

**Thurston County Critical Areas Regulations**  
**Best Available Science Review: Important Habitats and Species**



A Report Prepared by the Sustainable Fisheries Foundation  
for the  
Black Hills Audubon Society

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## **Introduction**

The Black Hills Audubon Society contracted with the Sustainable Fisheries Foundation (SFF) to conduct a brief review of recent “best available science” (BAS) applicable to the “Important Habitats and Species” section of the Thurston County Critical Areas Ordinance (CAO) and to make recommendations for updates to the ordinance. A separate report by Nickerson (2010) provides additional detail on marine habitats within the County.

To comply with the requirements of Washington State’s Growth Management Act (GMA), the county must incorporate BAS in the development and implementation of critical areas policies or regulations to protect the functions and values of those areas. Moreover, the County must give “special consideration” to conservation or protection measures necessary to preserve or enhance anadromous fisheries. Critical area ordinances regulate human activities, which in turn affect freshwater, estuary and nearshore marine habitats of anadromous fish.

Thurston County is currently in the process of updating its critical area regulations, which were drafted by the Planning Commission in 2005<sup>1</sup>. A final CAO is expected to be produced by the Commission and adopted by the Board of County Commissioners this year. When they produced the draft CAO, the Planning Commission and county staff relied on reviews of best available science for each of the five different types of critical areas: 1) wetlands, 2) areas with a critical recharging effect on aquifers used for potable water, 3) fish and wildlife habitat conservation areas, 4) frequently flooded areas, and 5) geologically hazardous areas. The BAS reviews were completed in 2005 and are available on the County’s website ([http://www.co.thurston.wa.us/planning/critical\\_areas/criticalareas\\_home.htm](http://www.co.thurston.wa.us/planning/critical_areas/criticalareas_home.htm)).

The purpose of this document is to review information on important species and associated habitats that occur within Thurston County, with emphasis on anadromous salmon and trout, that meets the definition of “best available science” and is not appropriately reflected in the current version of the county’s CAO. We focused, in particular, on scientifically credible information that has become available since 2005. Our comments are limited to new information that would, in our professional opinion, justify changes to the existing CAO. If revision appears to be warranted, we suggest ways in which the regulations can be updated to reflect BAS.

## **Derivation and Application of BAS**

As defined in Washington Administrative Code (WAC) 365-195-905, Best Available Science (BAS) refers to current scientific information derived from research, monitoring, inventory, survey, modeling, assessment, synthesis, and expert opinion that is:

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<sup>1</sup> Thurston County Critical Areas Regulations Draft (revised (July 26,05)

- Logical and reasonable
- Based on quantitative analysis
- Peer reviewed
- Used in the appropriate context
- Based on accepted methods
- Well referenced.

The ambiguity over what qualifies as science, what information is “best”, and whether or not it can be used (i.e., is “available”) invites confusion. For this reason, local governments are encouraged to rely on the professional judgment of experts in the relevant scientific disciplines to synthesize and apply information that meets the foregoing criteria and standards of care. The authors of this report possess the requisite knowledge and experience to qualify as experts on salmonids, their ecological requirements, and the impact of human activities on them.

In some instances the GMA and its regulations constrain the choice of science that can be used to designate or protect a particular resource. For example, local governments are required to use the definition of wetlands found in RCW 36.70A.030.21. In other cases, there may be a range of options that are supported by science; for example, the size and composition of the vegetated buffers necessary to protect wetland functions and values.

The State legislature and the Growth Management Hearings Boards have defined “protection” to mean preservation of the ecological “structure, function, and value” of critical areas. Local governments are not required to protect all functions and values of all critical areas, but are required to achieve “no net loss” of critical area functions and values across the jurisdictional landscape. Local governments are also required to develop regulations that reduce hazards associated with some types of critical areas, including geologically hazardous areas and frequently flooded areas. The standard of protection is to prevent adverse impacts to critical areas, to mitigate adverse impacts, and/or reduce risks associated with hazard areas.

