients or organic material to a wetland can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen. Increases in nutrients can favor one group of organisms such as algae to the detriment of other types such as submerged aquatic vegetation, potentially causing adverse health effects, objectionable tastes and odors, detrimental impacts to aquatic organisms and wildlife, and other problems.

Changes in hydroperiod can significantly affect a wetland's ability to provide water quality and water quantity support to the beneficial use of water supply. Severe water fluctuations will limit denitrification and phosphorus retention. Changes in pH to more acidic conditions can reduce the wetland's ability to process nitrogen and phosphorus. Increases in water volume and/or velocity will increase loading and decrease sedimentation rates in the wetland, thereby decreasing the effectiveness of the wetland's ability to remove and retain nutrients and sediments. Increased velocities can also cause decreased water storage time in the wetland which will reduce the opportunity for the wetland to serve as a groundwater recharge source. Drawdown of wetland water levels often concentrates and mobilizes nutrients locked up in the exposed substrate.

Changes to a wetland's outlet can also significantly affect the hydroperiod. Wetlands with no outlets or constricted outlets have an increased probability of adsorption, biological processing, and retention of nutrients. Alterations to the outfall which increase the flow out of the wetland will reduce the ability of the wetland to perform these functions. These alterations could be significant enough to change the wetland type (e.g., permanently flooded to seasonally flooded) which would have a dramatic affect on how the wetland functioned to benefit water supply.

Different vegetation types act to remove nutrients in different ways. Dense emergent vegetation offers frictional resistance to water, grows and takes up nutrients rapidly, and releases the nutrients seasonally. Trees are often able to store greater amounts of nutrients for longer periods of time but generally offers less frictional resistance to water. A diversity of vegetation classes will result in the most effective nutrient cycling processes. Accordingly, impacts to wetlands which result in a reduction of vegetation density or types (e.g., change from emergent to open water or mixed vegetation to monotypic vegetation) can decrease the wetland's ability to provide the beneficial use of water supply support.

The sediment load of the incoming water is an important factor to consider. If incoming sediment loads are high, the wetland's assimilation and storage capacity may be compromised over time, ultimately affecting the wetland's ability to function. If a wetland is unable to assimilate the nutrients or toxicants it is receiving, there could be an increased threat to the ecosystem and other wetland functions. If the wetland is functioning as a groundwater recharge site, the sediment could seal the bottom of the wetland and create an impervious surface, preventing the wetland from providing a beneficial use.

According to Marble (1992), wetland characteristics which enhance the water supply beneficial use include:

- A wetland with a constricted outlet or no outlet will slow water and hold it in the basin.
- A gentle gradient in the wetland basin will slow water velocity.
- Dense wetland vegetation will act to slow water velocity, to force water to flow through a longer course, to retain it longer in the basin, and to discourage resuspension of bottom sediments.
- A long duration and extent of seasonal flooding allows for longer water retention time.

- Shallow water depth increases frictional resistance and slows water velocity. Vegetation which persists throughout the year is optimal for this function.
- The larger the wetland relative to the watershed, the greater the proportional amount of suspended sediment likely to be retained.
- Runoff from a watershed which is predominantly urban, agricultural, and/or disturbed land is more likely to carry sediment and the nutrients and toxicants associated with them.

Stock Watering

Description

Stock watering is listed as a characteristic use for all water classes except Class C (fair). Class C has been applied to low quality water and is presently limited to only one marine water (Commencement Bay).

Wetlands are often located in the transition zone from deep water habitat (e.g., river, stream or lake) to upland, where the deep waterbody is actually being used for stock watering, but the wetland receives significant damage as a result of the trampling and grazing from livestock. Best management practices (BMPs) related to stock watering, such as fencing and riparian vegetation buffers, can reduce the degradation to wetlands caused by livestock.

There is considerable debate concerning the use of wetlands for stock watering. Overuse of any waterbody, wetland or other, by livestock can cause severe damage to vegetation, soils, and water quality. Stock watering is a characteristic use of waters of the state and must, therefore, be protected. However, stock watering cannot significantly degrade a waterbody's ability to perform other beneficial uses (e.g., fish and wildlife habitat). Finding this balance through BMPs and other regulatory and nonregulatory efforts is essential to ensuring wetlands and other waterbodies can support all legitimate beneficial uses possible.

Fish and Shellfish

Description

Under the water quality standards, fish and shellfish support includes:

Salmonid migration, rearing, spawning, and harvesting.
Other fish migration, rearing, spawning, and harvesting.
Clam, oyster, and mussel rearing, spawning, and harvesting.
Crustaceans and other shellfish (crabs, shrimps, crayfish, scallops, etc.) rearing, spawning, and harvesting.

Being among the most productive ecosystems in the world, wetlands support a large number of both animal and plant aquatic species for some or all of their life history. Impacts to water quality can variously affect populations of fish, crustaceans, mollusks and other aquatic organisms as adults, juveniles, larvae, or eggs. Through photosynthesis, wetland plants convert sunlight into plant material, or biomass, and produce oxygen as a byproduct. This biomass serves as food and shelter for a number of aquatic and terrestrial organisms. Degraded water quality can result in the proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species.

Indicators

Generally, direct grazing by aquatic organisms of wetland plants is limited, so the vegetation's major food value is produced when it dies and fragments, forming detritus. This detritus forms the base of an aquatic food web which supports higher consumers. Wetlands can be regarded as the farmlands of the aquatic environment, producing great volumes of food annually. The majority of nonmarine aquatic animals depend, either directly or indirectly, on this food source (USEPA, 1985).

Most freshwater fishes can be considered wetland dependent for many reasons. Many species feed in wetlands or upon wetland produced food, many other fish use wetlands as nursery grounds, and almost all important recreational fish spawn in the aquatic portions of wetlands (USEPA, 1985). Many fish and shellfish feed along the edges of salt marshes and in shallow marsh ponds and move up into the marsh at high tides. Many estuarine organisms benefit from both the shelter afforded by marshes and the organic production exported from them (Mitsch and Gosselink, 1986).

Impacts and Effects

Suspended particulates settling on attached or buried eggs can smother the eggs by limiting or sealing off their exposure to oxygenated water. Water quality impacts to wetlands may result in the debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent. Increases in turbidity can also cause a shift in vegetation community structure, affecting the quality of habitat and food supply for aquatic organisms.

Mollusks are particularly sensitive to impacts of pollution during periods of reproduction, growth, and development due primarily to their limited mobility. They can be rendered unfit for human consumption by tainting, by production and accumulation of toxins, or by ingestion and retention of pathogenetic organisms, viruses, heavy metals or persistent synthetic organic chemicals.

Degradation of water quality from all forms of pollution can redirect, delay, or stop the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places such as spawning or nursery grounds and potentially leading to reduced populations. Reduction of detrital feeding species or other representatives of lower trophic levels can impair the flow of energy from primary consumers to higher trophic levels. The reduction or potential elimination of food chain organism population decreases the overall productivity and nutrient export capability of the wetland ecosystem.

Nutrient loading can cause shifts in vegetation communities to more aggressive, invasive species (USEPA, 1990). Submersed and floating leaved vegetation usually respond more strongly to higher nutrient inputs than does emergent vegetation. This can be detrimental to bottom dwelling organisms as a result of increased shading and biological oxygen demand (BOD). Decreased emergent species richness can also result from high nutrient inputs which can degrade the quality of habitat and food supply for fish and shellfish. Ambient pH can be one of the most important factors affecting community composition of emergent and aquatic bed vegetation. Continuous inputs of water to a wetland beyond the natural hydrologic budget can affect the pH.

Numerous changes can detrimentally affect fish and shellfish. Increasing or decreasing water fluctuation levels, frequency, or duration can increase water temperatures or make habitat unsuitable for certain organisms by changing inundation patterns. Ditching or draining a wetland can cause significant changes in water regime which not only affect the wetland, but can also have serious downstream impacts such as sediment loading and increased flooding potential. Changes in substrate elevation or composition can also have a detrimental impact on fish and shellfish life histories. Discharging dredge or fill material to convert wetland habitat to upland is the most obvious and common alteration of a wetland substrate. Instream and upland vegetation are a critical component of fish and shellfish habitat. The loss or reduction of vegetative cover can significantly raise water temperatures and increase ambient light levels, both of which are detrimental to aquatic life forms.

Water quality impacts from point and nonpoint sources are perhaps the most serious threats posed to fish and shellfish use of wetlands. Wetlands are frequently overloaded from inputs of toxins and nutrients and these compounds are then flushed downstream or often stored in the substrate where they can become available to bottom dwellers and feeders.

Wildlife Habitat

Description

Wildlife habitat is defined as "the waters of the state used by, or that directly or indirectly provide food support to, fish, other aquatic life and wildlife for any life history stage or activity" (WAC 173-201A-020). Wetlands serve as a transition area between land and water (an area often called an ecotone) and are among the richest wildlife habitats in the world. Wildlife associated with wetland ecosystems are resident and transient mammals, birds, reptiles, and amphibians. Wildlife are an integral part of the values and functions of wetlands because wildlife are disproportionately dependent on wetlands, in comparison to uplands, for resting, feeding and breeding (King County, 1991).

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Indicators

Many wildlife species such as beaver, frogs and salamanders depend on wetlands for their survival. Other species such as deer, wood ducks, herons, and raccoons depend on wetlands as a source of drinking water, food and cover. The unique characteristics of individual wetlands allows each wetland to provide wildlife habitat more suited for particular species. Each wetland then contributes to the collective diversity of habitat and wildlife found in Washington state. This is another reason why impacts to individual wetlands must be considered on a regional scale; widespread protection of wetlands is important in order to protect the regional biodiversity.

Wetland type, vegetation type, and water regime are all critical factors in determining the ability of a wetland to provide wildlife habitat. These same factors will also determine the kind of habitat that is provided. A wetland that may not have enough water for ducks may be perfect for frogs or salamanders. Scrub-shrub or forested wetlands provide a certain kind of habitat as do open water wetlands. Each wetland must be evaluated on the basis of the habitat it is providing.

Impacts and Effects

Many, if not all, of the impacts described in the previous section on fish and shellfish also affect the ability of a wetland to provide quality wildlife habitat; that discussion will not be repeated here. Also, the impacts described here may be important considerations for the support of fish and shellfish habitat as a beneficial use.

Sedimentation can kill emergent and woody vegetation when deposition is enough to bury trunks or stems or cut off root oxygen exchange. Severe sedimentation may also change the water regime in a wetland leading to further changes in vegetation community structure, affecting the quality of wildlife habitat the wetland is able to provide. Sedimentation can also cause decreases in species richness and diversity in invertebrate communities. Many species of wildlife that use wetlands for any life history stage are directly or indirectly dependent on these invertebrate communities as a food source.

Changes in water regime are perhaps most significant to wildlife. Increases in water level, the frequency or duration of inundation, and the frequency, duration, and degree of fluctuations can all have a significant affect on vegetation community structure (King County, 1991). Many species of wildlife have narrow habitat requirements (niche) and are not able to adapt to rapid or frequent changes in their immediate surroundings. Often, other aggressive, invasive or non-native species are able to take advantage of these conditions and become dominant.

