2016

Braided Freshwater Governance: A case study of regulation and stewardship of riparian areas and wetlands in British Columbia and Washington State

Stacy Clauson
Western Washington University

Laurie Trautman
Western Washington University, laurie.trautman@wwu.edu

BORDER POLICY RESEARCH INSTITUTE
WESTERN WASHINGTON UNIVERSITY

Braided Freshwater Governance

A case study of regulation and stewardship of riparian areas and wetlands in British Columbia and Washington State

Stacy Clauson
Master's Candidate, WWU

Laurie Trautman
Associate Director, BPRI

Working Paper No. 8
March 2016

Border Policy Research Institute
Western Washington University
Bellingham, Washington
www.wwu.edu.bpri

WESTERN WASHINGTON UNIVERSITY

ACKNOWLEDGEMENTS

This report was prepared as part of a Research Assistantship with the Border Policy Research Institute (BPRI) under the supervision of Dr. Laurie Trautman, Associate Director of BPRI, and Dr. Don Alper, Research Fellow at BPRI.

I would like to thank both Dr. Laurie Trautman, Dr. Don Alper, and Dr. Bert Webber for their guidance throughout the development of this project. I would like to extend my sincere gratitude for the financial support provided for this project by the Border Policy Research Institute.

I would like to recognize the work of the many professionals engaged in riparian and wetland management in the Salish Sea, a few of which I was able to talk directly with as part of this study. These individuals have dedicated themselves to preservation and restoration of these vital natural and cultural features, and work tirelessly to ensure that these common resources are maintained for future generations.

I must take time to recognize those who I was not able to contact. As with any study, there were time constraints that prevented me from talking to more individuals working in this field. There are many other individuals involved in this work, and their experiences and perspectives undoubtedly would provide a deeper understanding than I have been able to present.

Moreover, I must recognize those individuals who gave graciously of their time and experience to help me prepare this study.

EXECUTIVE SUMMARY

Clean water from freshwater sources that flow into the Salish Sea is essential for maintaining a healthy ecosystem. Yet, the riparian and wetlands areas that help to protect upstream water quality are threatened by a number of stressors, which include land use and development practices, forestry activities, and agricultural operations. These practices have historically resulted in the removal of vegetated cover, hardening, straightening or culverting of stream bank features, increases in impervious area, and wetland fill. These changes can impact a variety of ecosystem functions and, as a result, are considered to have a high potential impact to watersheds and marine basins in the Salish Sea.

PROJECT OVERVIEW

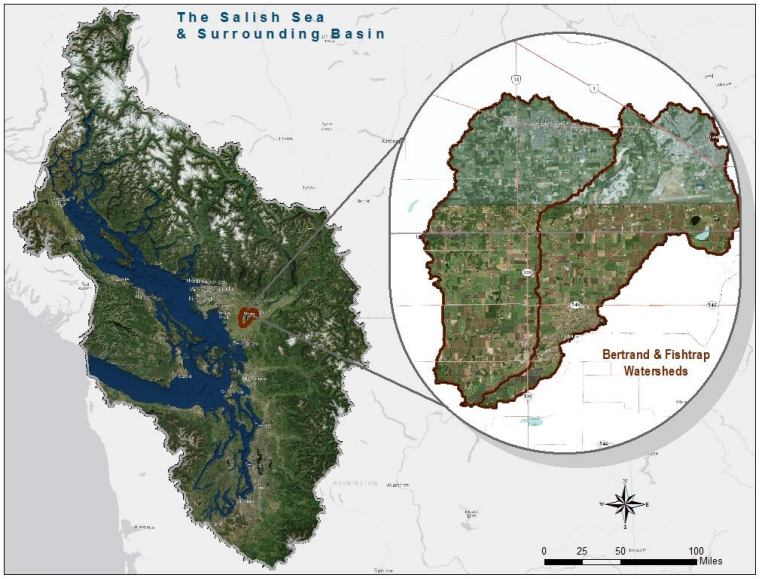

Figure 1: Map showing Bertrand and Fishtrap Watersheds.

Different levels of government on both sides of the United States-Canadian border have developed regulatory protections to minimize land use and development-related impacts to riparian areas and wetlands. Efforts are also being made to restore previously impacted resources. Yet, as these natural features flow across national and internal borders between subfederal governments, the reality is that these features are governed differently. Freshwater governance, much like the braided streams it addresses, has multiple approaches that repeatedly divide and converge around the varied interests and/or policies that exist in Canada, the United States, and the indigenous reserves and reservations in the region.

This study explores how these governance systems compare, by conducting a case study analysis of the regulatory protection strategies and stewardship activities that exist in two transboundary watersheds located in British Columbia and Washington State: the Bertrand and Fishtrap watersheds (see Figure 1). In addition, this study explores how the management approaches converge and diverge at the border, and highlights potential opportunities and barriers to transboundary collaboration. These small, transboundary watersheds were selected because they provide an opportunity to examine issues that relate back to the larger context of riparian and wetland protection and restoration in the Salish Sea region.

STUDY ORGANIZATION

This study is organized into multiple chapters, as follows:

Chapter 1: A detailed introduction to the purpose, scope and methods.

Chapter 2: An overview of governance issues and trends within and between Canada and the United States, drawing on the interviews and on secondary literature. This chapter also outlines the different tools (regulatory and non-regulatory) that are used in managing wetlands and riparian areas (see Figure 2).

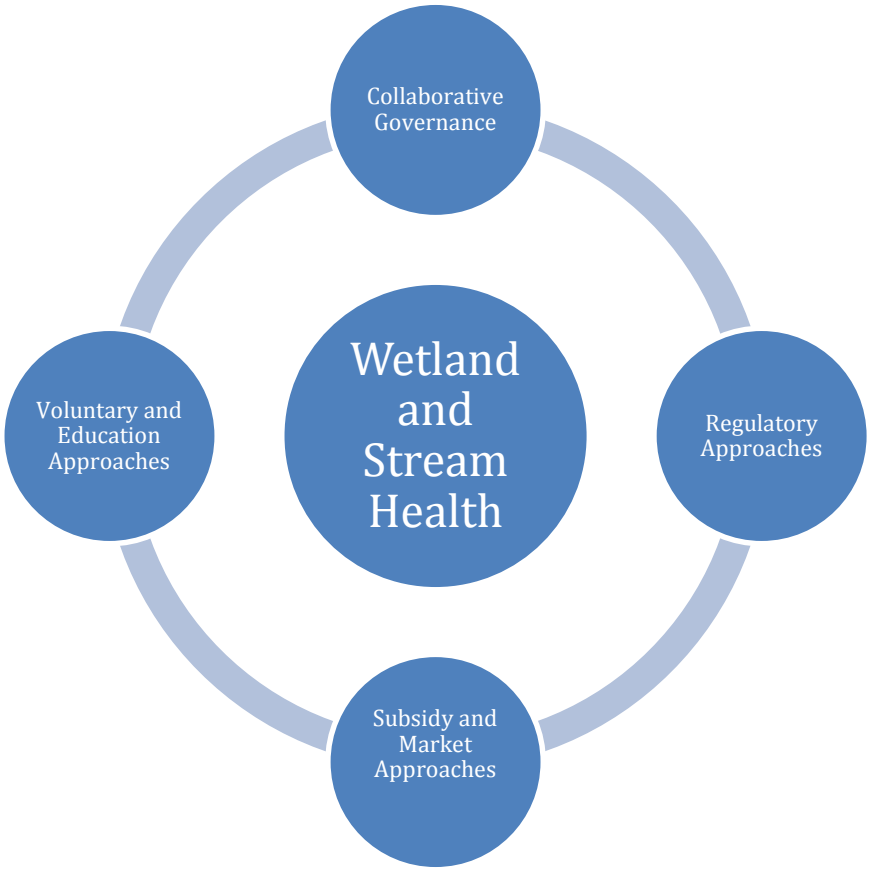

Figure 2: Graphic depicting tools used in managing wetlands and riparian areas.