Thurston County encompasses an area of 774 square miles, including portions of the Nisqually, Deschutes, Black, Skookumchuck, and Chehalis River watersheds, and smaller watersheds with tributaries that empty into Budd, east Eld and Henderson Inlets. Approximately 35% of Thurston County (270 square miles) lies within the 760-square mile Nisqually River Watershed. The Deschutes watershed covers 270 square miles, most of which is contained within Thurston County, and includes the cities of Olympia, Lacey, Tumwater and Rainier. In addition to the extensive network of wetlands, lakes, streams and rivers found within its boundaries, Thurston County has over 688 miles of Puget Sound shoreline. These freshwater and marine areas constitute important salmonid habitat, meet the State’s definition of critical areas, and therefore must be conserved and protected.

## Review of Literature

Due to funding constraints, the review conducted in this study was limited to scientific literature reported in recent synopses or literature reviews of BAS, with particular emphasis on literature related to the ecological requirements of Pacific salmonids in the Puget Sound region. A search of the internet and library databases revealed that relatively few BAS reviews have been produced since the 2005 draft CAO was prepared. The Municipal Research and Services Center (MRSC) of Washington provides information via resource links on critical areas and best available science. Many of the listed documents contain information that was explicitly considered by Thurston County in the development of their draft 2005 CAO. Of the more recent articles and reports, the following were judged to be most relevant to this review:

- The Washington State Department of Community, Trade and Economic Development (CTED), Growth Management Services page which includes the Critical Areas Assistance Handbook, Appendices, Findings of Fact and Local Examples.
- The 2007 City of Ellensburg Best Available Science Review.
- Snohomish County 2007 Critical Area update.
- The Washington Department of Fish and Wildlife (WDFW) October 2009 document, A Land Use Planners Guide to Salmon Habitat Protection and Recovery.
- WDFW, Priority Habitats and Species (PHS) Program. WDFW provides current, comprehensive information on important fish, wildlife, and habitat resources in Washington.

The document “Protecting Nearshore Habitat and Functions in Puget Sound: An Interim Guide” (EnviroVision et al. 2007) synthesizes best available science on key nearshore habitats and processes, describes how they are affected by shoreline modifications, and provides guidance for protecting nearshore functions and values, including buffer width ranges for freshwater and marine riparian areas. Specific information is provided with respect to three common and potentially detrimental shoreline modifications: construction of overwater structures, armoring of shorelines, and clearing of native riparian vegetation.

In addition to articles and reports on Best Available Science, a number of recent publications have assessed the effectiveness of different habitat restoration strategies and actions on salmon and their freshwater and marine habitats. These documents summarize what is known from research on the restoration of key physical and ecological processes and components, and therefore offer correlative insights into what can be protected through government

regulation. An example of BAS gleaned from this type of review and synthesis of the scientific literature is Clancy et al. (2009), entitled “Management Measures for Protecting the Puget Sound Nearshore.”

## **Findings and Recommendations**

The most recent document providing comprehensive, BAS-based guidance on CAO updates is the WDFW document: “Land Use Planning for Salmon, Steelhead and Trout, Land Use Planners Guide to Salmonid Protection and Recovery, October 2009”. This document consolidates BAS information and applies it to land use planning recommendations. Other than a few notable exceptions, which are discussed below, prescriptions in the Thurston County CAO are generally consistent with the WDFW recommendations and, in fact, are cited by the agency as an example of “good” regulations (WDFW 2009). Nevertheless, we found several areas in which the CAO can be substantively improved.

*Buffer Widths.* There is ample evidence in the scientific literature that vegetated buffers between developed areas and aquatic systems protect the ecological function of those systems (May et al. 1997a, b). The degree of protection and the functions protected are dependent on the composition, maturity, and width of the vegetation; sensitivity of affected aquatic and riparian biota; characteristics of the receiving water (e.g., channel geometry, discharge and hydraulic attributes); soil characteristics; the aspect, slope and geology of the surrounding land; and the degree and type of development occurring in adjacent areas. The width of the vegetated buffer is particularly important, and because it is easily measured and applied, it is typically specified in CAOs.

Although its CAO specifications are, as a whole, consistent with those promulgated by other jurisdictions in Washington, Thurston County’s ordinance is more restrictive with respect to fish bearing stream buffer widths (Table 1) required elsewhere. Thurston and Chelan County both prescribe 200-250 foot wide buffers for fish bearing streams, but Chelan County’s may be viewed as less protective in that riparian vegetation supported alongside watercourses in eastern Washington is apt to be less dense, and therefore less protective on a per-width basis, when compared to riparian vegetation in Thurston County.