Water quality impacts to wetlands can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. These adverse impacts upon wildlife habitat may result from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation. Increased water turbidity can adversely affect wildlife species which rely upon sight to feed, and disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms. The accumulation of contaminants from water quality impacts may lead to the bioaccumulation of such contaminants in wildlife. Changes in such physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species at the expense of resident species and communities. In some aquatic environments, lowering plant and animal species diversity may disrupt the normal functions of the ecosystem, leading to reductions in overall biological productivity.

Recreation

Description

Wetlands support recreation as a beneficial use, both directly and indirectly. Wetland related recreation encompasses activities undertaken for amusement and relaxation; many different activities can be considered as recreation. Primary contact recreation (generally defined as complete submergence, i.e., swimming) may not occur frequently in wetlands, but it certainly can occur in some wetlands. In order to protect human health, EPA requires states to set criteria to reflect swimming if it appears that primary contact recreation could occur (USEPA, 1983). It is also recommended that "common sense and good judgment" be used to set appropriate uses and criteria. Regulatory decisions based on the ability of a wetland to support primary contact recreation would be made on a case-by-case basis. Swimming aside, wetlands support a great number of recreational activities from fishing, nature walks, photography, hunting, and boating.

Indicators

Public enjoyment of the state's waters is a beneficial use (RCW 90.48.010, 020) protected by the federal Clean Water Act (40 CFR §230.53). Public enjoyment of a wetland can be passive (nature walks) or active (fishing and hunting). Aesthetic values associated with wetland ecosystems consist of the perception of beauty through a combination of the senses of sight, hearing, touch and smell. Aesthetics of wetlands contributes to the quality of life enjoyed by the general public and property owners (40 CFR 230).

Recreational and aesthetic values of wetlands are also related to the position of the wetland on the landscape, the relative scarcity or abundance of that wetland type, and the proximity of the wetland to potential users. For example, in an urban setting, a wetland that may be far from pristine still provides local residents an opportunity to enjoy a "natural" environment. When evaluating a wetland for its recreational or aesthetic qualities, one should consider how effectively the wetland could be cleaned up. A trashy wetland could easily be the focus of a neighborhood clean-up campaign.

Impacts and Effects

The impacts described above for fish and shellfish, and wildlife habitat are also important for consideration here. An impact that degrades or destroys a beneficial use such as wildlife habitat will also have a significant impact on the recreational quality of the wetland for hunting, fishing, bird watching, etc. Again, impacts that cause a change in the character of the wetland such as severe sedimentation or changes to the water regime have the greatest potential for degrading the recreational quality of a wetland.

Pollution can degrade the recreational and aesthetic qualities of a wetland by degrading water quality, creating unpleasant and distracting disposal sights, and by destroying vital elements that contribute to the compositional harmony or unity, visual distinctiveness, or diversity of an area. Further, pollution may adversely modify or destroy water use for recreation by changing turbidity, suspended particulates, temperature, dissolved oxygen, dissolved materials, toxic materials, pathogenetic organisms, quality of habitat, and the aesthetic qualities of sight, taste, odor, and color.

Pollution can adversely affect the particular features, traits, or characteristics of a wetland which make it valuable to property owners. Activities which degrade water quality, disrupt natural substrate and vegetational characteristics, deny access to or visibility of the resource, or result in changes in odor, air quality, or noise levels may reduce the value of a wetland to adjacent private property owners.

Commerce and Navigation

Indicators

Activities directly associated with commerce and navigation are often conducted in wetlands. Hunting and fishing, photography, birding and sightseeing are all activities which contribute to the local commerce. The potential affects of pollution and other detrimental impacts to water quality in wetlands is much the same for commerce and navigation as it would be for recreation. Pollution can seriously impair a wetland's ability to provide opportunities for activities related to commerce and navigation.

Impacts and Effects

Pollution and other negative impacts to wetlands can degrade the qualities of a wetland important to commerce and navigation by degrading water quality, creating unpleasant and distracting disposal sights, and by destroying vital elements that contribute to the compositional harmony or unity, visual distinctiveness, or diversity of an area.

Aesthetics

Indicators

Aesthetics is listed separately as a characteristic use as well as being listed as a subset of recreation (see above). Public enjoyment of the state's waters is a beneficial use (RCW 90.48.010, 020) protected by the state Water Pollution Control Act and the federal Clean Water Act (40 CFR §230.53). Public enjoyment of a wetland can be passive (nature walks) or active (fishing and hunting). Aesthetic values associated with wetland ecosystems consist of the perception of beauty by one or a combination of the senses of sight, hearing, touch and smell. Aesthetics of wetlands applies to the quality of life enjoyed by the general public and property owners (40 CFR 230).

The discussion of recreation as a beneficial use, above, applies directly to aesthetics as well and is not repeated here.

Other Wetland Beneficial Uses

As discussed above, the CWA, state Water Pollution Control Act, and the water quality standards make it clear that all existing beneficial uses of a waterbody are to be protected, not just those listed specifically in the standards (RCW 90.48.020, WAC 173-201A-070). This is an important consideration for wetlands when evaluating the potential for an activity to impair water quality. Some of the functions performed by wetlands which are protected as beneficial uses include:

- Groundwater exchange
- Stormwater attenuation
- Shoreline stabilization

Groundwater Exchange

Description

Groundwater is frequently used for public or private water supplies. Groundwater supplies are recharged by precipitation that seeps into the ground and by surface waters. Those wetlands that are connected to groundwater systems or aquifers are important areas for groundwater exchange. By retaining water, they provide time for infiltration to occur. Such movement of surface water into the groundwater system is called groundwater recharge.

During periods of low streamflow (or low lake water levels), the slow discharge of groundwater often helps maintain minimum water levels, a process known as groundwater discharge. In addition, wetlands located along streams, lakes, and reservoirs may release stored water directly into these systems, thus also contributing to their maintenance. The many intricate connections of wetlands with groundwater, streamflow, and lake and reservoir water levels make wetlands essential in the proper functioning of the hydrologic cycle.

Stormwater Attenuation

Description

Stormwater attenuation is the storage or conveyance of flood waters or groundwater and the retention or detention of runoff that occurs in the depression containing the wetland. Geomorphic variables and other characteristics of the wetland determine how much water is stored.

Indicators

The location and distribution of wetlands within a watershed influence how flow is detained and distributed. Wetlands located in headwaters generally desynchronize tributary and main channel peaks, and lakes and wetlands with restricted outlets hold back flood water and attenuate flood peaks. The extent of depressional storage is an important characteristic determining the ability of a wetland to retain water. Wetlands within watersheds characterized by gently sloping topography will have more ability to store water than those where slopes are steep. Basins with irregular, sinuous shorelines have the potential to slow flood waters through physical resistance, in contrast to watersheds where streams have been heavily channelized.

Flood flows are affected by the percentage of wetland area in the watershed and the size of a wetland relative to the size of the watershed. Flood flows in watersheds with a high percentage of wetlands (30-40 percent) can be reduced by as much as 80 percent. Wetland losses from basins initially having little wetland area may have a greater impact on stream flow than wetland losses from basins initially having large percentages of wetland area. A wetland which is large relative to watershed size can result in significant moderation of peak flows since inflowing water is spread out as a thin layer over the entire wetland surface.

The frictional resistance of a wetland is a critical characteristic that influences water storage. Frictional resistance varies depending on the width of the wetland, density of vegetation or other obstructions and the rigidity of these obstructions. Wetlands with relatively low proportions of open water to vegetation are more capable of altering flood flows than open water ponds or lakes. Vegetation slows flood waters by creating frictional drag in proportion to stem density.

Organic soils in wetlands also increase water retention capacity. These soils are generally more porous but less permeable than most mineral soils and therefore allow infiltration of water but inhibit its movement. The type of vegetative cover is also an important characteristic for flood storage. Because of their rigidity and persistence, trees and shrubs are the most important vegetative cover for water storage.

Table 1 Importance of Various Wetland Characteristics to Water Storage

Wetland Feature	Importance to Water Storage
Landscape Position	High
Depressional Storage	High
Gradient to Watershed	Moderate
Wetland to Watershed Ratio	High
Outlet Characteristics	High
Vegetation Density	Moderate
Vegetation Type	Moderate

Shoreline Stabilization

Description

Shoreline stabilization refers to the role of wetlands in protecting the shorelines of streams, rivers, and lakes from erosive forces. The vegetative cover of a wetland is the key to determining its ability to stabilize a shoreline or stream bank. Vegetation both dissipates erosive forces and anchors the sediments of the stream bank in place. Since certain species of trees and shrubs have deep roots, layering ability (the ability to root and sprout once buried), high regenerative capacity, and a long life-span, both trees and shrubs are essential for shoreline anchoring.

Indicators

The opportunity for a wetland to stabilize a shoreline is related to the magnitude of erosion in the watershed as well as the erodability of the adjacent lands. Urbanization contributes to greater peak flows from an increase in impervious surface area. The erodability of an area adjacent to a wetland is related to the steepness of the basin gradient, erodability of bank soils, evidence of scour, and evidence of flow.

Table 2 Importance of Various Wetland Characteristics to Stream Bank Stabilization

Wetland Feature	Importance to Stream Bank Stabilization
Vegetation Type	Moderate
Vegetation Width	High
Land Use in Watershed	Moderate
Fetch/Exposure	High

Table 3 Aspects of Wetlands Changed by Water Quality Impacts

PHYSICAL
changes to hydrology include alterations to:
- hydroperiod (water regime)
- volume of incoming water
- velocity of incoming water
- wetland outlet
- outfall rates

changes to the substrate include alterations to:
- elevation
- composition

CHEMICAL
changes to the quality of incoming water include alterations to:
- clarity
- color
- odor
- taste
- sediment load
- turbidity
- pH
- toxins
- pathogenic organisms
- metals
- nutrient loading

BIOLOGICAL
changes to the vegetation include alterations to:
- density

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type

Water Quality Criteria

A water quality standard defines the water quality goals of a waterbody, or a portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect those uses. States must adopt those water quality criteria that protect the designated (characteristic) use. For waters with multiple use designations, the criteria shall support the most sensitive use (40 CFR 131).

The Washington water quality standards use a combination of numeric and narrative criteria to protect beneficial uses of state waters. The numeric criteria are specific to waterbody class (e.g., Class AA, Class A, etc.). Numeric criteria include fecal coliform organisms, dissolved oxygen, total dissolved gas, temperature, pH, and turbidity. There are also numeric criteria established for toxic materials based on EPA's "Gold Book" (1986). These numeric toxic criteria are often referred to as aquatic life criteria because of the testing methods used by EPA. The direct application of existing aquatic life criteria to wetlands is assumed to be reasonable in most cases (Hagley and Taylor, 1991). The aquatic life criteria are found in WAC 173-201A-040.

Narrative criteria are particularly important for wetlands, since many wetland impacts cannot be fully addressed by numeric criteria. EPA's Water Quality Regulations (40 CFR 131) states that "States should...include narrative criteria in their standards where numeric criteria cannot be established or to supplement numeric criteria."

Ecology relies on the antidegradation policy (WAC 173-201A-070) which requires the protection of existing beneficial uses and establishes that, if the natural conditions of a waterbody are of a lower quality than the assigned criteria, the natural conditions become the criteria. This occurs most typically with criteria such as pH, dissolved oxygen, temperature, and fecal coliform. The natural conditions of a wetland often exceed the criteria for these parameters.

