



**COMMUNITY PLANNING &  
ECONOMIC DEVELOPMENT**

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Ashley Arai, Director

**TO: Thurston County Planning Commission**

**FROM: Claire Swearingen, Associate Planner**

**DATE: November 19, 2025**

**SUBJECT: Critical Areas Ordinance Update: Best Available Science (BAS) Overview**

**Introduction (What is BAS?)**

Best Available Science (BAS) is scientific environmental information that is used to inform a Critical Areas Ordinance (CAO). State law requires the use of BAS when a CAO is created or updated, and this ensures that environmental regulations are supported by quality scientific evidence. According to WAC 365-195-905, Counties must weigh information received during public input for its scientific validity, and the items in this list are "characteristics generally expected in a valid scientific process:"

1. **Peer review.** The information has been critically reviewed by other persons who are qualified scientific experts in that scientific discipline. The criticism of the peer reviewers has been addressed by the proponents of the information. Publication in a refereed scientific journal usually indicates that the information has been appropriately peer-reviewed.
2. **Methods.** The methods that were used to obtain the information are clearly stated and able to be replicated. The methods are standardized in the pertinent scientific discipline or, if not, the methods have been appropriately peer-reviewed to assure their reliability and validity.
3. **Logical conclusions and reasonable inferences.** The conclusions presented are based on reasonable assumptions supported by other studies and consistent with the general theory underlying the assumptions. The conclusions are logically and reasonably derived from the assumptions and supported by the data presented. Any gaps in information and inconsistencies with other pertinent scientific information are adequately explained.
4. **Quantitative analysis.** The data have been analyzed using appropriate statistical or quantitative methods.

5. **Context.** The information is placed in proper context. The assumptions, analytical techniques, data, and conclusions are appropriately framed with respect to the prevailing body of pertinent scientific knowledge.
6. **References.** The assumptions, analytical techniques, and conclusions are well referenced with citations to relevant, credible literature and other pertinent existing information.

Research takes many forms, and not every type of scientific information will include all of these qualities. Valid types of BAS may include research, monitoring, inventories, surveys, modelling, assessment, synthesis, and expert opinions. It's important that the CAO is not based on nonscientific information such as:

1. Anecdotal information. One or more observations which are not part of an organized scientific effort (for example, "I saw a grizzly bear in that area while I was hiking").
2. Nonexpert opinion. Opinion of a person who is not a qualified scientific expert in a pertinent scientific discipline (for example, "I do not believe there are grizzly bears in that area").
3. Hearsay. Information repeated from communication with others (for example, "At a lecture last week, Dr. Smith said there were no grizzly bears in that area")

This staff memo will emphasize the present guidance as published by state and federal agencies. Some examples of other studies, like peer-reviewed research, will be included, but this memo does not represent a complete BAS review or gap analysis. Staff also anticipate that BAS materials will be submitted by the public throughout the process and incorporated into the CAO as appropriate. A complete BAS review will be prepared for each critical area.

### **Geologically Hazardous Areas**

The Washington Department of Natural Resources (WA DNR) is the primary source of state guidance for geologically hazardous areas. Other agencies, such as the US Geological Survey (USGS) and Thurston Regional Planning Council (TRPC) also publish relevant documents. Many of the most important publications for geologically

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hazardous areas are in the form of GIS mapping resources, but other studies and hazard or resiliency plans are also important.

For these areas, regulating development through the CAO is one piece of a larger natural hazards mitigation effort to protect people from landslides, earthquakes, mine hazards, and volcanic hazards. Newly published mapping resources from DNR include a LiDAR-based landslide map, which displays areas previously affected by landslides or at risk for future landslides with a very high level of accuracy and precision. Because regulating geologically hazardous areas relies so heavily on GIS mapping, it's important that the CAO refer to the most accurate and precise mapping resources available.

The CAO should also reflect hazard mitigation efforts, like TRPCs *Hazard Mitigation Plan for the Thurston Region*, which includes hazard assessments for earthquakes, landslides, and volcanic lahar events. Another important aspect for regulating geologic hazards is planning for the effects of climate change. The severity and frequency of landslides can be affected by sea level rise, intense heavy rainfall events, and wildfires, all of which are natural events connected to climate change. This issue is reflected in WA DNR's *Plan for Climate Resilience*, and by ensuring that the CAO reflect the most up-to-date mapping and risk assessments from WA DNR, we can ensure improved safety for Thurston County residents at risk of adverse effects from climate change.

Some BAS resources that address geologically hazardous areas include, but are not limited to, the following:

[Geologic Planning \(Webpage\)](#), WA DNR, 2025

[Geologic Hazards and Environment \(Webpage\)](#), WA DNR, 2025

[Geologic Information Portal \(Webpage\)](#), WA DNR, 2025

[Safeguarding our lands, waters, and communities: DNR's plan for climate resilience](#), WA DNR, 2025

[Coastal Bluffs and Sea Cliffs on Puget Sounds, Washington](#), USGS, 2004

[Hazards Mitigation Plan for the Thurston Region](#), TRPC, 2024

**Critical Aquifer Recharge Areas**

Critical aquifer recharge areas (CARAs) are areas where surface water can infiltrate into groundwater aquifers, which are vital for drinking water supplies, and for the health of surface waters such as streams. Groundwater is the main source of drinking water for Thurston County, so the CAO must ensure that aquifers and wellheads are protected from pollution sources. The CAO will accomplish protection for the County's drinking water by aligning with guidance from the Washington State Department of Ecology (Ecology) and the Environmental Protection Agency (EPA). This guidance includes information on mapping and designating CARAs and wellhead areas, and best management practices (BMPs) for controlling and mitigating stormwater runoff and point source pollution.