It is reasonable to ask if the buffer widths in the Thurston County CAO provide an adequate level of protection for all types of streams and wetlands within the County. If the goal is to maintain an ecological system functioning at or very close to levels associated with undisturbed landscapes, the answer is no. If the goal is to keep some lower but still reasonably good level of aquatic health, or to prevent further degradation, the available scientific literature suggests that the specified buffer widths are adequate.

Table 1. Vegetated buffer widths for different stream types adopted by selected cities and counties in the Puget Sound region.

<b>Jurisdiction</b>	<b>Fish Bearing Stream (Type F)</b>	<b>Non-Fish Bearing Perennial Stream (Type Np)</b>	<b>Non-Fish Bearing Seasonal Stream (Type Ns)</b>
Thurston County	200-250'	100-200'	100'
Snohomish County	100-150'	50'	50'
Pierce County	150'	115'	65'
King County	115'-165'	65'	65'
Everett City	100-150'	50-75'	50-75'
Chelan County	200-250'	150-200'	50'
CTED	150-200'	150-225'	150-225'

The guidance document produced by EnviroVision et al. (2007) describes the importance of riparian vegetation on key marine nearshore habitats, and reviews the ecological benefits provided by vegetative buffers of varying widths. Noting that there is no consensus in the literature recommending a single vegetated buffer width to protect a particular function or to protect all functions, the authors cite data presented by May (2003) and Knutson and Naef (1997) that indicates that widths necessary to protect various functions range from 13 to 600 feet. May (2003) recommends minimum buffer widths of 98 to 328 feet, depending on the function to be protected, and Knutson and Naef (1997) recommend that shoreline buffers be at least 250 feet in width.

Various authors have proposed the use of variable width buffers based on site-specific conditions to protect nearshore ecological functions (Haberstock et al. 2000; Levings and Jamieson 2001; IMST 2002). EnviroVision (2007) noted that, “when applied properly, variable width buffers can be more ecologically sound because they have the potential to reflect the true complexity of the environment and management goals.”

Unless it can be demonstrated, based on an assessment of site-specific conditions, that smaller buffer widths would provide adequate protection of ecological functions and values, we recommend that the Thurston County CAO require a minimum of 150-foot wide vegetated buffers on land adjoining marine nearshore habitats. Additional support for this recommendation can be found in Sustainable Fisheries Foundation (2005) and Nickerson (2010).

*Floodplains.* The National Marine Fisheries Service (NMFS) issued a Biological Opinion (BiOp) in 2008 addressing the effects of the Federal Emergency Management Agency’s (“FEMA”) National Flood Insurance Program (NFIP) on listed Chinook salmon in the Puget Sound region. The BiOp summarizes best available science with respect to the importance of normally functioning floodplains to Chinook salmon. The agency determined that FEMA’s implementation of the NFIP leads to floodplain development in the region, which jeopardizes Puget Sound Chinook salmon and destroys or adversely affects its critical habitat. In conjunction with the BiOp, NMFS issued an incidental take statement that sets forth terms and conditions that FEMA must comply with, including the following:

1. ...“prevent and/or minimize the degradation of channel and floodplain habitat by, among other things, not allowing any development in the floodway, riparian buffer zone, and other areas, unless the local permitting authority can demonstrate that development in those areas “does not adversely affect water quality, water quantity, flood volumes, flood velocities, spawning substrate, and/or floodplain refuge for listed salmonids”; and either (a) prohibiting development in the 100-year floodplain; or (b) only allowing development if floodplain storage loss can be “avoided, rectified or compensated for.”
2. ...“create incentives for the use of Low Impact Development methods, and thereby decrease the need for added stormwater treatment.”

The implications of these directives on the formulation of development regulations by local government are clear; in order to avoid jeopardy of Chinook salmon and adversely modifying their critical habitat, critical area ordinances must ensure that development does not impact the functions and values of floodplains. Significantly, any local government that participates in the NFIP that fails to abide by the terms and conditions of the incidental take statement forfeits the protective coverage granted by ESA section 7(o)(2); i.e., exemption from the prohibition against taking listed species.