Chapter 3: A comparison of the existing management framework for riparian and wetland areas in British Columbia and Washington State, with a focus on the tools highlighted in Figure 2.

Chapter 4: The case study, which highlights how the management tools identified in Chapter 2 and further detailed in Chapter 3 are working within small transboundary watersheds, Bertrand and Fishtrap watersheds. This Chapter concludes with a discussion on how the management approaches converge and diverge at the border, and highlights existing pathways for transboundary collaboration.

Chapter 5: A conclusion summarizing the key study findings, identifying areas for further research, and containing reflections on the research.

STUDY FINDINGS

This study had several main objectives: to describe how wetland and riparian policies and management approaches were converging or diverging, to compare how the two management systems in British Columbia and Washington State work, and to identify what formal and informal institutional arrangement potentially limit or foster transboundary watershed management.

Through a case study of the Bertrand and Fishtrap Watersheds, this study has:

1. Identified different policy tools used on both sides of the border (e.g. regulatory, subsidy and market, voluntary and education, and collaborative governance) and compared these tools. One of the key findings is that officials in Canada and the United States manage riparian areas and wetlands in many similar ways, using a mixture of regulatory and non-regulatory tools. This study also identified some areas of divergence.
2. Highlighted some of the ways in which information exchange across the border is occurring, as well as the benefits deriving from these exchanges.
3. Identified the many ways in which government and non-government entities across the border are working in parallel with each other to focus on similar issues in the Bertrand and Fishtrap watersheds. While there may be differences in the specific approaches taken to address particular issues, this degree of parallel or aligned action suggests that there are similar underlying values that are pushing forward action on riparian and wetland areas, namely the value of clean water. However, the lack of integration of these efforts is identified as a lost opportunity.
4. Highlighted existing pathways for transboundary collaboration, but also the limitations that exist in existing collaborative efforts, suggesting that there may be an appetite for evolution of existing mechanisms or creation of new ones.
5. Identified barriers to more integrative forms of collaboration, including lack of resources, lack of strategic leadership or champion(s) to promote the value of transboundary collaboration, lack of clear identification for the scale at which collaboration should occur, and lack of capacity and funding support.

If collaboration efforts are going to evolve to address some of the identified limitations, new forms will need to respond to the barriers highlighted in this report. Further, collaborative efforts will need to be responsive to the varying factors that can influence participants' commitment levels, including values, trust, knowledge, capacity, voice, credibility and openness, accountability, autonomy, equity and support.

In addition, the study identifies several areas for future research, including: more fully integrating Coast Salish peoples into the discussion of collaboration, addressing a larger range of management issues, considering how lack of alignment in management tools impacts opportunities for collaboration, assessing the conditions and context that would support more integrated forms of collaboration, and providing detailed recommendations for fostering collaborative transboundary governance.

Finally, this study concludes with several reflections on environmental governance in a transboundary context, noting that while water links us in profound and complex ways, these linkages do not always translate into governance solutions. In order to respond to the complexity of

issues threatening the health of the Salish Sea, this region will need to respond in new and innovative ways. It will require these two nations, as well as the multitude of associated subnational and non-state actors, to adapt and intentionally work together through a common agenda to solve the shared problems that impact the Salish Sea.

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

CHAPTER ONE: INTRODUCTION

"Water links us to our neighbor in a way more profound and complex than any other." —John Thorson (Administrative Law Judge, California Public Utilities Commission)

SALISH SEA – OUR SHARED WATERS

The waters of the Salish Sea have linked the inhabitants of the Salish Sea ecosystem for millennia, as routes for trade, as a source of food, as habitat for its keystone species, and as part of the cultural essence of the region. These waters continue to bind the region together, as part of our economy and as part of an interconnected ecosystem, but also part of our history and identity. While the region is now bifurcated by an international border and numerous internal borders, the water, forests, and fish and wildlife that inhabit the waters and land in the Salish Sea ecosystem[1] exist across these political boundaries (see Figure 1.1).

In recognition of this connectedness, government leaders on both sides of the Canada – U.S. Border officially named the area the Salish Sea in 2010 (BC-Geographical Names, 2010; USGS, 2009) to refer to the transboundary ecosystem and language of First Nations and Tribes that originally occupied the area. The naming is symbolic not just of the integrated ecosystem that exists across political boundaries, but also of the degree of coordination and collaboration that must occur between these two nations, as well as the multitude of associated subnational and non-state actors, in order to effect change to ensure the restoration and preservation of the Salish Sea.

Figure 1.1: The Salish Sea and Surrounding Basin (Freelan 2009).

[1] The Salish Sea ecosystem extends from the north end of the Strait of Georgia in British Columbia, Canada, to the south end of Puget Sound in Washington State, U.S., west to the mouth of the Strait of Juan de Fuca where it meets the Pacific Ocean and east to the land and rivers that drain into these coastal waters.

The call for change is coming about because of continuing declining trends in the health of the Salish Sea, including marine water quality deterioration, marine species at risk, Chinook salmon stock declines, and summer stream flow changes (Wong and Rylko 2014). The concern over the health of the Salish Sea system is based on common values that occur across political boundaries, such as the desire to have safe places to recreate and a healthy ecosystem that can sustain the species and character that are integral to the identity of the Pacific Northwest.

Varied processes and stressors drive changes in the Salish Sea, occurring at different spatial scales. Recent research in both Canada and the United States have attempted to identify the key stressors and ecosystem vulnerability that should be addressed to ensure sustainable long-term protection and recovery of the Salish Sea (Department of Fisheries and Oceans 2013, McManus et al. 2014). Key stressors identified included conversion of land within upland watersheds, as well as the contribution of toxic chemicals and conventional pollutants from non-point sources, such as agricultural and stormwater runoff. Thus, on a large-scale, rivers and the watercourses draining to the Salish Sea represent a major pathway for the transfer of nutrients and water inputs. As a result, changes within the upstream watersheds that span the Canada – U.S. Border and drain to the Salish Sea have numerous impacts on the varied processes affecting this common ecosystem. These pressures have the potential to magnify with increasing population growth and climate change.

On a more localized scale, watershed basin and sub basins span the international boundary, and impacts occurring along and within these systems have the potential to impact downstream neighbors, with impacts flowing both ways across the border depending upon place-specific issues. For example, naturally occurring asbestos deposited into Swift Creek (in northern Whatcom County near the Canadian border – see Figure 4.1) from a landslide currently flows north into the Sumas River and Canada, with the potential to cause health impacts if disturbed, and increasingly likely if in-stream water flows remain low. How can the contributing source be limited and in-stream flow be restored to minimize health impacts, particularly if the impacts are far removed from the contributing source, spanning an international border? Cumulative sources of nutrient and bacteria pollution in waters draining to Portage Bay[2] have resulted in shellfish closures, a vital economic resource for the Lummi Nation as well as an important cultural resource. How can upstream pollutant sources be managed and processes restored, particularly in the context of transboundary pollution flow?