The general classifications section (WAC 173-201A-120) states, among other things, that any unclassified surface waters that are tributaries to Class AA waters are classified Class AA. All other unclassified surface waters are classified Class A. Thus most wetlands are classified Class A. However, wetlands are classified as Class AA if they are associated with Class AA waters; if they are in national parks, national forests, and/or wilderness areas; and if they are tributaries to lakes.

The water quality standards for Class AA (extraordinary) and Class A (excellent) surface waters are in WAC 173-201A-030 (1) and (2) respectively.

Antidegradation Policy

There are several narrative criteria and statements used in Washington's water quality standards (e.g., aesthetic values, toxics). Perhaps the most important component of the water quality standards regulation as it applies to wetlands is the antidegradation policy, WAC 173-201A-070:

"(1) existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed.
(2) Whenever the natural conditions of said waters are of a lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria.
(3) Water quality shall be maintained and protected in waters designated as outstanding resource waters in WAC 173-201A-080.
(4) Whenever waters are of a higher quality than the criteria assigned for said waters, the existing water quality shall be protected and waste and other materials and substances which will reduce the existing quality shall not be allowed to enter such waters, except in those instances where:
(a) It is clear, after satisfactory public participation and intergovernmental coordination, that overriding considerations of the public interest will be served;
(b) All wastes and other materials and substances discharged into said waters shall be provided with all known, available, and reasonable methods of prevention, control, and treatment by new and existing point sources before discharge. All wastes and other materials and substances discharged into said waters from nonpoint sources shall be provided with all known, available, and reasonable best management practices; and
(c) When the lowering of water quality in high quality waters is authorized, the lower water quality shall still be of high enough quality to fully support all existing beneficial uses.
(5) Short-term modification of water quality may be permitted as conditioned by WAC 173-201A-110."

The antidegradation policy applies to any action that may lower water quality or adversely affect existing uses in any water of the state. Both point and nonpoint sources of pollution are covered. Federal regulations specify several requirements for states when developing their antidegradation policy and implementation procedures (40 CFR §131). States are required to develop programs that provide waters with three levels of protection, usually referred to as tiers. The water quality criteria, antidegradation policy, and the implementation methods define how the state will:

Protect existing beneficial uses and the water quality necessary to protect the uses (tier 1).

Determine, on a case-by-case basis, whether, and to what extent, water quality may be lowered where water quality exceeds levels necessary to support propagation of fish and shellfish, wildlife, and recreation in and on the water (tier 2).

Define, designate, and protect waters that constitute an outstanding national resource (tier 3).

The following sections discuss these tiers in more detail.

Tier 1: Existing uses shall be maintained and protected

The antidegradation policy requires the protection of existing uses and the level of water quality to protect those uses (tier 1; WAC 173-201A-070(1)). To provide adequate protection for existing uses, it is important to differentiate "existing use" from "characteristic use.› The following definitions appear in the Water Quality Standards Regulations (40 CFR §131.3):

"(e) Existing uses are those uses actually attained in the waterbody on or after November 28, 1975 [the date of EPA's first water quality standards regulation], whether or not they are included in the water quality standards.

(f) Designated uses [referred to as characteristic uses in Washington] are those uses specified in water quality standards for each waterbody or segment whether or not they are being attained."

The critical distinction here is that existing beneficial uses do not need to be specified in the water quality standards in order to receive the protection of the antidegradation policy. This is important for wetlands which have beneficial uses such as shoreline stabilization or nutrient filtration that are not specifically mentioned. Yet these uses support on-site or down-stream fish and wildlife habitat, recreation, and other water-quality related activities. An existing use can be established by demonstrating that fishing, swimming, or other uses have actually occurred since November 28, 1975, or that the chemical water quality is suitable to support all the uses to be attained - unless there are physical problems, such as substrate or flow, which preclude the use.

For Washington state, characteristic uses are established for each waterbody class (see discussion on characteristic uses, above). A characteristic use that is not an existing use may, in some circumstances, be removed under 40 CFR §131.10(g) of the water quality standards regulation, in a process known as Use Attainability Analysis (UAA). (Washington currently does not conduct UAAs). An existing use, however, must be protected whether or not it is also a characteristic use. Because federal and state regulations require the most sensitive use be protected by the water quality standards, the level of protection necessary must still be sufficient to protect all existing uses.

For example, although commerce may occur on some wetlands with commercial harvesting of fish, berries or grain crops, it is not an activity that is conducted on a lot of wetlands. However, even though a wetland would not have to be protected for commerce, it must still be protected for wildlife habitat or recreation. Wildlife habitat or recreation would require just as stringent protection as commerce, if not more so.

Tier 2: Protection of Water Quality in High Quality Waters

Tier 2 provides the opportunity for Ecology to make decisions that may lower water quality in high quality waters, provided existing uses are maintained, and appropriate public participation occurs. All actions that may lower water quality in high quality waters must undergo an antidegradation review as described above (WAC 173-201A-070(4).

EPA has identified five tasks that should be completed when making antidegradation determinations for high quality waters. Often one or more of these steps requires minimal effort for any particular project or plan review. Other proposals may require extensive review or evaluation. The level of review required should be directly correlated to the severity of the environmental impact of the project; this concept is reflected in Task 1.

1. Identify actions that require a detailed antidegradation review including water quality and economic impact analysis.

2. Determine that lower water quality will protect existing uses.

3. Determine that lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

4. Determine that the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control have been achieved.

5. Complete intergovernmental coordination and public participation.

Tier 3: Outstanding Resource Waters

Tier 3 of the antidegradation policy provides protection to Outstanding Resource Waters (ORW). The CWA regulations allow states to designate ORWs "[w]here high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance..." (40 CFR §131.12(a)(3)). The regulations further state that water quality will be maintained and protected in these waters. This designation fits very well for wetlands, whose overall ecological value may be higher then sheer numerical high quality. For example, subalpine bogs are exceptional wetlands that are ecologically significant due to their rarity and irreplaceability, but they may not be pristine waters. The language in the water quality standards reads:

> "(3) Water quality shall be maintained and protected in waters designated as outstanding resource waters in WAC 173-201A-080."

ORWs will be nominated and designated through a public process similar to rule-making. The designated waterbodies would be identified in the water quality standards. At this time there are no waterbodies in the state that have been specifically identified as ORWs.

Wetland Mitigation

EPA addresses the issue of consistency with the antidegradation policy in terms of wetland fill in its guidance to states *Questions and Answers on: Antidegradation* (USEPA 1985b) as follows:

> "Since a literal interpretation of the antidegradation policy could result in preventing the issuance of any wetland fill permit under Section 404 of the Clean Water Act, and it is logical to assume that Congress intended some such permits to be granted within the framework of the Act, EPA interprets 40 CFR §131.2(a)(1) of the antidegradation policy to be satisfied with regard to fills in wetlands if the discharge did not result in "significant degradation" to the aquatic ecosystem as defined under Section 230.10(c) of the Section 404(b)(1) guidelines. If any wetlands were found to have better water quality than "fishable/swimmable," the State would be allowed to lower water quality to the no

significant degradation level as long as the requirements of Section 131.12(a)(2) were followed. As for the ONRW [Outstanding National Resource Water] provision of antidegradation (131.12(a)(3)), there is no difference in the way it applies to wetlands and other waterbodies."

This interpretation allows states to adopt a system approach to wetland management. This means that the reviewer considers the effect of the project in a larger context, such as a watershed, where losses in some areas may be less serious than others given how the overall wetland functions. Mitigation is often used as the tool to maintain the integrity of the wetland aquatic ecosystem and to avoid "significant degradation" of the system.

Generally, mitigation can be thought of as any action taken to eliminate or reduce an impact to the environment. Specifically, wetland mitigation is usually defined in terms of a series of steps which should be taken in sequential order. They are:

1. Avoiding adverse impacts (usually by either not doing the project, revising the project, or finding another site);

2. Minimizing adverse impacts by limiting the degree of impact or changing the location of a project's footprint within the site;

3. Rectifying adverse impacts by restoring the affected environment;

4. Reducing the adverse impacts by preservation and maintenance operations over the life of the project;

5. Compensating for adverse impacts by replacing or providing substitute resources or environments; and

6. Monitoring the impacts and taking appropriate corrective measures.

Following this process is referred to as "sequencing". Most people equate wetland mitigation with step 5, and this has led to the use of the term "compensatory mitigation" to distinguish this type of mitigation from the broader definition. In most cases, Ecology requires that an applicant demonstrate that they have followed this sequence in developing their project before permit approval is granted. However, Ecology has taken the position that lower quality wetlands (Category 4 wetlands; see page 43) do not warrant the first step of avoiding the impact altogether. This is based on our assumption that these types of wetlands can be successfully replaced. With other wetlands, particularly higher quality wetlands, we are usually stringent in requiring that applicants demonstrate that they have followed the sequence.

Ecology can be flexible in approving practical options that provide the most protection to the resource and that balance the effects of such actions on the total environment. Mitigation is often implemented through the use of best management practices. For example, a stormwater detention and retention facility could be used to reduce the threat of pollution in a wetland. Best management practices can be established in permits, orders, rules, or directives from Ecology. Mitigation is discussed more fully on page 48.

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Section 3: Antidegradation Decision-Making Process

Description

This section describes the process for using the antidegradation policy (WAC 173-201A-070) for determining if a project that may have a water quality impact on wetlands will comply with the water quality standards. The process is intended to provide the necessary steps required for making a water quality determination for wetlands. Every case must be evaluated on its own merits, taking into consideration the individual wetland and the proposed project, as well as the position of the wetland in the landscape and its role in the watershed (e.g., flood attenuation). These guidelines are not rules and are not intended to be used as such.

Flexibility in decision making is essential in order to make decisions that provide the most environmental benefit. However, these guidelines ensure the consistency in how Ecology determines when to be flexible. These guidelines present a reasonable means of making decisions by taking into account all the appropriate aspects of a proposed project and the aquatic environment that may be affected.

Antidegradation Decision-Making Process

The antidegradation decision-making process consists of identifying if the project will affect a wetland, evaluating reasonable alternatives that avoid or reduce wetland impacts, assessing if the project will degrade or destroy beneficial uses or have other significant environmental consequences, and determining if and what kind compensatory mitigation is appropriate. These steps are outlined in Table 4, followed by a step-by-step explanation that clarifies the meaning of the terms, factors to be considered, and decision criteria.

Table 4 Antidegradation Decision-Making Process

Step 1. Will the project affect a wetland?

Will there be any direct or indirect effects to a wetland?

YES: Proceed to Step 2.	**NO:** You need not continue with the antidegradation water quality standards process.

Step 2. Are there reasonable alternatives that avoid or reduce wetland impacts?

Is there an affordable, reasonable, and available option which will not harm wetlands or cause other significant harm to the environment? Is the proposed activity water dependent?

YES: Compliance with water quality standards for project as planned has not been achieved.	**NO:** Proceed to step 3.

Step 3. Will the project degrade or destroy the beneficial uses of a wetland or have other significant environmental consequences?

After considering alternatives to avoid and/or minimize impacts, will there be a significant adverse impact upon wetland beneficial uses, water quality, or other significant environmental consequences?

YES: Compliance with water quality standards for project as planned has not been achieved.	**NO:** Water quality standards are met. Your project is in compliance with state water quality requirements.