*Low Impact Development.* The CAO does not mention Low Impact Development principles and techniques, which have proven generally effective in mitigating the effects of stormwater runoff (Beckman et al. 2009). Broadly speaking, LID-based policies and regulations guide where to place development and how to build it to minimize negative consequences for aquatic ecosystems. They include both structural solutions (e.g., pervious pavement, rain gardens, green roofs) and operational and design choices (e.g., water harvesting, preservation of soils and vegetation). Although not every method of low-impact development is appropriate in every circumstance, taken as a whole, LID practices are both more effective and much preferred over existing methods used to treat stormwater.

The County convened a Steering Committee, Citizens advisory committee, and Technical Working Group in 2004-2005 to develop and recommend LID regulations and standards. In

addition, the non-profit organization People For Puget Sound has recently offered to work with Thurston County on developing an interim LID requirement (PFPS Memo dated 26 July 2009) that reflects the most recent science in this area. We recommend that appropriate LID requirements be incorporated into the CAO for the Commissioners' consideration and approval.

*Rehabilitation of Disturbed Areas.* The Thurston County CAO, as it is currently written, does not provide for the rehabilitation of existing disturbed areas. Aquatic systems associated with these areas can be expected to remain degraded over the long term. To recover freshwater and marine systems that have been impaired by past land use activities, Thurston County should establish regulations and provide incentives that not only prevent adverse impacts, but that also lead to improved conditions in areas that are already significantly degraded. For example, areas that have been cleared of vegetation could be replanted; impervious pavement could be removed and either replaced with pervious material and/or restored to natural condition; rock revetments, bulkheads, concrete walls and other bank protection structures could be removed; and stormwater conveyance systems could be retrofitted or replaced with LID structures to reduce their negative effects on receiving waters. Existing incentives, such as state and federal grant programs to fund the acquisition and restoration of important salmonid habitat, are not sufficient to reverse the extreme degradation that has occurred in many urban and suburban areas.

*Urban Settings.* Mills et al. (2008) reported that application of the BAS requirement is particularly difficult in urban areas, which they attributed in part to the difficulty of extrapolating results from studies of less perturbed systems. Heavily developed areas retain very little habitat function or value for salmonids, and are therefore perceived as being unresponsive to restoration. In their review of the effects of land use practices, including "best management practices" (BMPs) on aquatic biological communities, Horner et al. (2009) concluded that structural BMPs can be an effective in some urban areas. They noted, "If ecological losses are to be stemmed at high urbanization, structural BMPs appear to have a substantial role." As Mills et al. (2008) point out, however, the implementation of measures necessary to sustain a healthy biological community are hindered by a general lack of resources and conflicts over competing societal goals.

*Effects of Climate Change.* Global warming is expected to result in a significant rise in sea level in Puget Sound over the next several decades (Mote et al. 2008). Changes in regional weather patterns, including wetter winters and drier summers, are expected to alter the hydrology of local streams and rivers. Although current predictions of the extent of the changes are imprecise, it is important to anticipate the potential effects on floodplains and shorelines in coastal areas. Several of the more likely effects on ecosystem processes are listed in Table 2. These effects threaten homes, roads, and other structures located near or in water.

Thurston County CAOs should explicitly consider the cumulative effects of development and other human activities in light of expected sea level and hydrological changes. As a precautionary measure, it may be prudent to require wider vegetated buffer widths and building setbacks along low-lying rivers and coastlines where rising sea levels, increased flooding, and channel avulsions in the future are likely to inundate formerly exposed areas of land. Clancy et al. (2009) considered the probability that habitat protection policy or regulations will fail will “substantially increase” in the future due to anticipated increases in sea levels. The uncertainty surrounding climate change predictions and questions regarding the efficacy of CAOs underscore the need for monitoring to determine whether they provide the desired level of protection in the future.

Table 2. Potential impacts of sea level rise caused by global warming on nearshore processes (from Clancy et al. 2009).