These examples illustrate that at multiple scales, the residents of the Salish Sea have shared concerns and problems, as well as challenges in managing these issues. These interconnected natural resources thus serve to tie the residents of the region together in pursuit of solutions. Yet, this connected ecosystem is bifurcated by multiple borders, with resulting management conducted by various policy actors and under a multitude of resulting policies of Canada, the United States, and the indigenous populations of the region. Because the current management approach is territorially fixed in this way, it is important to understand how the various policies and priorities compare, thus revealing how governance is either diverging and/or converging on both sides of the border. Further, if the residents of the Salish Sea seek to have shared solutions, it is vital to understand the mechanisms in place that may help to foster and sustain the required collaboration that will be necessary to identify and implement shared solutions, or, alternatively may provide barriers to effective collaboration.

[2] Located in the Salish Sea at the outlet of the Nooksack River in Whatcom County, which drains the Nooksack River Basin, including the Nooksack River and its tributaries – some of which flow south from British Columbia into Washington State

SCOPE OF RESEARCH

The purpose of the proposed project is to compare the existing governance structures, administrative processes, and management tools for wetland and riparian area conservation and management in the Salish Sea Basin and examine potential opportunities for transboundary collaboration. My specific focus is on management of riparian and wetland areas, as these areas provide important functions to the Salish Sea and provide an effective 'container' for a comparative policy analysis. I examined the following questions:

1. How are wetland and riparian area policies and management diverging and converging on both sides of the border?
2. What formal and informal institutional arrangements limit and potentially foster transboundary watershed management?

METHODOLOGY

The products of this research are part of an ongoing project initiated by the Border Policy Research Institute at Western Washington University focused on assessing the value and possibility of developing a cross-border policy framework for governance of the Salish Sea. The Border Policy Research Institute has initiated this research effort by first conducting a baseline inventory of the policies (ranging from local to federal) and the policy actors (including governmental agencies, NGOs, and indigenous populations) that are shaping how the Salish Sea is governed (Clauson and Trautman 2015). This research builds and extends this initial effort by conducting a more in-depth analysis of riparian and wetland area management, examining how management of these freshwater systems compares and either promote or impede transboundary cooperation. This study utilizes a comparative case study approach, using a transboundary watershed and stream system to compare the governance structure in British Columbia and Washington State for urban stream protection, including the different scale(s) and form(s) of governance.

The Bertrand and Fishtrap watersheds, which are subbasins to the Nooksack River basin, were selected for the case study. These small, transboundary watersheds were selected because they provide an opportunity to examine issues that relate back to the larger context of riparian and wetland protection and restoration in the Salish Sea region, yet on a smaller, more in-depth scale, including:

- The watersheds are bisected by an international border, providing an opportunity to examine parallel policies at the federal and state/provincial levels relating to riparian and wetland areas;
- The land within the watersheds are part of several different local governments, which each exercise local bylaw/zoning provisions that regulate development activities, providing an opportunity to examine the downscaling of environmental management to local levels that is occurring on both sides of the border;
- The watersheds are developed with agricultural and urban development, representing two key upland uses that contribute to impacts to riparian and wetland areas;
- These watersheds are experiencing a number of 'downstream' water quality and quantity issues, with both sides of the border experiencing impacts from 'upstream' users in the watershed;
- The watersheds drain to the Salish Sea, and therefore at the larger scale all activities within the watershed contribute to the overall health of the transboundary Salish Sea; and

- There have been previous initiatives and studies conducted by the Border Policy Research and university students investigating water governance in these watersheds, which provide a rich resource of materials to draw from (e.g. Anaka 2012; Norman and Melious 2004; Brown 2015; Clauson and Trautman 2015).

Thirteen interviews were conducted with water management professionals from both the United States and Canada during the period January to February 2016. A semi-structured interview was conducted with participants, each interview taking approximately 30-40 minutes. Interviewees were asked to describe their agency/organization's role in preserving and/or restoring wetland and riparian areas, asked about specific regulatory provisions (if applicable), their impressions of adequacy of current management approaches, as well as existence of, and drivers or barriers to transboundary networking and coordination. Participants were recruited based on a web-based search of what policies and policy actors are operating in the region, while further individuals were identified through a modified snowball approach. Interviewees' identity cannot be disclosed because of confidentiality requirements; however, a list of participating organizations is included in Appendix A. In addition, bibliographic research was conducted.

STRUCTURE OF THE REPORT

Chapter 2 of this report provides an overview of governance issues and trends within and between Canada and the United States, drawing on the interviews and on secondary literature. These sources were also used to compile the comparison of the existing regulatory environment for riparian and wetland areas that is contained in Chapter 3. The interview results, together with additional background research, were also used to produce the case study included in Chapter 4 of the report, which serve to illustrate how similarities and differences in management of freshwater systems, as well as drivers and barriers to cooperation on transboundary governance work in practice. The case study is focused on two small transboundary watersheds, Bertrand and Fishtrap watersheds. The report concludes in Chapter 5 with suggestions for future research.

CHAPTER TWO: RESEARCH CONTEXT

This section provides an overview of governance issues and trends within and between Canada and the United States. First, this section examines the functions that riparian and wetland areas provide and the resulting problems and challenges that arise when these systems are impacted. Then, the discussion turns to overview the different ways in which wetland and riparian areas are managed. Finally, I evaluate, at a high level, the institutional arrangements that form resulting from the different management tools and discuss how those arrangements might be a driver or barrier to collaborative governance, both vertically within Canada and the United States as well as laterally across the border.

TRANSBOUNDARY WATER GOVERNANCE - BRITISH COLUMBIA/WASHINGTON STATE BORDERLAND

Freshwater resources provide a variety of important functions in the Salish Sea. Riparian corridors[3], streams, and wetlands help to store, infiltrate, evaporate and cleanse stormwater runoff. They also provide groundwater recharge and flood attenuation. They provide habitat for a number of different species. Wetlands and riparian areas typically occur as natural buffers between uplands and adjacent water bodies. Yet, riparian and wetlands areas are threatened by land conversion practices such as development practices, forestry activities, and agricultural operations. These practices have historically resulted in the removal of vegetated cover, hardening, straightening or culverting of stream bank features, and wetland fill.

These individual, isolated activities have resulted in adverse impacts to many different interconnected processes. As an example, removal of native vegetation and replacement with impervious surface areas can result in increased and faster responding peak flow rates during the wet season and, correspondingly, reduced infiltration and recharge, resulting in increased evapotranspiration during dry periods. These resulting changes to vegetation and hydrology can impact flooding and erosion, reduce the ability of the system to store and process pollutants, and limit instream base flows needed to support a variety of users. Stream bank hardening and other modifications to channel morphology that can trigger watercourse instability, erosion, and result in reduced water quality and deteriorated aquatic habitat. Removal of vegetation also reduces shading, which can affect water temperature and limit refuge areas, influencing predator-prey relationships. Less overhanging vegetation also limits leaf litter and other inputs to the system, which can influence food sources and water chemistry. Loss of these systems allows for a more direct contribution of nonpoint pollutants to receiving waters, as both physical and biological processes are impacted. Impacts to water quality and aquatic habitat can affect biotic species, including endangered species, both instream and in downstream waters.

While individual impacts may appear as small changes, the combined impacts on watersheds can have substantial effects on water quality, species composition, and flooding patterns. Such combined impacts are often referred to as “cumulative effects.”

Yet, despite their importance, the Salish Region is experiencing continued loss of riparian and wetland areas due to development and agricultural operations, as well as loss of forested areas in the upper watersheds due to timber harvesting or land use conversion (US EPA Region 10 2015). In addition, systems previously impacted by conversion activities are providing reduced functions, and have less ability to address on-going sources of point and non-point pollution. Further, climate change threatens

[3] Though definitions of riparian areas vary, for purposes of this report riparian areas is considered to be a transition zone between land and water environment through which energy, materials, and water pass.

to exacerbate the changes to the hydrological cycle, with greater likelihood for flooding in the wet season and lower in-stream flow in the dry season. These changes have impacts for pollutant loading, as materials more quickly flush out in high water conditions and are more concentrated during low flow events.