Step 4. Is compensatory mitigation appropriate? If so, what kind?

If the project degrades or destroys the beneficial uses of a wetland, is compensatory mitigation possible and appropriate? If so, has applicant provided an adequate mitigation plan?

YES: Water quality standards are met. Your project is in compliance with state water quality requirements.	**NO:** Compliance with water quality standards for project as planned has not been achieved.

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Step 1: Will the Project Affect a Wetland?

What Is a Wetland?

Like other states, Washington uses the CWA definition of wetlands. This definition is found in federal regulations 40 CFR §232.2(r):

> "Those areas that are inundated or saturated by surface or groundwater 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. Wetlands generally include swamps, marshes, bogs, and similar areas."

This definition is used by Ecology to maintain consistency with the federal regulatory programs. The term "wetland" describes an area where hydrology, vegetation, and soils interact to form a unique community of plants and animals.

The water quality standards apply to all wetlands of the state, regardless of size and quality. Wetland inventories can greatly aid the early identification process necessary for project planning. Ecology has a complete set of National Wetland Inventory (NWI) maps in a Geographical Information Systems (GIS) data base for Washington. NWI mapping is done by classifying wetlands hydrologic and physical characteristics based on the Cowardin classification system (Cowardin et al., 1979).

NWI maps provide a good "first cut" at identifying wetlands. These maps were drawn using aerial photographs at a very small scale, thus the accuracy of the maps can be poor. Wetlands should be delineated to verify the boundaries on the ground. A wetland delineation consists of determining the landward edge of the wetland. Ground verification by delineation is necessary for most project applications.

When delineating wetlands for CWA purposes (e.g., §401 water quality certifications), Ecology and the federal agencies use the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* in conjunction with the "Washington Regional Guidance on the 1987 Wetland Delineation Manual". Previously Ecology and the federal agencies (Corps, EPA, Soil Conservation Service (now the Natural Resources Conservation Service) and the U.S. Fish and Wildlife Service) had formally adopted the 1989 *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* as the preferred manual. Now, however, the Corps of Engineers is required by federal law to use the 1987 manual, and the EPA adopted its use in 1993. In 1995, the state Interagency Wetlands Review Board decided that Ecology should also use the 1987 manual for regulatory consistency. Because many jurisdictions in Washington have specifically adopted either the 1987 or 1989 manual for their local ordinances, project proponents are encouraged to check the local ordinances to ensure that they are using the correct delineation method.

In addition, the state legislature passed a law in 1995 directing Ecology to adopt a state wetland delineation manual that is consistent with the federal delineation manual (1987 Corps of Engineers manual). Ecology will be developing and adopting this state manual under the SMA regulations during the coming year. For consistency, once the state manual is adopted, local governments will be required to use it in implementing their Shoreline Management Act and Growth Management Act regulations. Until the state manual is adopted, Ecology will use the 1987 Corps manual with the regional guidance issued by the Corps Seattle District in May 1994.

What Does "Affect" Mean?

Wetlands can be affected directly by filling, draining, mowing, and plowing, or indirectly by non-point source pollution or changing the wetland's water regime. Because pollution is broadly defined as any alteration of the chemical, physical, or biological properties of a water of the state (RCW 90.48.020), affect can be construed as meaning pollution. These properties of a waterbody, in turn, support the beneficial uses of that water. The determination of "affect" is simply the first step in the decision-making process; not all activities which may have an affect on wetlands are regulated.

Activities which result in chemical and physical changes to the wetland can cause changes in water clarity, color, odor, and taste. Water clarity, nutrients and chemical content, physical and biological content, dissolved gas levels, pH, and temperature contribute to a wetland's life-sustaining capabilities. Changes in the clarity, color, odor, and taste of water through the addition of contaminants such as suspended particulates, viruses and pathogenic organisms, and dissolved materials can reduce or eliminate the suitability of a wetland for direct or indirect maintenance of aquatic organisms, and affect other beneficial uses.

Loading rates of incoming water that exceed the wetland's ability to assimilate sediments, nutrients or toxicants can cause a harmful effect. The introduction of nutrients or organic material to a wetland can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen (DO). Increases in nutrients can favor one group of organisms such as algae to the detriment of other types such as submerged aquatic vegetation, potentially causing adverse health effects, objectionable tastes and odors, detrimental impacts to aquatic organisms and wildlife, and other problems.

Changes in hydroperiod (e.g., increased duration or extent of water level fluctuations) can significantly affect wetland water quality. Severe fluctuations in water level will limit denitrification and phosphorus retention. Changes in pH to more acidic conditions can reduce the wetland's ability to process nitrogen and phosphorus. Increases in water volume and/or velocity will increase loading and decrease sedimentation rates in the wetland, thereby decreasing the effectiveness of the wetland's ability to remove and retain nutrients and sediments. Increased velocities can also cause decreased water storage time in the wetland which will reduce the opportunity for the wetland to serve as a groundwater recharge source.

Different vegetation types act to remove nutrients in different ways. Dense emergent vegetation offers frictional resistance to water, grows and takes up nutrients rapidly, and releases the nutrients seasonally. Trees are often able to store greater amounts of nutrients for longer periods of time but generally offer less frictional resistance to water. A diversity of vegetation will result in the most effective nutrient cycling processes. Accordingly, impacts to wetlands which result in a reduction of vegetation density or types (e.g., change from emergent to open water or mixed vegetation to monotypic vegetation) can decrease the wetland's ability to provide some beneficial uses.

Detrimental effects on beneficial uses can result from increasing or decreasing natural fluctuations in water levels. Changing the frequency or duration of inundation can increase water temperatures or make habitat unsuitable for certain organisms. Ditching or draining a wetland can cause significant changes in hydrology which not only affect the wetland, but can also have serious downstream impacts such as sediment loading and increased flooding potential. Significant changes in a wetland's hydroperiod can also cause a change in vegetation species composition to a non-native, invasive community. Such vegetation changes may, in turn, affect the ability of the wetland to provide habitat for native species of fish or wildlife.

Changing the substrate can also have a detrimental impact on wetlands. Discharging dredge or fill material to convert wetland habitat to upland is the most obvious and common alteration of a wetland substrate. Instream and upland vegetation are a critical component of fish and shellfish habitat. The loss or reduction of vegetative cover can significantly raise water temperatures and increase ambient light levels, both of which are detrimental to some aquatic life. Water quality impacts from point and nonpoint sources are perhaps the most serious threat to fish and shellfish use of wetlands. Wetlands are frequently overloaded from inputs of toxins and nutrients and these compounds are then flushed downstream or often stored in the substrate where they can become available to bottom dwellers and feeders.

Some project proponents may propose artificially supplementing surface water flows to maintain wetland water regime and therefore avoid "affecting" a wetland. Some project proponents may argue that such a proposal would avoid the need of going through the antidegradation decision process. Engineering the water regime or similar measures are strategies for minimizing impacts to wetlands and should be considered later during the "review other factors" portion of Step 3. Alternatives that avoid wetland impacts altogether are preferred over alternatives where impacts are minimized through engineering.

Stormwater discharges deserve special mention because wetlands are often affected by them. Stormwater runoff from urban areas has been shown to contain many different types of pollutants, depending on the nature of the activities in those areas. The runoff from roads and highways is contaminated with oil, grease, lead, cadmium, and other pollutants. Uncontrolled runoff from industrial areas can contain PCBs, heavy metals, high pH concrete dust, and many other toxic chemicals. Residential areas contribute herbicides, pesticides, fertilizers, and animal waste runoff. All of these contaminants can seriously impair beneficial uses of receiving waters.

Short-term changes in water quality from stormwater can restrict contact recreation, stress aquatic organisms, and damage shellfish beds. Long-term impacts on wetland morphology often occur when urbanization changes natural water regimes. The long-term accumulation of pollutants in receiving waters can also create problems that can be particularly difficult to correct, such as eutrophication, polluted groundwater, and contaminated sediments.

In considering the effect of stormwater in a wetland, the interrelationships between hydrology, pollutant loading, and the wetland ecosystem need to be recognized. Factors such as the stormwater source, velocity, and flow rate; contaminant loading rate; concentrations of toxic substances; wetland biological renewal rate; and level and frequency of inundation have a major bearing on the chemical and physical properties of the wetland and how it reacts to stormwater loading. These properties can, in turn, influence the character and health of the whole watershed.

Some of the desirable water quality improvement function of wetlands can be obtained by constructing a wetland to replicate the water quality improvement capabilities found in natural wetlands. Because such wetlands are constructed and maintained primarily for the treatment of wastewater or stormwater, they are considered a part of the treatment system and are regulated as such.

It should be recognized that other jurisdictions and agencies are involved in the development of stormwater management plans, including local governments, Washington Department of Health, Washington Department of Fish and Wildlife, U.S. Environmental Protection Agency, and, if stormwater projects are constructed in wetlands, the U.S. Army Corps of Engineers. Critical area ordinances of local governments developed under the Growth Management Act may apply, as well as municipal stormwater general permits and industrial and construction site stormwater permits.

When wetlands are created to mitigate for the loss of existing wetlands, they are also regulated as waters of the state. Because a stormwater discharge is likely to overwhelm the capability of a mitigation wetland to withstand changes in hydroperiod, process the nutrient load, and absorb toxic substances, it is not likely that treatment would occur. Further, it is also very unlikely that the objective of stormwater treatment could be consistent with the goal of replacing a natural ecosystem. Thus, mitigation wetlands are not appropriate components of a stormwater treatment system.

The Department of Ecology has published the "Stormwater Management Manual for the Puget Sound Basin" (Manual), that describes many different best management practices intended to prevent or reduce stormwater pollution. Although written for the Puget Sound region, many of the techniques and methods described in the Manual are applicable statewide. The Manual covers best management practices for all waters, but it does have specific information on wetlands. For example, Chapter III-5 (Natural Wetlands and Stormwater Management) provides the guidelines developed by the Puget Sound Wetlands and Stormwater Research Project for managing stormwater in natural wetlands. Another pertinent chapter is that on hydrologic analysis, Chapter III-1.

In the Surface Water Quality Standards, the Manual is included in the definition of AKART (all known, available, and reasonable methods of prevention, control, and treatment) as an appropriate means of developing best management practices. This means that using the manual is one way of demonstrating that one is meeting the water quality requirements.

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What Type of Wetland Will Be Affected?

To fully evaluate the potential impact of a project, it is necessary to have an understanding of the wetland that will be affected. Perhaps the most commonly used classification system is the Cowardin system. The Cowardin system is hierarchical, placing wetlands in Systems, Subsystems and Classes, and thus provides several levels of detail in classifying wetlands. Ecology has developed another classification system, the *Washington State Wetlands Rating System*, with versions available for eastern and western Washington. The rating system is used in part to determine what level of protection is necessary for a particular wetland. These are just two examples of the kinds of systems available for describing biological, morphological, and habitat information on wetlands. The reviewer can then use this information to assess the significance of the impact of the proposal.

This section represents only a brief example of what can affect a wetland. More information on what affects a wetland can be found in Section 2, Beneficial Uses. More information on the kinds of wetland assessment methodologies available can be found below in Step 3. As with other aspects of the antidegradation decision process, decisions on what constitutes an effect on the wetland will need to be determined by Ecology on a case-by-case basis.