<b>Process</b>	<b>Anticipated Impacts</b>
Sediment Supply and Transport	Increased sediment supply from bluff erosion and streams, increased littoral drift rates, likely loss of sediment sources due to new shore protection.
Beach Erosion and Accretion	Exacerbated erosion along erosional and generally stable shores, and likely shifted areas of accretion. Overall landward shift (transgression) of shore features and associated habitats.
Distributary Channel Migration	Channels may accrete with rising sea levels and have greater tendency for migration in response to altered freshwater input.
Tidal Channel Formation and Maintenance	Tidal channels may accrete and processes may become less predictable in response to altered freshwater input.
Freshwater Input	Freshwater input predicted to become more variable, with more flooding (winter-spring) and drought conditions (summer-fall).
Tidal Hydrology	Greater inundation and tidal flows into semi-enclosed systems, increased saltwater incursion.
Detritus Recruitment and Retention	Likely greater detritus recruitment due to overall greater wave energy reaching marine riparian zone. Likely increased storminess and storm surges (including more frequent and intense <i>El Nino</i> storms) and from rivers due to increased peak flows.
Exchange of Aquatic Organisms	Reduced productivity of threatened salmon stocks due to increased winter flooding, decreased summer and fall stream flows, and elevated warm season stream and estuary temperatures. Loss of biological diversity/localized extinctions of marine and freshwater species if habitat shifts outpace ability of species to migrate or adapt to changing conditions.
Solar Radiation	Altered solar patterns due to hotter summers and colder winters.
Wind and Waves	Overall greater wave erosion and potential accretion due to SLR and likely increased storminess and storm surges (including more frequent and intense <i>El Nino</i> ).

## **Additional Recommendations**

**Recommendation:** The Thurston CAO refers to a 2003 CTED document for Clearing and Grading. There is an updated CTED document: Technical Guidance Document for Clearing and Grading in Western Washington, dated May 2005. The Thurston County CAO is substantially consistent with the 2005 document; however, the document includes a section on Low Impact Development (LID) which is not mentioned in the CAO. Developers should be encouraged and, under certain circumstances, required to utilize LID methods.

**Recommendation:** Incorporate LID language in other sections of the document – subdivision, stormwater facilities, roads/streets. For example from “Land Use Planning for Salmon Steelhead and Trout”:

*“Encourage use of Low Impact Development techniques during the site planning and layout phase of a project, particularly in areas of high aquatic species diversity or salmonid-bearing streams. Examples of these techniques include narrower road widths and the use of pervious paving materials.”*

**Recommendation:** Use the following checklist provided by the Washington State Department of Community, Trade and Economic Development (CTED) for any future Critical Areas Ordinance updates:

### Fish and Wildlife Habitat Conservation Areas (FWHCA)

- Have all habitat areas primarily associated with endangered, threatened, and sensitive species, as well as locally-important habitats and species been identified, including potential connectivity corridors?
- Have the habitat needs for both aquatic and terrestrial local wildlife been considered?
- Have sufficient habitat conservation areas been designated to support local populations of identified fish and wildlife species?
- If needed, have adjacent jurisdictions been contacted to ensure consistent approaches to protecting identified critical areas?
- Has a process been established for reviewing development projects for potential impacts to designated fish and wildlife habitat conservation areas? Does this process require mitigation sequencing?
- Have regional lead entities for salmon planning and recovery been contacted?
- Have nonprofit groups engaged in habitat conservation been contacted?
- Have you considered reviewing regional and local habitat assessment information? Sources include Ecoregional Assessments for access to broad scale information on critical habitat needs and potential opportunity areas; Local Habitat Assessments, completed for some areas, and Conservation Opportunity Framework maps from the Washington Biodiversity Strategy.

**Recommendation:** Follow the programs that both Snohomish County and King County have implemented to monitor the effects of their Critical Area Ordinances and consider establishing a monitoring program for the Thurston County CAO.

**Recommendation:** The County should incorporate into its CAO and mitigation strategy information obtained from its ongoing study of watershed condition that was funded in 2008 with a \$625,000 grant from the U.S. Environmental Protection Agency. The study will produce a prioritized list of sites for restoration and prioritization, storm water retrofitting, and LID (including clustering and storm water BMPs). The study will also enable land and water managers to monitor the cumulative impacts of land use and other regulated activities on future conditions, and to modify the CAO as necessary ensure that impacts are avoided, or at least minimized and mitigated.

**Recommendation:** As discussed above, the County should consider implementing regulations that are intended to restore degraded aquatic systems to fully functioning condition, and not just maintain the status quo.

### **Incentives**

- King County uses Density Credits that provide landowners with compensation and Current Use Taxation that reduces tax payments as incentives for property owners.
- Stewardship programs used by many organizations promote voluntary actions by landowners that benefit the resource.
- Incentives that encourage Low Impact Development (LID) would be beneficial. Incentives could include faster project review times, more flexible permit conditions, or reduced or waived permit fees or bonds for projects that clearly show preventive techniques in site plans.

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