The resulting cumulative impacts are altering the basic functioning and resilience of the Salish Sea's ecological systems. While there is local variability in freshwater water quality conditions, a trend analysis of freshwater quality in the southern portion of the Salish Sea conducted by the Puget Sound Partnership shows that on balance, local improvements to water quality are outpaced by the degradation that is occurring at a regional scale (Puget Sound Partnership 2015). As a result, protecting riparian areas is recognized as a key strategy for improving water quality and endangered species recovery.

Riparian and Wetland Area Management Approaches

Different levels of government on both sides of the United States-Canadian border now have protections in place intended to minimize impacts to riparian areas and wetlands. There is a multitude of management tools available for protecting riparian areas and the functions they provide. The following overviews some of the key mechanisms used in the context of the Salish Sea. Section 3 describes in more detail the specific laws and policies in place.

Command-and-Control Mechanisms

Command-and-control mechanisms emerged early in environmental management and generally describes approaches where government "commands" progress toward certain environmental targets by establishing prescriptive standards, which then agencies were authorized to "control" by requiring permitting and monitoring compliance (Holley, Gunningham, and Shearing 2013). In the context of riparian and wetland areas, these fall into a number of different mechanisms, with key provisions described below.

Regulatory riparian buffers: Riparian and wetland areas in Washington State and British Columbia are predominately managed under a "command-and-control" regulatory riparian buffer width approach. Under this approach, an appropriate functioning buffer system is protected through the establishment of prescriptive buffer standards. Activities within these riparian buffers are controlled in order to isolate upland activities from the aquatic environment and protect riparian zone functions. The buffer area represents a 'no-touch' zone where activities are limited and natural conditions are to be preserved. For activities occurring within the buffer, a permit is required, though there may be exemptions or administrative allowances, with incorporation of Best Management Practices (BMPs). Often, as part of urban land development activities, permittees will be required to establish some sort of native growth protection easements (NPGEs), restrictive covenant or similar mechanism which provides additional protection by providing notice to homeowners of the property's development limitations with respect to the riparian area.

There are varying approaches to establishing and applying riparian buffer zones or widths, which is reflective of the differences in ecological, economic, and social factors influencing the establishment and implementation of buffer widths. In many cases, different types of development activities (e.g. urban land uses such as residential, commercial, and industrial uses; forestry; and agricultural operations) are addressed by different laws and regulations, and therefore may be implemented by different agencies.

Land use and zoning: At the larger, landscape scale both Washington State and British Columbia also incorporate growth management strategies and zoning. These land use and zoning tools can (ideally) be used to encourage development and urban growth in areas that are less environmentally sensitive or better suited to support growth and, conversely, to set aside areas for protection.

Point and non-point source pollution control: Riparian function, with its connection to water quality, is also protected through various water quality standards and objectives. These may be established to address point and non-point sources of pollution. Point source discharges (e.g. discharges from publicly owned treatment works (wastewater treatment plants or POTWs), discharges from industrial facilities, and stormwater discharges) are often required to obtain permits, and may be limited in the amount of pollutant it can discharge. Non-point sources are typically controlled through different programs. Sources of pollution are often bundled into different categories (e.g. agriculture, forestry, mining, urban runoff). Permits and/or best management practices may apply, depending on the size and scope of the generating pollution source. While in many cases these programs are focused on activities occurring in upland areas, these activities nonetheless have important impacts on water quality within freshwater systems. Due to the breadth of potential tools that may be included and the characteristics of the study area examined in this report's case study, this analysis will be limited to a discussion of agricultural practices (e.g. manure spreading, storage, pesticide application, etc.) that may be occurring within wetland and riparian areas[4].

Timing limitations and other restrictions: Due to a variety of issues (e.g. presence of protected species, potential for runoff or erosion, etc.), there may be timing restrictions imposed on activities. Other protection measures could include establishment of physical barriers (e.g. protective fencing), signage, etc.

Water Quantity and In-Stream Flow[5]: Adequate amounts of water in streams are needed to protect and preserve instream resources and uses. A key management tool for protecting stream flows is to set flow levels in regulation. Specific stream flow amounts protected in a regulation are called "instream flows."

Subsidy and Market Approaches

A number of different subsidy and market approaches have emerged, with tools relevant to this analysis overviewed below. Many of these tools act as complements to regulatory programs.

Acquisitions and conservation easements: Acquisition of land is used to preserve areas that may be highly sensitive or threatened, and thus warrant preservation in a manner in which the purchaser holds rights to determine the future use and management of the land. Conservation easements are typically voluntary agreements between landowner and government or conservation group that restricts development rights over a portion of the land, such as the riparian buffer.

[4] It should be noted that stormwater is a key contributing sources of pollutants impacting both freshwater and marine systems. While this is a key stressor, it is beyond the scope of this analysis to conduct a comparative analysis of this issue. This highlights an area for potential future research.

[5] In-stream flow is an important issue that is connected to water quality and quantity. This issue is highlighted here, but not discussed in depth through this report. This highlights an area for potential future research.

Subsidies/Incentives/Tax-Subsidy Combinations and similar mechanisms: In this context, these tools include financial support for environmentally beneficial programs. Examples could include grants, low-interest loans, and favorable tax treatment. For instance, riparian areas located on farmland with particular conservation values may be removed from production in exchange for annual rental payments.

Ecosystem services: These type of tools attempt to establish a system in which providers of ecosystem services (benefits people obtain from ecosystems, such as clean water) can access financing to protect, restore and maintain ecological values. For example, these tools could be designed to allow farmers with land containing environmentally sensitive forested areas, wetlands, and wildlife habitats that need protecting to receive annual payments to preserve their lands and allow access for monitoring and ecological assessments. Many of these programs as in exploratory or pilot, experimental stages.

Transfer of Development Rights: These programs establish a marketplace for development rights; developers in urban areas where higher density development is allowed pay to remove density from sending areas (that may be more environmentally sensitive, such as areas surrounding riparian buffers) through marketplace transactions.

Voluntary Approaches

A number of different voluntary programs exist. For instance, non-governmental organizations may work with private landowners to gain access to property for planting and other restoration activities. Organizations may provide technical assistance to agricultural producers to plan and implement conservation practices that improve soil, water, plant, animal, air and related natural resources on agricultural land.

Education and Information-based Strategies

Education and stewardship programs exist, covering a number of different topic areas, from proper operation of septic systems to reduction of non-point source pollution.

Collaborative Governance

In environmental management, many researchers have described a shift from centralized planning and command-and-control regulation towards collaborative governance (Holley, Gunningham, and Shearing 2013; Fraser Basin Council 2015). In this approach, non-governmental organizations play an increasing role in environmental management activities, from administrative, regulatory, managerial, to mediation functions. Decision-making involves both public and private actors. This approach to governing is depicted as more inclusive of local circumstances and better able to capitalize on local knowledge and capacity. Government expenditures can be leveraged by incorporating resources from other actors to perform policy implementation, monitoring and enforcement roles. This shift has occurred in the context of freshwater resources, with the formation of watershed societies, councils, and similar organizations that serve to coordinate and implement activities to promote the long-term sustainability of the watershed.

Integration of Different Management Tools

In reality, a combination of different governance systems (e.g. command-and-control regulation, subsidy and market approaches, voluntary and education, and collaborative planning and management) has emerged with respect to riparian area and wetland management.