Step 2: Are There Reasonable Alternatives that Avoid or Reduce Wetland Impacts?

Alternatives Analysis

Determining if reasonable alternatives exist involves understanding a process known as the "practicable alternatives analysis" under the federal Clean Water Act. Before issuing a 404 permit, the Corps of Engineers conducts an analysis of alternatives using the "404(b)(1) guidelines". These guidelines were developed by EPA for use by the Corps of Engineers in determining the suitability of a fill project (40 CFR Part 230). The guidelines provide for the identification of adverse impacts to wetlands and discourage avoidable fills in wetlands: "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to proposed discharge which would have less adverse impacts on the aquatic ecosystem." If the fill can be avoided or placed somewhere else and the same purpose be achieved, the permit must be denied. If the project is not water dependent, it is presumed that other practicable alternatives exist unless proven otherwise; if water dependent, impacts are to be minimized to the greatest extent possible (40 CFR 230.10(a)(3)). Analysis of alternatives must include cost, logistics, and technology. If no practicable alternatives exist, impacts must be minimized, and mitigation requirements are usually incorporated into the permit.

What Is the Definition of "Reasonable"?

The state Water Pollution Control Act, and the state surface water quality standards, both use the term "reasonable" as a measure of compliance (RCW 90.48.010, WAC 173-201A-020).

"Reasonable" is not defined in Chapter 90.48 RCW or Chapter 173-201A WAC. *Webster's Dictionary* defines reasonable as:

> 1. Capable of reasoning: rational. 2. Governed by or in accordance with reason or sound thinking. 3. Within the bounds of common sense. 4. Not extreme or excessive: fair.

The term "practicable" is not defined in state regulations, but is defined in federal regulations as "available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes" (40 CFR §230.3(q)). Practicable is often used to

The question of practicability or reasonability is an essential factor in the review of a project. It is a necessary question to consider in order for Ecology to make the determination that all "reasonable" means have been taken to prevent pollution.

How Does Ecology Decide If an Alternative Is Reasonable?

The question of whether a project is reasonable is a key element of the antidegradation compliance test. This is a measure of whether all reasonable methods have been employed to prevent and control pollution of a wetland. Alternatives that avoid wetland impacts should be considered early in the project plan development. Early consultation with Ecology staff is encouraged to discuss potential for compliance with water quality requirements.

A key element in the determination of reasonableness is whether or not the activity is water dependent. Water dependent means a use or a portion of a use which requires direct contact with the water and cannot exist at an upland location due to the basic project purpose. For example, someone proposing a lakeside restaurant may argue their project needs to be located adjacent to a particular lake. The "basic purpose" of the project, generally seen as the generic function of activity, is food service. It need not be located in or adjacent to a lake or wetland. For activities that are not water dependent, the pursuit of alternatives that avoid adverse wetland impacts must be more substantial.

The determination of water dependency must be made on a case-by-case basis. It may be that certain portions of a large project will be water dependent. Such a determination would not make the entire project water dependent. Examples of activities that may be considered water dependent under certain circumstances include aquatic plant management actions, construction of bridge abutments through a wetland, and construction of a boardwalk through a wetland for educational purposes.

Reasonableness of alternatives must be defined in the context of the specific activity proposed. Due to the large variety in the types of projects that can affect wetland water quality, it is difficult to establish specific criteria for an analysis of alternatives. The burden of proof is on the applicant to show that no reasonable alternative exists that will not adversely impact wetlands. Ecology staff reviewing projects will need to employ some element of best professional judgement based on knowledge of the types of projects, associated technological constraints, cost considerations, and the local availability of alternative sites. For complex projects, staff may need to rely on special consultants to help determine the viability of certain alternatives.

The following list is an example of the kinds of questions asked in an evaluation of reasonableness. At a minimum, Ecology should require a report that addresses alternatives. The applicant's report should state the project purpose, determine the water dependency of the activity, list alternatives considered, evaluate the alternatives based on costs, logistics, and technology, and justify the selected option. The report should be substantial enough to show that if the selected alternative will impact a wetland, no reasonable alternative exists that would avoid wetlands or otherwise cause significant harm to the environment. If the project proponent is not able to provide sufficient information, the application for the permit may be denied.

Table 6 Information Needed for Evaluation of Reasonableness

I. Detailed outline of the background of the project

  A. Describe the purpose and need for the project.

  B. Explain why the project is water dependent (i.e., must be located in or adjacent to wetlands.)

II. Alternatives

  A. How could the project be redesigned to fit the site without affecting wetlands?

  B. What other sites were considered?

    1. What geographical area was searched for alternative sites?

    2. How did you determine whether other nonwetland sites were available for development in the area?

  C. What are the consequences of not building the project?

III. Comparison of alternatives

  A. How do the costs compare for the alternatives considered in II above?

  B. Are there logistical (location, access, transportation, etc.) reasons that limit the alternatives considered?

  C. Are there technical limitations for the alternatives considered?

  D. Are there other reasons certain alternatives are not feasible?

IV. If you have not chosen an alternative which would avoid wetland impacts, explain:

  A. Why was your alternative selected?

  B. What do you plan to do to minimize the adverse effects on the wetlands?

It is important to remember that the evaluation of reasonableness includes the evaluation of costs, logistics and technology. Therefore, even if an upland site is available, other factors may make the alternative not reasonable. A wide array of arguments can be expected and applicants are encouraged to put forth all viable explanations and issues surrounding the practicability of various alternatives. Ecology staff who review projects may need to suggest certain alternatives for consideration based on staff knowledge of a particular area.

Step 3: Considering Several Factors, Will the Project Degrade or Destroy Wetland Beneficial Uses or Have Other Significant Adverse Environmental Consequences?

What Factors Need To Be Reviewed?

There are several factors that should be considered in making the determination concerning the significance of wetland impacts. In addition to evaluating reasonable alternatives to the proposal that will avoid and/or minimize impacts to the wetland, consider:

- possible violations of other water quality standards (e.g., toxic substances and human health criteria)
- cumulative and secondary impacts
- downstream impacts
- adverse impacts to the beneficial uses of a wetland

Even if a project must be located in or adjacent to a wetland, there may be available alternatives to avoid the impacts. Reconfiguration of the project, erosion control measures, slope restrictions, or other appropriate BMPs may be required in order for Ecology to conclude that the activity will not degrade or destroy the beneficial uses of the wetland.

What Are the Beneficial Uses of Wetlands?

Wetland "functions" and "values" are almost synonymous with beneficial uses. These terms are used almost universally when discussing wetland processes and wetland regulation. Wetland functions are the physical, chemical, and biological processes that occur in a wetland, or under the direct influence of a wetland. They include hydrologic functions such as the conveyance or storage of flood water, chemical functions such as biogeochemical cycling, and biological functions such as primary and secondary productivity. Many of the functions performed by wetlands result in direct or indirect benefits and services to society. These benefits and services have been called wetland values. Perceived values arise out of the ecological processes wetlands perform, but they are determined also by the location of a particular wetland, the human population pressures on it, and the extent of the wetland resource. Section 2 provides detailed information on the beneficial uses of wetlands and clarification of terms; this section presents a brief discussion of beneficial uses.

Temporary water storage illustrates the distinction between wetland functions and values. By itself, temporary water storage is a function - a physical process that occurs in a wetland. This process becomes important because of the value to society which results from it. Flood water attenuation and groundwater recharge are extremely important values provided by the wetland as a result of the water storage function.

Another function is the process of trapping suspended material in a wetland; the water quality improvement which results from that process is the value provided to society. Simply put, wetland functions and values are equivalent to the beneficial uses of a wetland, and are to be provided protection under the water quality standards. With wetlands, as with other surface waters, it is necessary to understand the processes and the resultant benefits to ensure effective protection of the beneficial uses through using the water quality standards.

Using the water quality standards for wetland protection requires that beneficial uses be identified in order to be protected. The protective umbrella of the water quality standards is not limited to only those uses listed; all existing beneficial uses are protected, whether or not they are listed in the water quality standards. Seven beneficial uses are described below; uses one through four are examples of beneficial uses protected under the standards that are not specifically listed in the standards.

1. Storm/flood water storage and retention and moderation of water level fluctuation extremes

Peak flows from groundwater and surface water can be detained as they travel down slope and through wetlands. When several wetland basins perform this function within a watershed, they can individually release water gradually, causing a staggered or moderated discharge that reduces flood peaks. Studies show that flood flows are significantly lower in basins with substantial lake and wetland area than in basins with no lake or wetland area. This function provides a direct benefit to the public by reducing the need for structural flood controls such as dikes and levees and by reducing costly flood damage.

2. Hydrologic functions including maintenance of dry season stream flow, the discharge of groundwater to a wetland, the recharge of groundwater from a wetland, and the flow of surface water through a wetland

Groundwater recharge is the process by which surface water moves into the groundwater system. Recharge usually occurs in the higher portion of the watershed, and some wetlands can provide a valuable service of replenishing groundwater supplies. Groundwater discharge, which more commonly occurs in wetlands in Washington, can be important for stabilizing stream flows, especially during dry months. This results in an enhancement of the fish and aquatic life communities in the downstream areas.

3. Filtration and storage of sediments, nutrients, or toxic substances that would otherwise adversely impact the quality of other waters of the state

Wetlands can store or filter nutrients, such as phosphorus and nitrogen, which would otherwise flow into other groundwater or surface waters. Wetlands can store the nutrients on a short term basis within wetland plant tissue or on a longer term basis in substrates. The short term storage of nutrients is beneficial because downstream waters may be highly sensitive to nutrients at the time of year that the wetland is storing them. Also, wetlands can transform nitrogen to its gaseous state (denitrification), thereby removing it from the aquatic environment. Sediment storage often occurs in wetlands because of their low slope and flow characteristics (water retention capacity). Many toxic substances can also be stored or transformed to a less toxic state within wetland sediments.

Although a very important function of wetlands, the use of wetlands to filter or store sediments or nutrients for an extended period of time will result in changes to the wetland. Sediments will eventually fill in wetlands and nutrients will eventually modify the vegetation by changing the species composition. Such changes may result in the loss of this beneficial use over time.

Conditions that allow a wetland to perform filtration and storage can also be conditions that allow for serious impact to the wetland. For example, a riverine wetland that is downslope from a field of row crops is likely to provide a significant water quality function as the wetland slows runoff waters and allows settling and uptake of nutrients before the materials reach the stream portion of the surface water system. However, too much runoff can change the plant community and excess nutrients can affect the productivity of the system.

Evaluating the impacts to a wetland requires considering when the beneficial use is used to the point of exploitation that adversely affects the wetland.

4. Shoreline protection against erosion through the dissipation of wave energy and water velocity and anchoring of sediments

Wetland vegetation can hold soil particles and reduce wave energy. Benefits include the protection of habitat, buildings, other structures, and land that may otherwise be lost to erosion. Also, a wetland which reduces erosion also reduces sedimentation to other nearby waterbodies. If the water is a navigational channel, the reduction in sedimentation can reduce the frequency of channel dredging.

5. Habitat for aquatic organisms

Wetlands provide food and habitat for a variety of biota which in turn support fish and other organisms. Benefits include providing support for valuable fish species important for both the sport and commercial fishing industries. For example, coho salmon use wetlands in the first and second years of their life cycle.

l dissolved gas shall not exceed 110 percent of saturation at any point of sample collection."