Some BAS resources that address critical aquifer recharge areas include, but are not limited to, the following:

[Critical Aquifer Recharge Areas Guidance](#), Ecology, 2021

[2024 Stormwater Management Manual for Western Washington](#), Ecology, 2024

[Wellhead Protection Programs: Tools for Local Governments](#), EPA, 1989

[Benefits and Costs of Prevention: Case Studies of Community Wellhead Protection](#), EPA, 1995

## Frequently Flooded Areas

Flood hazard areas are primarily designated through FEMA flood maps. Like geologically hazardous areas, frequently flooded area regulation through the CAO is part of a broader emergency management and hazard mitigation framework. Thurston County recently adopted a new Flood Hazard Management Plan, and the CAO update will integrate the goals and implementation strategies of this plan where appropriate. Thurston County currently also regulates development in high groundwater hazard areas and flood of record areas, which are not a part of FEMA flood maps, but are discussed in the *Thurston County Flood Hazard Management Plan*. The CAO will also align with the *Hazard Mitigation Plan for the Thurston Region* and *DNR's Plan for climate Resilience*.

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Some BAS resources that address frequently flooded areas include, but are not limited to, the following:

[Comprehensive Planning for Flood Hazard Management: A Guidebook](#), Ecology, 2021

[FEMA Resources for Climate Resilience](#), FEMA, 2021

[FEMA Flood Maps Service Center](#), FEMA, 2025

[Flood Hazard Management Plan](#), Thurston County, 2025

[Hazards Mitigation Plan for the Thurston Region](#), TRPC, 2024

[Safeguarding our lands, waters, and communities: DNR's plan for climate resilience](#), WA DNR, 2025

## **Wetlands**

Wetlands are a key feature for many important ecological functions. They help maintain water quality and quantity, provide important habitat, mitigate flooding, and restore groundwater. The primary source of guidance on wetlands is the Washington State Department of Ecology (Ecology), although the Army Corps of Engineers, the Washington Department of Fish and Wildlife (WDFW) and the Environmental Protection Agency (EPA) also provide guidance. Guidance from Ecology establishes the functions and values of wetlands that the CAO protects, and provides regulatory frameworks for those protections, including multiple options for buffer calculations. Undisturbed buffers are crucial to maintaining the ecological functions of wetlands.

Agency guidance also provides support for wetland mitigation, which occurs when impacts to wetlands is unavoidable, and helps to ensure no net loss of ecological function. Wetland mitigation can be either programmatic like the County's approach to the Habitat Conservation Plan, or permittee-responsible, meaning mitigation occurs on a case-by-case basis.

Some BAS resources that address wetlands include, but are not limited to, the following:

[Wetlands in Washington State, Volume 1: A Synthesis of the Science](#), Ecology, 2005



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[Wetlands in Washington State, Volume 2: Guidance for Protecting and Managing Wetlands](#), Ecology, 2005

[Update on Wetland Buffers: The State of the Science](#), Ecology, 2013

[Wetland Guidance for Critical Areas Ordinance \(CAO\) Updates](#), Ecology, 2022

[Wetland Mitigation in Washington State Part 1: Agency Policies and Guidance](#), Ecology, Army Corps of Engineers, EPA, 2021

[Wetland Mitigation in Washington State Part 2: Developing Mitigation Plans](#), Ecology, Army Corps of Engineers, EPA, 2006

[Interagency Regulatory Guide: Advance Permittee-Responsible Mitigation](#), Army Corps of Engineers, Ecology, WDFW, 2012

### **Fish and Wildlife Habitat Conservation Areas**

The Washington Department of Fish and Wildlife's (WDFW) Priority Habitats and Species (PHS) program publishes guidance for Fish and Wildlife Habitat Conservation Areas (FWHCAs). FWHCAs include many features of the landscape that support endangered, threatened, or locally important species. Many of the areas and species protected in FWHCAs are designated through the PHS program and on PHS maps. FWHCAs are often associated streams, lakes, and rivers, and the land near them, called riparian areas. Riparian ecosystems are the areas where surface and groundwater connect waterbodies to dry land. These areas contribute and exchange energy and organic matter with aquatic ecosystems, and are vital to the health and morphology of waterbodies. WDFW guidance encourages the use of riparian management zones (RMZs) rather than the historically more common method of using buffers. This method focuses on the area and functions of the riparian ecosystem, and involves a framework centered on ecosystem functions.

Many dry land habitats in Thurston County are also listed as PHS, including Oregon White Oak woodlands, old growth forests, West Side Prairies, and more. FWHCAs are home to many important species of birds, mammals, invertebrates, amphibians, reptiles,

and fish, and these important habitat areas represent a complex and interconnected web of ecological functions. Connectivity is an important habitat value, particularly for any species that migrates, and the Washington Habitat Connectivity Action Plan (WHCAP) Connectivity Values Map can help jurisdictions plan for protecting habitat connectivity.

Some BAS resources that address FWHCAs include, but are not limited to, the following:

[Priority Habitats and Species \(Webpage\)](#), WDFW (PHS), 2025

[Riparian Ecosystems, Volume 1: Science Synthesis and Management Implications](#), WDFW (PHS), 2020

[Riparian Ecosystems, Volume 2: Management Recommendations](#), WDFW (PHS), 2020

[Management Recommendations for Washington's Priority Habitats and Species: Riparian Pollinators](#), WDFW (PHS), 2023

[Best management practices for mitigating impacts to Oregon white oak priority habitat](#), WDFW (PHS), 2024

[Management Recommendations for Washington's Priority Habitats: Oregon White Oak Woodlands](#), WDFW (PHS), 1998

[Channel Migration Assessments](#), Ecology

[WHCAP Connectivity Values Map](#), WDFW, 2025

[Channel Migration Zone Spatial Catalog](#), Ecology