Critiques of command-and–control have increasingly led to inclusion of other mechanisms. These critiques generally align along a number of themes: that these tools result in a management approach that is too centralized, with an emphasis on uniform, prescriptive standards that are not responsive to local conditions and values (Holley, Gunningham, and Shearing 2013). This approach to management is also seen as adversarial, pitting different stakeholders against each other in a contested regulatory environment (Holley, Gunningham, and Shearing 2013). Command-and-control tools managing activities in complex environmental systems have also been criticized as being fragmented, with different actors working within regulatory and organizational silos. Further, this management approach is piecemeal and conducted on a case-by-case basis, as projects are evaluated when a development review is triggered. The focus is on compliance, and, as a result, this regulatory approach lacks a holistic ecosystem-oriented view and rarely addresses restoration of previously degraded systems.

Yet, voluntary and educational approaches are often criticized as lacking accountability and being insufficient to serve as a standalone approach (Holley, Gunningham, and Shearing 2013). There are numerous concerns about subsidy and market approaches, including valuing the system and establishing a tradeable unit, equity, and accountability and monitoring.

With respect to collaborative governance, there are still many unresolved concerns about these approaches. These concerns range from participation (e.g. are the right people involved and what level of participation is actually occurring); collaboration (e.g. how decisions made and are there power imbalances); sustainability and viability (e.g. is their sufficient funding and resources to sustain operations); and accountability.

The integration of different mechanisms allows different approaches to potentially fill different niches in the management approach. However, it also leads to a complex environment that can potentially lead to confusion and a fragmentation of management responsibilities. This confusion can be magnified when working across a bordered environment, where unfamiliarity and lack of connections and networking challenges outreach and communication.

CHAPTER THREE: PROTECTING RIPARIAN AND WETLAND AREAS

The next section provides a more detailed overview of the different actors and policies that are employed to protect riparian and wetland. First, this section examines similarities and differences in culture and political structure that exist amongst the nations, before turning to examine the management approaches used on either side of the border.

CULTURAL AND POLITICAL SIMILARITIES AND DIFFERENCES

Differences in policies and their implementation are often the result of distinct economic, sociocultural and political factors (Healy, VanNijnatten, and López-Vallejo 2014). This section overviews some of the key differences at the federal and provincial/state levels, with a specific focus on British Columbia and Washington State.

Federalism

While both countries have federal, democratic systems, there are distinct differences between these systems that impact the manner in which environmental policy is made and implemented. At the most basic level, the U.S. is a republic that emphasizes separation of powers between the Legislative, Executive, and Judicial branches. This separation institutes multiple checkpoints on the exercise of power and provides opportunity for citizens to take a more active role in government (Healy, VanNijnatten, and López-Vallejo 2014; Thomas and Biete 2014). The Canadian Parliamentary System, in contrast, has more integration between its governmental branches and has strong political party control. This is true at both the national and provincial level. As a result, Healy et al (2014) describe the Canadian political system as

> *"neither open no participatory. Indeed, the Canadian environmental policy regime is, to a considerable degree, the result of an interconnecting set of compromises most often reached behind closed doors, between the federal government and the provinces, between the heads of environmental and other agencies with economic portfolios (e.g. industry, natural resources) at the level of the cabinet, and between the economic interests aligned with these various actors. For non-governmental (e.g. environmental) groups, gaining access to these decision-making arenas is quite difficult"* (pg. 32).

At the same time, the Canadian version of federalism is more decentralized, where regulation and natural resource management in Canada rests largely in the hands of the provinces (Beckplumb 2013), largely derived from their Constitutional division of powers that allocated property and civil rights, as well as municipal institutions and manners of local or private nature to the provinces. In addition, much of the land in British Columbia is also owned by the Province (e.g. Crown Land), which empowers the provinces to regulate activities on these lands. Yet, with respect to water resources, the Constitutional division of powers divides responsibility between provincial and federal governments (Beckplumb 2013). Within this system, provinces have responsibility for water resources, and the federal government is responsible for fisheries, shipping and navigation, international waters, and international trade. As a result, management of water resources can be fragmented between different federal and provincial agencies. This decentralized nature can also encourage the Canadian federal government to tread lightly in environmental-related areas, if conflicts with provincial governments exist, and work through conflicts with intergovernmental mechanisms (Healy, VanNijnatten, and López-Vallejo 2014). Environmental non-governmental groups became active later in Canada than in the United States, and

largely operate at provincial levels of government, in line with Canada's decentralized approach to environmental issues.

With respect to the judicial branch, U.S. environmental law is more generous in allowing for judicial review of decision-making by government agencies; Canada, in contrast, has rules of standing that restrict the ability of environmental groups to challenge governmental decisions (Biber 2012). The U.S. is also more generous in allowing private parties to enforce environmental laws against other private parties who are alleged to have committed violations (Healy, VanNijnatten, and López-Vallejo 2014; Thomas and Biete 2014).

With respect to the capacity of the relative governments to implement environmental policies, over the last several years, Canada has made steady cuts to spending to support its environmental agencies (Healy, VanNijnatten, and López-Vallejo 2014). Despite changes in political party leadership in the United States in the beginning of the 21st century, financial support for environmental agencies has only declined slightly since the early 1990s. States received considerable support from the Environmental Protection Agency, which acts in many cases as watchdog for states undertaking administration of EPA programs, but also as a technical advisor and facilitator (Healy, VanNijnatten, and López-Vallejo 2014).

There are significant differences between the indigenous relationships and agreements that have been forged between Tribes, First Nations and governments in Canada and the United States. In the United States, Tribes have entered into treaties with the federal government. Federally recognized tribes are sovereign nations, and each sovereign tribe has an independent relationship with each other and the federal and state government. A federally recognized tribe is recognized as having a government-to-government relationship with the United States, with the responsibilities, powers, limitations, and obligations attached to that designation. There is a duty to consult with Tribes to ensure that agencies consider the effects that their activities have on Native American lands, resources, and protected rights. The duty extends to off-reservation activities that may harm a tribe's land base or treaty-protected resources.

In contrast, in British Columbia very few treaties have been negotiated with First Nations. Therefore, there are limited formal agreements in place that described the nature, scope and extent of Indigenous rights and title across BC. The Constitution Act, passed in 1982, recognized and affirms the rights of First Nations. However, the Act did not define these rights, which has led to a series of court cases through which First Nation rights have been interpreted through court decisions, with varying outcomes. Many First Nations in British Columbia are in the process of negotiating treaties. Governmental agencies have recognized a duty to consult and accommodate First Nations, where required, on land and resource decisions that could impact their interests.

British Columbia and Washington State

British Columbia and Washington State, at face value, have many similarities. Both of these subnational governments are physically separated from their respective federal governments; both have significant connections to nature, with species such as salmon and Orca whales having very significant cultural and economic importance to the region. Finally, the residents in these regions are often seen as having 'left-of-center' political orientation, though there is significant variability in political beliefs (Lampman and Thomas 2014).

Despite being separated by an international border, these subnational actors are also connected economically. Canada is Washington State's second highest export destination, in a state economy that is heavily dependent on trade (Storer et al. 2015). Both regions are also experiencing population growth pressures.

Despite these similarities and connections, there are important institutional and political cultural differences. In Washington State, there is more pronounced polarization that occurs between rural and urban parts of the state, reflective of differing values with respect to the role of government (Lampman and Thomas 2014). This is one of the factors contributing to increasing partisanship in the legislature (Lampman and Thomas 2014). The Governor and executive branch hold relatively lesser power than their British Columbia counterparts (Lampman and Thomas 2014). There is also more emphasis on local politics in Washington State (Lampman and Thomas 2014).