Temperature: "Temperature - no measurable change from natural conditions."

pH: "pH - no measurable change from natural conditions."

Turbidity: "Turbidity shall not exceed 5 NTU over background conditions."

Toxic substances: "Toxic, radioactive, or deleterious material concentrations shall be below those which have the potential either singly or cumulatively to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-203-040 and 050)."

Aesthetics: "Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste."

Narrative criteria make the most sense for wetlands because the conditions in wetlands are too variable to be able to apply a single numeric criterion. Narrative criteria are general statements designed to protect a specific designated use or set of uses. Washington's water quality standards apply narrative criteria to all beneficial uses for all water classes. EPA's Water Quality Regulations (40 CFR §131) states that "States should...include narrative criteria in their standards where numeric criteria cannot be established or to supplement numeric criteria."

Washington's antidegradation policy (WAC 173-201A-070) provides two standards that are essential to protecting wetlands:

1) "Existing beneficial uses shall be maintained and protected and no further degradation which would interfere with or become injurious to existing beneficial uses shall be allowed."

2) "Whenever the natural conditions of said waters are of a lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria."

These statements in the antidegradation policy indicate how we use the water quality standards to protect wetland beneficial uses when the numeric criteria in the standards do not always apply to wetlands. For example, pH in a wetland may naturally occur at lower values than the Class A criterion of 6.5 to 8.5. We need to protect the pH that is necessary to support beneficial uses of the wetland, e.g., low pH for a bog, neutral pH for an emergent marsh; the naturally occurring pH constitutes the water quality criteria.

There are people who believe that "natural" conditions no longer exist so it is unrealistic to use it as a standard. However, the term is used in this context to identify conditions other than the standard that are normal. These waters are not being held to a higher standard, rather they are being maintained at existing levels, as long as the existing conditions are sufficient to maintain beneficial uses. The language (in WAC 173-201A-070(2)) does not mean that if the existing conditions were degraded from human-caused impacts, then the existing conditions would become the standard. If this were true, a wetland, no matter what its present condition or what was being done to it, would always be in compliance with the water quality standards. Instead, existing beneficial uses must be maintained and protected.

Overall, the antidegradation policy is the best existing approach we have in the standards for protecting water quality in wetlands. However, it is important to consider whether the Class AA, A, and Lake criteria are appropriate, and to use them if they are. Ultimately, our goal is to develop specific numeric criteria for wetlands, but we can protect water quality using our current standards.

What Techniques Are Available and Acceptable for Evaluating Wetland Beneficial Uses and the Project Impacts?

In order to determine if the requirements of the antidegradation policy are being met, existing beneficial uses must be identified, and the impact of the project upon them must be assessed. There are several wetland evaluation methods that would identify wetland beneficial uses that characterize the types of functions performed by wetlands. Some of these methods generalize the extent to which these functions are performed. They range from simple rapid assessments to more sophisticated computer driven models. The various functional assessment methods currently available all have drawbacks and cannot be heavily relied upon to base regulatory decisions. Some of these methods can provide useful information to assist in making a regulatory decision but we are still left with applying "best professional judgment" in determining wetland functional performance.

We currently do not have a quantitative method for determining wetland function or value that is scientifically valid and applicable in a regulatory setting. What is needed is a rapid method of quantifying wetland functional performance that is scientifically supported. To address this concern, Ecology, with funding from an EPA grant, is coordinating the development of a quantitative function assessment method for Washington state over the next two years. It is our intent that the Wetland Function Assessment Project will result in methods useful in making regulatory decisions and establishing mitigation banking credits and debits.

The following is a list of some wetland evaluation methods available. Please note that this list is not comprehensive, and any method that addresses all relevant wetland beneficial uses and is appropriate for the scope of the proposed project can be employed.[1] Methods include:

- Habitat Evaluation Procedures (HEP) - HEP is designed to provide a "habitat suitability index" for a particular species of wildlife for a particular wetland. A number of species indices can be pooled for a wetland. Wetlands can be compared using the HEP. For the species that it covers, HEP addresses most of the essential structural indicators of habitat suitability. However, for some applications, a sufficient number of published habitat

[1] Other methods, such as Reppert and the Wetland Characterization Method are not accepted by Ecology. The Wetland Characterization Method was developed by Ecology for use with inventory-level planning efforts and is not appropriate for assessing functions for regulatory decisions on a specific site. The original Reppert method contains serious flaws that make it ineffective - however, more recent revised "Repperts" may provide useful information in estimating wetland functional performance.

suitability models may not be available to allow analysis, or they are not appropriate for conditions in Washington State. In these cases, it is best to choose another method for evaluating the beneficial use of wildlife habitat.

- Wetland Evaluation Technique (WET) - WET, developed by Paul Adamus et al., is perhaps the most well known assessment method. WET evaluates wetland beneficial uses based on the wetland's opportunity to fulfill a certain function; the effectiveness of the wetland to fulfill a given function based on its physical, chemical, and biological characteristics; and the social significance of the function. WET provides an assessment of several common wetland functions: groundwater recharge, groundwater discharge, flood flow alteration, sediment stabilization, sediment/toxicant removal, nutrient removal/transformation, production export, aquatic diversity/abundance, and wildlife diversity/abundance. Perhaps the most significant limitation of WET is that after wetlands are scored with a fairly elaborate process, the wetland is placed in one of three categories: high, moderate, or low. This limited sensitivity may result in several quite different wetlands being in the same category, making it difficult to differentiate wetlands that need to be compared to assess the project.

- The *Washington State Wetlands Rating System*; for *Eastern Washington* and *Western Washington* - The rating system was developed by the Department of Ecology to rate wetlands based on wetland functions and values, sensitivity to disturbance, rarity, and irreplaceability. The rating system only approximates certain wetland functions and values - it does not even attempt to measure them. The rating system was designed to be used with local development regulations to ascertain appropriate protective measures for a particular wetland. Thus, the rating system is not useful in evaluating the adequacy of a particular mitigation plan, but is helpful in determining the appropriate buffers for a site and in establishing mitigation parameters such as sequencing and replacement ratios.

- Indicator Value Assessment (IVA) - Ecology is also developing this assessment technique. IVA is a semi-quantitative assessment of value for individual wetlands within a specific region or watershed for a particular function. The estimate of relative value is based on the assumption that wetlands that have specific wetland indicators are more valuable than those that do not have those indicators. Indicators are the environmental variables that are characteristic of wetland functions. IVA can be tailored to any particular region or watershed and is designed to fit local priorities.

- Oregon Method - Oregon has developed a method based on a modified New Hampshire method. The Oregon method has a much greater likelihood of being usable in Washington, due to similarities in climate and geomorphology.

- Wetland and Buffer Functions Semi-Quantitative Assessment Methodology - This provides a quick method for identifying and quantifying potential wetland functions. It has been modified to be more applicable to Northwest wetlands, and will be revised periodically in response to field tests.

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In addition to using one of the above methods, applicants are encouraged to provide site specific information on wetland characteristics such as location in the watershed, inlet/outlet character, basin storage capacity, vegetation type, species abundance and distribution, interspersion, structural diversity, etc. to assist in making an individual assessment of wetland function.

What Are Secondary and Cumulative Impacts?

It is often difficult to differentiate between primary and secondary effects of a project. Project review should consider both direct and indirect impacts from a project. Activities that are near, but not directly in wetlands may have very significant secondary impacts. Impacts to one wetland or portion of a wetland may have far reaching effects on other wetlands and surface waters. Secondary impacts may also occur over time. For example, filling a very small wetland area may allow for future building activities which will lead to increased erosion and sedimentation of other wetlands nearby. In such a scenario, the actual impacts of the immediate action were minor, but the secondary impacts in the future may be significant.

Federal regulations (40 CFR §1508.7) define cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency...or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Consideration of cumulative impacts requires evaluating the impacts of the current project in relation to past or reasonably anticipated future actions. Evaluation of cumulative effects can include those impacts expected from repeated actions of the same type, or related actions or other activities occurring locally that can be reasonably anticipated to compound impacts.

The state Water Pollution Control Act, Chapter 90.48 RCW, clearly states that the potential for an activity to cause pollution is within Ecology's jurisdiction to regulate. RCW 90.48.020, in the definition of pollution, includes the phrase:

> "...any alteration of the physical, chemical, or biological properties, of any water of the state, ... as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare..." (emphasis added).

RCW 90.48.080, Discharge of Polluting Matter Prohibited, states:

> "It shall be unlawful for any person to throw, drain, run, or otherwise discharge into any waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the department..." (emphasis added).

These statements indicate the need for Ecology to evaluate a project's potential to degrade or destroy wetlands, immediately or over time.

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Again, the evaluator must consider the ramifications of the action beyond the immediate scope of the proposed project. A very minor fill may set precedent for other minor fills in an area, thereby eventually causing the destruction of scarce habitat in an urbanizing setting.

What Is Meant by "Other Significant Adverse Environmental Consequences?"

Reviewers need to consider other significant adverse environmental consequences to balance concerns about other aspects of the environment with wetland concerns. For some projects, the overall environmental good of a project or the potential for adverse impacts to other important natural resources may outweigh any adverse impacts to the wetland. Such a determination is made only in very special cases, however. An example would be a hazardous waste clean-up site where the only alternative for preventing human health impacts and/or further damage to the ecosystem may require significant adverse impacts to a wetland.

Step 4: Is Compensatory Mitigation Appropriate?

Mitigation must be used in some form or another to make the antidegradation policy work. As explained earlier, mitigation can be thought of as any action taken to eliminate or reduce an impact to the environment. Specifically, wetland mitigation is usually defined in terms of a series of steps which should be taken in sequential order. They are:

1. Avoiding adverse impacts (usually by either not doing the project, revising the project, or finding another site);

2. Minimizing adverse impacts by limiting the degree of impact or changing the location of a project's footprint within the site;

3. Rectifying adverse impacts by restoring the affected environment;

4. Reducing the adverse impacts by preservation and maintenance operations over the life of the project;

5. Compensating for adverse impacts by replacing or providing substitute resources or environments; and

6. Monitoring the impacts and taking appropriate corrective measures.

Following this process is referred to as "sequencing". Most people equate wetland mitigation with step 5, and this has led to the use of the term "compensatory mitigation" to distinguish this type of mitigation from the broader definition. In most cases, Ecology requires that an applicant demonstrate that they have followed this sequence in developing their project before permit approval is granted. However, Ecology has taken the position that lower quality wetlands (Category 4 wetlands in our rating system) do not warrant the first step of avoiding the impact altogether. This is based on our assumption that these types of wetlands can be successfully replaced. With other wetlands, particularly higher quality wetlands, we are usually stringent in requiring that applicants demonstrate that they have followed the sequence.

Beginning with avoidance, the intent of any mitigation requirement is to prevent the loss of wetland beneficial uses. The mitigation process allows Ecology to make decisions that consider the wetland resource on a system scale. Without this system perspective, it would be difficult, if not impossible, to allow any wetland impact and meet the requirements of the antidegradation policy to prevent any degradation of existing beneficial uses.

When adverse wetland impacts are truly "unavoidable" an applicant is required to develop a compensatory mitigation plan. This can include creation of a new wetland, restoration of a former wetland, enhancement of a degraded wetland or some combination of the three. In some instances, preservation of high quality wetlands and/or adjacent high quality uplands may be acceptable as part of an overall mitigation "package".

Historically, creation of new wetlands in upland sites has been problematic, primarily due to the difficulty in establishing an adequate water regime to sustain wetland conditions. Thus, Ecology emphasizes restoration of former wetlands or enhancement of significantly degraded wetlands as the preferred methods of compensation. With these methods, establishing an adequate water regime is usually more certain.

The primary questions we ask in determining the adequacy of a compensatory mitigation method, location or plan are:

- What are the type and extent of functions being impacted by the project?
- How will the proposed mitigation replace these functions?
- Will the proposed mitigation be successful and sustainable?

Thus, the appropriate type of compensatory mitigation will depend on the individual circumstances of the project. It will also depend on the opportunities for mitigation in the area of the project since we usually require that the replacement wetland be located in the same drainage basin. It is difficult to replace hydrologic and fish habitat functions in a different drainage basin and impossible to replace them in a different watershed. However, the notion that compensatory mitigation must be "on-site" is now seldom required since adequate opportunities are seldom available on a given project site. In fact, we are increasingly directing applicants to look off their property in order to find sites which address the above primary questions.

Another historically required provision of compensatory mitigation was that it must be "in-kind", usually meaning that the replacement wetland must be the same type of wetland as the one being impacted (e.g., cattail marsh for a cattail marsh). This is still often a requirement since it is difficult to replace lost functions with a different type of wetland. However, Ecology makes an individual assessment in each case and has occasionally decided to accept, or even encourage, out-of-kind replacement. This is usually due to one or more of several factors. Sometimes the wetland being impacted is of low value or an undesirable type such as a reed-canarygrass dominated depression. In other cases there may not be adequate opportunities to recreate or restore the same type of wetland in the area and there may be an excellent opportunity to create a different, usually higher-value wetland in the area. In other cases, a different type of resource restoration makes more ecological sense in a particular situation. For example, we have allowed the restoration of stream and riparian corridors in exchange for a minimal loss of wetlands in areas where stream resources have been significantly degraded, particularly in eastern Washington.

Another mitigation concept is the use of replacement ratios. A replacement ratio is the amount of wetland area created, restored or enhanced in relation to the amount of wetland area impacted. For example, historically a replacement ratio of 1:1 was common. This means for every acre of wetland impacted an acre of wetland would be created. In recent years the ratio has increased and seldom is a 1:1 ratio acceptable to any regulatory agency. This increase is due primarily to two factors: 1) the likelihood of success of the compensatory mitigation and 2) the length of time it takes to successfully create or restore a wetland.

Since compensatory wetland mitigation has historically had varied success rates (different studies have determined that roughly half of the attempts to create wetlands have failed) and we are learning that it takes anywhere from several years to several decades to create a fully-functioning wetland, we have raised the replacement ratio as a means of equalizing the tradeoff. While the goal is always to replace the lost functions at a 1:1 ratio, it is almost always necessary to increase the replacement acreage in order to accomplish this. At present Ecology recommends replacement ratios based on the rating of the wetland and/or the type of wetland. For more information on replacement ratios and their scientific rationale, see *Wetland Mitigation Ratios: Defining Equivalency*, Ecology publication # 92-8.

The recommended ratios are listed in Table 5.

Table 5 Mitigation Replacement Ratios

		Creation and Restoration	Enhancement*
Category 1 wetland	(all types)	6:1	12:1
Category 2 or 3 wetland	Forested	3:1	6:1
	Scrub/shrub	2:1	4:1
	Emergent	2:1	4:1
Category 4 wetland	(all types)	1.25:1	2.5:1

* For wetland enhancement the ratios are doubled. Enhancement as compensation for wetland losses results in a net loss of wetland area and the net gain in wetland function from enhancement is usually less than from creation or restoration.

These ratios are general guidelines that are adjusted up or down based on the likelihood of success of the proposed mitigation and the expected length of time it will take to reach maturity. Good hydrologic information on the proposed mitigation site is necessary to establish a likelihood of success. In addition, the track record of the type of proposed compensatory mitigation is an important factor. If the person responsible for designing and constructing the compensatory mitigation can demonstrate that they or anyone else have successfully conducted a similar project, our confidence in the likely success is increased. Likewise, a lack of documentation that the type of mitigation proposed has been successful elsewhere may lead to even higher ratios.

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There are many details that must be considered in the development of an acceptable mitigation plan. Ecology typically likes to work with the applicant in developing a conceptual plan prior to extensive work being done on a detailed plan. This can prevent unnecessary expenditures of time and money for all parties. Ecology, in conjunction with the Washington Department of Fish and Wildlife, EPA, the US Army Corps of Engineers, and the U.S. Fish and Wildlife Service, has developed mitigation guidelines entitled: *Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals* (Publication #94-29). These guidelines detail what is expected in a mitigation plan and how Ecology will review proposed mitigation plans for projects.

Given the poor track record of compensatory mitigation, it is critical to have an adequate monitoring plan for a mitigation site. The standard length of time for monitoring a mitigation site has increased over the years as we have learned more about how slowly wetlands evolve. At present, five years is the minimum requirement and in many cases, especially where forested wetlands are being created or restored, a much longer time is required. Increasingly, invasion of a created or restored wetland with aggressive, non-native plant species is a major concern. It is essential that the mitigation plan take into account the potential for invasion and include monitoring and maintenance provisions to ensure success.

Mitigation banking is a concept that is receiving increasing attention and support. The general idea is to create or restore a large wetland area and use the "credit" to compensate for wetland impacts that occur elsewhere. If conducted appropriately this approach can be beneficial to applicants and the environment. Applicants benefit by not having to take on a risky, open-ended mitigation project and the environment benefits by having a functioning replacement wetland in place before the impact occurs. At present, federal and state agencies are working to develop consistent guidelines on mitigation banking to facilitate the development and use of private banks. The Department of Transportation has a signed agreement with federal and state regulatory agencies on how to establish and operate a bank for its own use, but has yet to initiate development of a banking site.

Documenting Decisions Under the Water Quality Standards

How Are Water Quality Standards Antidegradation Decisions Handled?
After the project review has been completed, a determination will be made that compliance with the surface water quality standards has or has not been achieved. Depending on the program requirements, such determination may be included as permit approval, findings of fact and conclusion of law, administrative orders or directives, or permit conditions of compliance. The decision should state that the project has been reviewed in accordance with Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington.

Given that the project affects wetlands, any formal finding of fact, as well as supporting field investigation information should address:

- water dependency
- reasonable alternatives
- analysis of whether the activity will or will not result in the degradation or loss of wetland beneficial uses, water quality, or other significant environmental consequences.

· adequacy of proposed mitigation

The antidegradation policy includes consideration of public participation and intergovernmental coordination in determining that "overriding consideration of the public interest will be served" in cases where a reduction in water quality will be allowed. If this portion of the standards is used for compliance, the reviewer needs to document how this requirement was satisfied. The primary means of accomplishing this is through SEPA review.

What Appeal Rights Are Available to Applicants?

The appeals process for water quality standards decisions made concerning wetlands are the same as for all regulatory determinations made under the water quality standards. Appeal rights and procedures are defined in RCW 43.21.B.

Conclusion

This section has outlined the questions and considerations necessary to evaluate the impact of a proposed project to wetlands. Although avoiding, minimizing, and mitigating impacts to wetlands is challenging, the resulting environmental protection will benefit the citizens of Washington state.

For More Information

For more information on **how to interpret these guidelines**, consult Perry Lund, Department of Ecology, P.O. Box 47775, Olympia, Washington, 98504-7775, (360) 407-7260.

For questions regarding **revisions to the water quality standards affecting wetlands**, contact Jaime Kooser, Department of Ecology, Northwest Regional Office, 3190 - 160th Avenue S.E., Bellevue, Washington, 98008-5452, (206) 649-4310.

For **specific wetland information**, contact the regional offices of the Washington Department of Ecology:

Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902-3401
(509) 575-2490

Eastern Regional Office
N. 4601 Monroe, Suite 100
Spokane, Washington 99203-1295
(509) 456-2926

Northwest Regional Office
3190 - 160th Avenue S.E.
Bellevue, Washington 98008-5452
(206) 649-7000

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Southwest Regional Office
P.O. Box 47775
Olympia, Washington 98504-7775
(360) 407-6300

For questions regarding **wetland policy**, consult Andy McMillan, Department of Ecology, P.O. Box 47600, Olympia, Washington, 98504-7600, (360) 407-7272.

For more information on the **Wetland Function Assessment Project**, consult Teri Granger, Department of Ecology, P.O. Box 47600, Olympia, Washington 98504-7600, (360) 407-6547.

For **stormwater** information, contact Ed O'Brien, Department of Ecology, P.O. Box 47600, Olympia, Washington, 98504-7600, (360) 407-6438.

For information regarding **water reuse and wetlands**, contact Marty Walther, Department of Ecology, P.O. Box 47600, Olympia, Washington, 98504-7600, (360) 407-6515.

For **technical and scientific questions regarding wetlands**, contact Tom Hruby, Department of Ecology, P.O. Box 47600, Olympia, Washington, 98504-7600, (360) 407-7274.

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Appendix A: Legal Considerations

This appendix describes the source of Ecology's authority to regulate water quality in wetlands. It is important to remember when discussing water quality issues that our authority comes from the state Water Pollution Control Act, as well as the federal Clean Water Act (CWA).

Water Pollution Control Act Policy Statement

The Department of Ecology's authority to regulate wetlands as waters of the state is presented in the state Water Pollution Control Act (Act), Chapter 90.48 RCW. The policy statement describes how broad the scope of the Act is:

> **90.48.010 Policy enunciated.** It is declared to be the public policy of the state of Washington to maintain the highest possible standards to insure the purity of all waters of the state consistent with public health and public enjoyment thereof, the propagation and protection of wildlife, birds, game, fish and other aquatic life, and the industrial development of the state, and to that end require the use of all known available and reasonable methods by industries and others to prevent and control the pollution of the waters of the state of Washington. Consistent with this policy, the state of Washington will exercise its powers, as fully and effectively as possible, to retain and secure high quality for all waters of the state. The state of Washington in recognition of the federal government's interest in the quality of the navigable waters of the United States, of which certain portions thereof are within the jurisdictional limits of this state, proclaims a public policy of working cooperatively with the federal government in a joint effort to extinguish the sources of water quality degradation, while at the same time preserving and vigorously exercising state powers to insure that present and future standards of water quality within the state shall be determined by the citizenry, through and by the efforts of state government, of the state of Washington. (emphasis added)

The basic purpose of the Act, and Ecology's responsibility in promulgating it, is to prevent and control pollution of the waters of the state of Washington.

Definition of Pollution

> **90.48.020 Definitions**. Whenever the word "pollution" is used in this chapter, it shall be construed to mean such contamination, or other alteration of the physical, chemical or biological properties, of any waters of the state, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state as will or is likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life. (emphasis added)

The state Legislature recognized that the effects of pollution extend well beyond chemical contamination of the water column. Pollution prevention is more than the regulation of effluent discharge if one also considers the effect of the alteration of physical and biological properties of a waterbody on the public and on plant and animal life.