In British Columbia, there is considerable horizontal fragmentation of natural resource management within the provincial government, with multiple ministries and agencies making and implementing natural-resource focused policies. This fragmentation exists to a lesser extent in Washington State, where the Department of Ecology plays a significant coordinating role in water related issues, but with some notable exceptions, including forestry and agricultural related issues.

Coast Salish Peoples[6]

Coast Salish First Peoples have resided in the Salish Sea since time immemorial. The traditional territories of these indigenous communities span what has now become the Canada-U.S. international border (Norman 2012 and 2015). Through the development of the Coast Salish Gatherings and other related initiatives, tribal leaders have started to convene together to address issues of shared environmental concern, particularly issues related to the protection of the sacred salmon (Norman 2012 and 2015). Emma Norman (2012 and 2015) highlights the role of this "third sovereign" in providing leadership in transboundary environmental governance.

OVERVIEW OF BRITISH COLUMBIA PROTECTION MEASURES

Management of riparian and wetland areas is currently addressed predominately by the provincial government, divided by ministry with respect to the type of activity that is being regulated. For example, urban land uses are addressed by the Ministry of Forests, Lands and Natural Resource Operations under the Riparian Areas Regulation; forestry activities are also addressed by the Ministry of Forests, Lands and Natural Resource Operations, but under the Forest and Range Practices Act[7]; while agricultural activities are addressed by the Ministry of the Environment and Ministry of Agriculture. In-stream work is regulated differently than work in the riparian area. Table 2, together with the

[6] This study does not contain a detailed study of Coast Salish Peoples activities related to protection and restoration of riparian and wetland areas, either on tribal lands or within traditional homelands. Indigenous communities (First Nations and Native Americans) have an increasing role in natural resources governance and, in particular, transboundary governance (Norman 2012 and 2015). Additional research into how the communities engage in and lead activities related specifically to riparian and wetland issues could greatly extend the work in this study.

[7] Since this report does not focus on Forestry activities, this Act is not further discussed.

information below, provides an overview of some of the key federal and provincial laws and regulations that affect riparian and wetland areas.

Regulatory Approaches

Table 1 provides a high-level overview of key regulations in British Columbia that are used in managing riparian and wetland areas.

TABLE 1: OVERVIEW OF KEY LAWS AND REGULATIONS ADDRESSING PROTECTION OF RIPARIAN AND WETLAND AREAS IN BC[8],[9]

Legislation	Purpose	Implementing Agency
	Federal	
Canada Fisheries Act	Provide for the sustainability and ongoing productivity of commercial, recreational and Indigenous fisheries.	Fisheries and Oceans Canada (except for freshwater fisheries, which are delegated to Province)
Species at Risk Act	Prevent Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species, and encourage the management of other species to prevent them from becoming at risk.	Fisheries and Oceans Canada (for aquatic species)
	Provincial	
Riparian Areas Protection Act (renamed from Fish Protection Act)	To ensure sufficient water for fish; to protect and restore fish habitat; and to allow for a renewed focus on protection and enhancement of riparian areas (British Columbia and Office of the Ombudsperson 2014).	Ministry of Forests, Lands and Natural Resource Operations
Riparian Areas Regulation	To establish directives to protect riparian areas from development so that the areas can provide natural features, functions and conditions that support fish life processes	Ministry of Forests, Lands and Natural Resource Operations
Environmental Management Act – Waste Discharge Regulation	Requires authorization for introductions of waste from "prescribed" industries, trades, businesses, operations and activities.	Ministry of Environment
Environmental Management Act - Agricultural Waste Control Regulation (Under Review)	Establishes Code of Practice for agricultural operations, describing environmentally sound practices for using, storing and managing agricultural wastes and by-products, such as manure and composted materials.	Ministry of Environment
Water Sustainability Act (Replacing Water Act, To be implemented in 2016)	Designed to meet three key outcomes: 1. Water management is sustainable, efficient and adaptive 2. Rights for water users, communities and industries are secure and transparent 3. B.C.'s water and aquatic ecosystems are healthy and protected.	Ministry of Forests, Lands and Natural Resource Operations

[8] There are other regulations that impact riparian and wetland areas that are not addressed in this evaluation, including the Canadian Environmental Protection Act (CEPA), Canadian Environmental Assessment Act (CEAA), and the provincial Forests and Range Practices Act, Land Act, and Environmental Assessment Act, as well as legislation addressing pesticides.

[9] See Appendix B for a more detailed table with information on the key laws and regulations.

Regulatory riparian buffers

Riparian buffers are a key approach to protecting riparian and wetland areas. For urban land uses (e.g. residential, commercial, industrial), the Riparian Areas Regulation (RAR), administered by the Ministry of Forests, Lands and Natural Resource Operations, addresses the protection of riparian areas during the development process. The RAR applies to more urbanized municipalities and regional districts in southern BC (see Figure 3.1). The RAR has three key provisions: 1) it establishes which waterbodies are to be managed under the regulation[10]; 2) it requires a mechanism by which development proposed in riparian areas triggers a review (e.g. development activities within 30 meters (98 feet) of the top of stream bank); and 3) it requires a Qualified Environmental Professional (QEP) retained by the property developer to be engaged in reviewing proposed development activities for compliance with the regulation and its assessment methods (Ministry of Forests, Lands and Natural Resource Operations 2015). The regulation thus relies upon a "professional reliance" model to meet its objectives – meaning that the Ministry relies on the judgment and expertise of professionals to ensure that riparian areas are adequate to protect fish habitat. "The underlying philosophy is that with QEPs doing the work on the ground, government resources focus on oversight activities – monitoring, reporting and enforcement" (British Columbia and Office of the Ombudsperson 2014, p. 9).

[10] Riparian areas are defined to include watercourses, whether it usually contains water or not; as well as ponds, lakes, rivers, creeks or brooks; or a ditch, spring or wetland that is connected by surface flow to the watercourses listed above

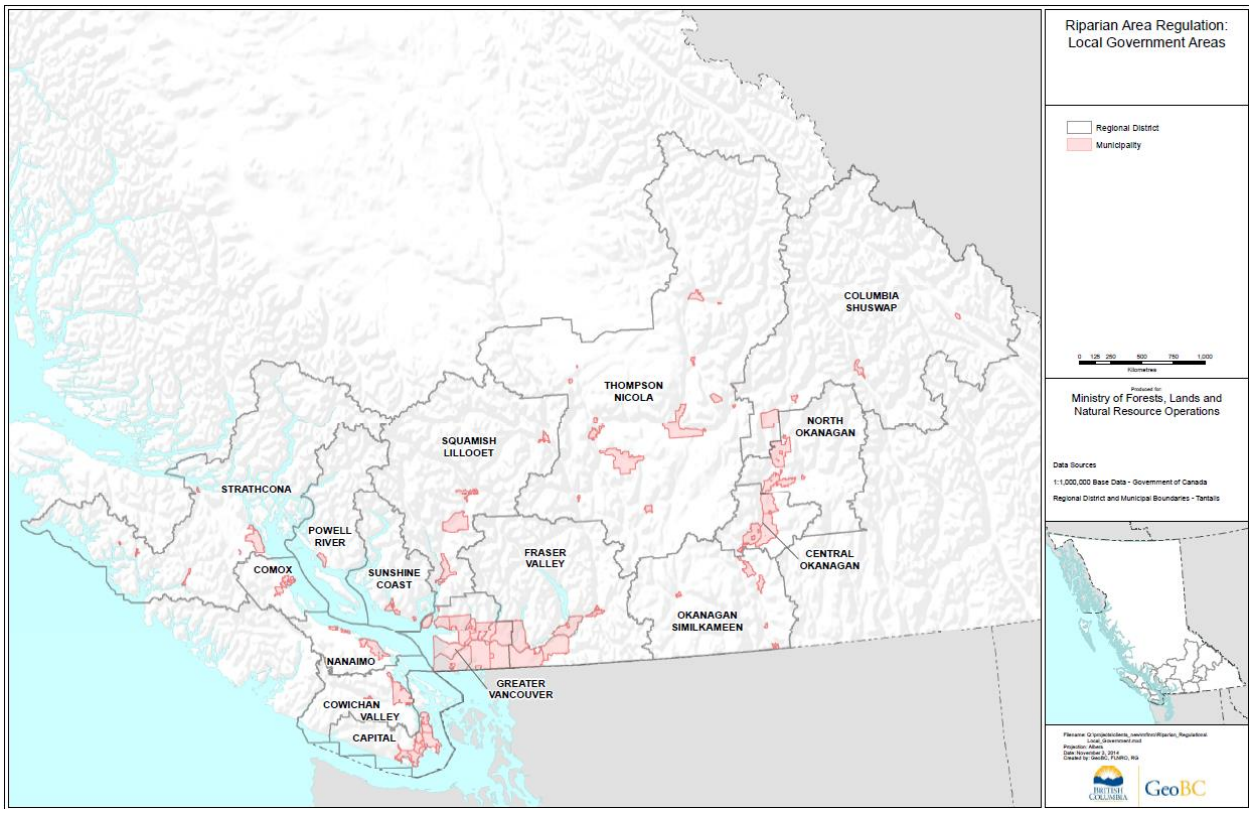

Figure 3.1: Local governments implementing Riparian Area Regulations in BC (From Ministry of Forests, Lands and Natural Resource Operations. 2015)

The QEP must complete an Assessment Report to assess the potential impact of a proposed development in a riparian assessment area. The RAR establishes an Assessment Methodology for the QEP to use in completing this report. Two assessment options are available to the proponent to determine an appropriate buffer width, referred to as a streamside protection and enhancement areas (SPEAs)[11]:

1. The Simple Assessment considers whether the stream is fish-bearing, the nature of stream flows (e.g. perennial or intermittent) and the status of streamside vegetation in determining the SPEA width. Buffers derived under the simple assessment typically range from a low of 16 feet (5 meters) for non-fish bearing streams with very narrow areas of existing or potential vegetation to 98 feet (30 meters) for fish bearing streams or non-fish bearing streams with at least 98 feet (30 meters) of existing or potential vegetation[12]. Figure 3.2 provides an example of the simple assessment methodology.

[11] SPEAs are "no disturbance" areas (i.e. no development activity of any kind is permitted within them)

[12] Existing or potential vegetation are areas with no permanent structures, which are structures and other improvements like roadways that were constructed in conformance with all appropriate legislation. If a division of the property is proposed or has the potential to be divided, the presence of a permanent structure only applies to the portion of the site where the structure is located.

Figure 3.2: Example of Riparian Area Regulation Simple Assessment Methodology (from Ministry of Forests, Lands and Natural Resource Operations n.d.).

2. The Detailed Assessment requires an evaluation of stream width, reach breaks, potential vegetation type and channel type and then applies formulas to determine the SPEA width and then an assessment of measures to protect the integrity of the SPEA[13]. The detailed assessment, which is scientifically derived, is based upon an assessment of five key features, functions, and conditions of the riparian area, with the SPEA being based on the largest needed buffer determined through this assessment process[14]. Table 2 provides a high-level overview of the assessment framework (Ministry of Forests, Lands and Natural Resource Operations, n.d.):

[13] The detailed assessment can (but not always) result in a smaller buffer width than would otherwise be determined through the simplified process.

[14] This assessment applies to streams. Under the detailed assessment method, ditches receive either a 6.5 foot (2 meter) or 32 feet (10 meters) SPEA depending on whether the ditch contains fish or not.

TABLE 2: OVERVIEW OF BUFFER REQUIREMENTS FROM RIPARIAN AREA REGULATION DETAILED ASSESSMENT METHODOLOGY

Feature, Function, or Condition	Buffer Ranges (Min – Max)	Description
Large woody debris	16 feet (5 meters) – 49 feet (15 meters)	Buffer range is dependent on potential vegetation, based upon the capability of vegetation, with narrower buffers for areas with the potential for deciduous woody vegetation and wider buffers for areas with the potential for coniferous woody vegetation
Bank stability	16 feet (5 meters) – 98 feet (30 meters)	Buffer range is dependent on channel type (e.g. riffle-pool, cascade-pool, or step-pool), channel width, and potential vegetation
Channel migration	16 feet (5 meters) – 98 feet (30 meters)	Buffer range is dependent on channel type (e.g. riffle-pool, cascade-pool, or step-pool), channel width, and potential vegetation
Shade	16 feet (5 meters) – 98 feet (30 meters)	Buffer range is dependent on potential vegetation, based upon the capability of vegetation, with narrower buffers for areas with the potential for deciduous woody vegetation and wider buffers for areas with the potential for coniferous woody vegetation
Litter fall and insect drop	16 feet (5 meters) – 49 feet (15 meters)	Buffer range is dependent on potential vegetation, based upon the capability of vegetation, with narrower buffers for areas with the potential for low, non-woody vegetation and wider buffers for areas with the potential for woody vegetation

The buffers must be located on the ground by the QEP and surveyed and are applied to the top of stream banks, the top of a ditch bank, the outer edge of wetlands, and the high water mark for lakes.[15] A plan for preventing erosion and sedimentation of the buffer area is required, and the QEP is responsible for monitoring its installation, effectiveness and maintenance during construction. The QEP also provides recommendations for protective fencing of the buffer area, depending upon the severity of encroachment anticipated.

The Ministry of Forests, Lands and Natural Resource Operations has a limited oversight role in reviewing QEP reports, as it cannot compel a QEP to modify an Assessment Report.

[15] The RAR Assessment Framework contains methodology for determining the location of the top of stream banks, the top of a ditch bank, the outer edge of wetlands, and the high water mark for lakes

Since development is administered by local municipalities, under the RAR local governments are responsible for adopting some type of regulatory tool that would ensure that the RAR requirements are triggered when a development review is considered. Further, before authorizing development local municipalities are responsible for ensuring that either the QEP Assessment Reports has been submitted to the Ministry of Forests, Lands and Natural Resource Operations or that the proposed development has been authorized by Fisheries and Oceans Canada (DFO). Local governments have flexibility to choose how to implement the regulation. Implementation can be through a single bylaw or a combination, supported by municipal policies and other tools.

Local municipalities can choose to take a more active role, by adopting bylaws with equivalent or greater protections than the RAR. This provides more local jurisdiction oversight than the traditional RAR implementation approach, in which local governments are not consulted in establishing stream protection measures. Under this alternative approach, municipalities may choose to pre-establish SPEAs based upon existing characterizations of watercourses in their jurisdiction. This approach has been used in many southwest mainland communities who were planning under a Streamside Protection Regulation that predated the current RAR. The pre-determined SPEAs that are established are typically larger than those that would otherwise be determined by a QEP by using the Assessment Methods provided for in the RAR. As a result, in this situation the local municipality would play a greater role in protecting the riparian area, because the City would have the primary authority outside of the setback determined through the RAR assessment methodology (see Figure 3.3).