Definition of "Waters of the State"

> **90.48.020 Definitions.** Wherever the words "waters of the state" shall be used in this chapter, they shall be construed to include lakes, rivers, ponds, streams, inland waters, under ground waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington. (emphasis added)

While the word "wetlands" is not included specifically, this definition is intended to encompass any water, above ground or under ground, that is within the jurisdictional borders of this state. The terms "lakes, rivers, ponds, streams" cover most of the commonly recognized waterbody types. The definition includes the extremely broad category of "inland waters" as well as "underground waters", extending the jurisdiction of the state to regulate water quality below the land surface. Including "salt waters" clarifies that Ecology's jurisdiction is not limited to inland waters or fresh waters. The phrase "and all other surface waters and watercourses within the jurisdiction of the state of Washington" encompasses wetlands.

It is important to note that a Superior Court decision in Thurston County, Washington ruled in favor of the Department of Ecology on the issue of wetlands as waters of the state. The Court ruled:

> "Therefore, to the extent the wetlands regulated by DOE are either underground, or bodies of water bigger than puddles, this court concludes that these bodies of water are included within the definition of 'waters of the state' under Ch. 90.48.RCW. Since the definition of 'waters of the state' is stated in terms of 'include,' the terms used to define waters, should be given the broadest possible reading consistent with the language of the section. Under this reading, this Court concludes and holds that any body of water that is either underground, or salt water, or above ground and either flowing like a stream, or bigger than a puddle, is properly within the jurisdiction of the Department of Ecology to regulate pursuant to Ch. 90.48 RCW." Building Industry Association of Washington, et al. v. State of Washington, et al., Thurston Co. 91-2-02895-5, p. 13-14 (1993).

Furthermore, wetlands are defined as waters of the United States (40 CFR §122.2). The requirement for states to adopt water quality standards which meet the goals of the federal CWA for all waters of the nation thus extends to wetlands.

The term "wetlands" is defined in the Clean Water Act regulations as:

> "Those areas that are inundated or saturated by surface or groundwater 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. Wetlands generally include swamps, marshes, bogs, and similar areas."

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This definition is used by Ecology when implementing programs related to the Clean Water Act, such as the water quality standards.

Ecology's Jurisdiction

> **90.48.030 Jurisdiction of the department.** The department shall have the jurisdiction to control and prevent the pollution of streams, lakes, rivers, ponds, inland waters, salt waters, water courses, and other surface and underground waters of the state of Washington.

"Jurisdiction" is defined in *Webster's Dictionary* as, "the right or power to interpret and apply the law." (emphasis added)

It is a function of Ecology to "control and prevent" pollution in all waters of the state. It is important to remember that pollution means any alteration of the physical, chemical, and biological properties of a water of the state where such action is likely to cause harm to the public or to the environment (90.48.020). This is very relevant to activities affecting wetlands, where changes to the physical structure (e.g., substrate alterations) and to biological communities (e.g., changes in plant species composition) can be more significant than changes to the chemical properties per se. It is also necessary to recognize that the inclusion in the definition of "pollution" the caveat that the alteration to a water of the state must cause (or potentially cause) harm allows for some alteration below this threshold. If this were not true, there would be no authority to allow such things as mixing zones or short-term modifications.

For wetlands, allowing some alteration of water quality allows for the use of mitigation as a method of "controlling pollution." Activities are often allowed to occur because the impacts are not considered significant enough to harm the environment, at least in the long-term. The water quality standards protect wetlands as well as permitting some level of degradation where unavoidable or necessary.

Ecology's Rule-Making Authority

The Legislature clarified Ecology's authority to carry out Chapter 90.48 RCW, and to determine how this should be done:

> **90.48.035 Rule-making authority.** The department shall have the authority to, and shall promulgate, amend, or rescind such rules and regulations as it shall deem necessary to carry out the provisions of this chapter, including but not limited to rules and regulations relating to standards of quality for waters of the state and for substances discharged therein in order to maintain the highest possible standards of all waters of the state in accordance with the public policy as declared in RCW 90.48.010.

The water quality standards are the rules, required by federal law (Section 303 of the federal Clean Water Act and 40 CFR Part 131 of the Federal Regulations) and authorized by the Legislature (90.48.035), used to implement the Clean Water Act. The Department has a responsibility to improve the standards regularly (triennial review requirement; 40 CFR 131.20) as we learn more about what water quality is and what we must do to protect it. Revisions to the

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standards are made in accordance with the public process requirements of the Administrative Procedures Act (Chapter 34.05 RCW).

In addition to defining pollution, RCW 90.48.080 also describes exactly what is included in the act of polluting:

> **90.48.080 Discharge of polluting matter in waters prohibited.** It shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the department, as provided for in this chapter.

The Department of Ecology has the authority to regulate actions that cause or could cause alterations to a waterbody that could harm public health, safety or welfare or the environment (90.48.020).

Ecology Designated Agency for Federal Clean Water Act

How we carry out the requirements mandated by the federal Clean Water Act is important. The state water quality standards program is one of those requirements:

> **90.48.260 Federal clean water act -- Department designated as state agency, authority -- Powers, duties and functions.** The department of ecology is hereby designated as the State Water Pollution Control Agency for all purposes of the federal clean water act as it exists on February 4, 1987, and <u>is hereby authorized to participate fully in the programs of the act as well as to take all action necessary to secure the state the benefits and to meet the requirements of the act</u>. With regard to the national estuary program established by section 320 of that act, the department shall exercise its responsibility jointly with the Puget Sound Water Quality Authority. The powers granted herein include, among others, and notwithstanding any other provisions of chapter 90.48 RCW or otherwise..." (emphasis added)

The objective of the federal Clean Water Act is to "restore and maintain" the chemical, physical, and biological integrity of the Nation's waters. This section declares that the Department of Ecology is to carry out the state's responsibilities under the federal Clean Water Act. States are required under Section 303 of the Act to adopt standards that "protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. "Serve the purposes of" (as defined in Sections 101(a)(2) and 303(c) means that water quality standards should, wherever attainable, provide water quality for the protection and propagation of fish, shellfish and wildlife and for recreation in and on the water and take into consideration their use and value of public water supplies, propagation of fish, shellfish, and wildlife, recreation in and on the water and agricultural, industrial, and other purposes including navigation." (40 CFR §131.2 Purpose)

Appendix B: Glossary

Best management practice (BMP) means physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water, and have been approved by Ecology.

Biofiltration means the process of reducing pollutant concentrations in water by filtering the polluted water through biological materials.

Bog means those wetlands that are acidic, peat forming, and whose primary water source is rainwater.

Breeding/Rearing means serving as mating or reproduction areas and/or nursery grounds.

Constructed wetlands means those wetlands intentionally constructed on sites that are not wetlands for the primary purpose of wastewater or stormwater treatment and managed as such. Constructed wetlands are normally considered as part of the collection and treatment system.

Created wetlands means those wetlands intentionally created from nonwetland sites to produce or replace natural wetland habitat.

Degraded (disturbed) wetland (community) means a wetland (community) in which the vegetation, soils, and/or hydrology have been adversely altered, resulting in lost or reduced functions and values; generally, implies topographic isolation; hydrologic alterations such as hydroperiod alteration (increased or decreased quantity of water), diking, channelization, and/or outlet modification; soils alterations such as presence of fill, soil removal, and/or compaction; accumulation of toxicants in the biotic or abiotic components of the wetland; and/or low plant species richness with dominance by invasive weedy species.

Diversity means the number of species in a community, and their relative abundances, per unit area or volume.

Drainage ditch means that portion of a designed and constructed conveyance system that serves the purpose of transporting surplus water; this may include natural watercourses or channels utilized by design, but does not include the area adjacent to the watercourse or channel.

Emergent plants means aquatic plants that are rooted in the sediment but whose leaves are at or above the water surface. These wetland plants often have high habitat value for wildlife and waterfowl, and can aid in pollutant uptake.

Emergent vegetation means dominated by erect, rooted, herbaceous angiosperms which may be temporarily to permanently flooded at the base but do not tolerate prolonged inundation of the entire plant.

Estuary means tidal wetland and deep-water habitats that are usually semi-enclosed by land but have open, partial, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from land.

Feeding/Foraging means providing habitat for collection or consumption of food, gravel, or other necessities for nutrition.

Fen means those wetlands that are generally acidic, peat forming, and whose primary water source is groundwater or surface water, except marl fens.

Forested vegetation means dominated by woody vegetation ≥6 m in height.

Groundwater exchange means the discharge and recharge of groundwater at a wetland. Discharge is inflow to a wetland from an aquifer, seeps or springs that increases the available supply of surface water. Recharge is outflow from a wetland downgradient to an aquifer or downstream to surface water for base flow maintenance. Exchange may include groundwater discharge in one season followed by recharge later in the year.

Hydric soil means soil that is wet long enough to periodically produce anaerobic conditions, thereby influencing the biota.

Hydrophyte means any plant growing in water or on a substrate that is at least periodically deficient in oxygen, during some part of the growing season, as a result of excessive water content.

Hydrodynamics means the dynamic energy, force, or motion of fluids as affected by the physical forces acting upon those fluids.

Hydroperiod means the seasonal occurrence of flooding and/or soil saturation; it encompasses depth, frequency, duration, and seasonal pattern of inundation.

Irrigation ditch means that portion of a designed and constructed conveyance system that serves the purpose of transporting irrigation water from its supply source to its place of use; this may include natural watercourses or channels utilized by design, but does not include the area adjacent to the watercourse or channel.

Marl fens means those wetlands that are alkaline or neutral pH as a result of buffering by calcium compounds in the soil.

Mitigation means, in the following order of preference:

- Avoiding the impact altogether by not taking a certain action or part of an action;
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;
- Compensation for the impact by replacing, enhancing, or providing substitute resources or environments; and

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- Monitoring the impact and taking appropriate corrective measures.

Mitigation for individual actions may include a combination of the above measures.

Nutrients means essential chemicals needed by plants or animals for growth. Excessive amounts of nutrients can lead to degradation of water quality and algal blooms. Some nutrients can be toxic at high concentrations.

Practicable alternative means an alternative that is available and capable of being carried out after taking into consideration cost, existing technology, and logistics in light of overall project purposes. It may include an area not owned by the applicant which could reasonably have been or be obtained, utilized, expanded, or managed in order to fulfil the basic purpose of the proposed activity.

Scour means to cut or carve out by grinding and carrying away sediment.

Shoreline stabilization means the anchoring of soil at the water's edge, or in shallow water, by fibrous plant root complexes; this may include long-term accretion of sediment or peat, along with shoreline progradation in such areas.

Shrub vegetation means dominated by woody vegetation less than 6 m in height.

Stormwater means that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, channels or pipes into a defined surface water channel, or a constructed infiltration facility.

Stormwater attenuation means the process by which peak flows from precipitation and runoff velocities are slowed as a result of passing through a wetland.

Surface waters of the state includes lakes, rivers, ponds, streams, inland waters, saltwaters, wetlands and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Water dependent means a use or a portion of a use which requires direct contact with the water and cannot exist at an upland (nonwater) location due to the intrinsic nature of its operations.

Wetlands [Clean Water Act definition] means those areas that are inundated or saturated by surface or groundwater 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. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands [Shoreline Management Act and Growth Management Act definition] means areas that are inundated or saturated by surface water or groundwater 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. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including but not limited to irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands.

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