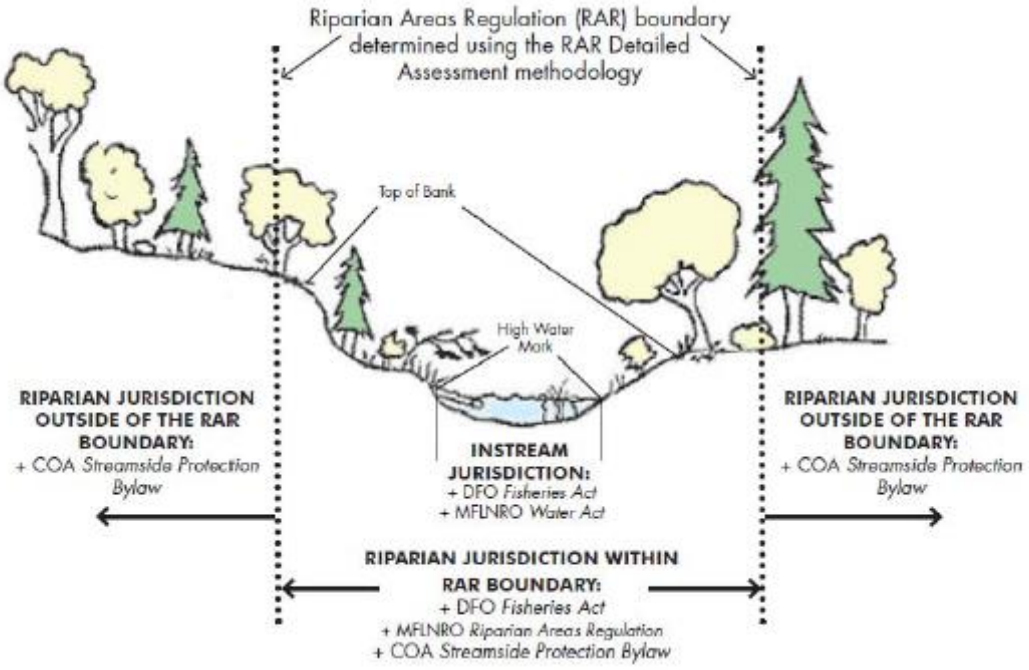

Figure 3.3: Jurisdiction over Streamside Protection and Enhancement Areas (From City of Abbotsford 2015)

The local government may elect to include provisions that allow the proponent to seek a variance from the pre-established SPEA, or to submit assessment information from a QEP where information on the watercourse was limited and no pre-determined SPEA was present (Ministry of Forests, Lands and

Natural Resource Operations 2015). In this case, the SPEA may then reflect the width as determined by the QEP through the RAR Assessment methodology. In situations where the SPEA is based upon a RAR detailed assessment, pursuant to the British Columbia's Court of Appeal decision in *Yankee v. Salmon Arm*, there is no legal foundation for local governments to modify the SPEAs defined in an assessment report prepared by QEPs. Therefore, the appropriate buffer width reverts to the recommendation of the QEP.

Riparian buffers are also incorporated, in a more limited application, into management of agricultural activities. For example, the Agricultural Waste Control Regulation, which is currently a Code of Practice under the Environmental Management Act, establishes setbacks from agricultural activities that may result in waste entering streams if otherwise not controlled. As a Code of Practice, there is no permit authorization required to discharge agricultural wastes into the environment, but the provisions are legally enforceable. The specified setback widths are determined based upon the risk for causing pollution. High risk-facilities, like solid agricultural waste field storages with greater than two weeks storage, confined livestock areas with greater than ten agricultural units, and seasonal feeding areas, are required to be setback 30 meters (98 feet) from watercourses. Those activities with a slightly lower risk, such as agricultural waste storage facilities (e.g., engineered manure pits); chemical, compost and wood waste storages; on-farm growing media production facilities; mushroom barns; confined livestock areas with less than ten agricultural units; silos; incinerators; and petroleum storages must be setback a minimum distance of 15 meters (49 feet) from any watercourse. Lower risk facilities located near channelized streams may require less setback.

A guide to bylaw development has been developed by Ministry of Agriculture for agricultural buildings (Ministry of Agriculture 2015a). As a guideline, these provisions are not enforceable unless otherwise adopted into a local bylaw or other regulation, but they do provide guidance to agricultural operators on how to avoid activities that may be regulated under more generic prohibitions against introduction of pollutants into the environment. In other words, though buffers and setbacks may not be legislatively required for certain activities, they may be incorporated into farm operations as a means of complying with other legislation addressing pollution control.

In-Water Work

Both the Federal Fisheries Act and the Provincial Water Sustainability Act address in-water work, meaning work that occurs more directly in the stream channel, rather than on the upland riparian area. Under the regulations adopted under the Water Sustainability Act, some specified stream works do not require prior approval, such as stream culvert installation stream culvert; construction of a clear span bridge crossing; bank stabilization by planting vegetation and seeding with native grasses; and hand cutting of aquatic vegetation below the waterline. These activities may also be exempt from Federal Fisheries Act review, though culvert work without approval is typically limited to debris removal, repair and replacement, or removal. These activities typically have required standards that need to be met to ensure that the activities do not impair water quality, riparian habitat, and the rights of water licensed water users. Activities not specifically listed as exempt would require review and approval. This would include activities in the stream such as bank stabilization or repair through bio-engineered techniques, using rock or other 'hard' engineering techniques, machine mowing of grass vegetation along a stream; and removal of vegetation.

New provisions introduced under the Water Sustainability Act also prohibit introducing foreign matter, such as animal waste, fertilizers, pesticides, into a stream, a stream channel or an area adjacent to a stream and provides mechanisms to mitigate for unauthorized introductions.

Point and non-point source pollution control

At the federal level, the Fisheries Act addresses direct discharges of pollution that impact fisheries.

Non-point source pollution is generally focused at the provincial level. The Environmental Management Act addresses point and non-point pollution control. Under the Act, a person must not introduce waste into the environment in such a manner or quantity as to cause pollution. The Act and its implementing regulations have three tiers of activities:

- Schedule 1 - Contains industries and activities that are unique, complex, or have variable technology. Generally, a permit, approval, or registration under a regulation is required to authorize these discharges, as well as a detailed technical assessment as part of the approval application.
- Schedule 2 - Contains industries and activities that may be authorized by a Code of Practice. Registration under a code of practice is required to authorize these discharges; if there is not yet a code in place, then authorization may be provided by a regulation (if it exists), or by a site-specific permit or approval.
- Schedule 3 - Industries or activities not listed in either Schedule 1 or 2 do not require a formal authorization or registration to discharge waste to the environment; however, discharges must not cause pollution.

With respect to agricultural activities, dairy products industries (establishments, except home-based businesses, educational facilities and establishments of hobbyists or artisans, engaged in processing fluid milk or manufacturing other dairy products) do fall on the Schedule 1 list. Agricultural operations fall on the Schedule 2 list. A regulation has been established for Agricultural Operation, the Agricultural Waste Control Regulation; operators must meet the terms and conditions specified in the regulation in order to be exempt from the requirement to obtain a permit or approval.

The province and federal government conduct monitoring to of freshwater and marine water through numerous types of programs to determine if a particular water body has been impacted. The Province also establishes water quality guidelines for various parameters to protect aquatic life, wildlife, livestock and irrigation. The guidelines are science-based policy tools that describe conditions that should be met to protect the designated uses of freshwater, estuarine, and marine ecosystems. In certain circumstances, the Province will establish a more specific water quality objective. Water quality objectives have been established for water systems within the lower mainland, including the Fraser River Basin, principally focused on the Fraser River main stem and its main tributaries.

Other regulatory approaches

Since many threatened or endangered species rely upon riparian and wetland areas for their habitat, regulations addressing endangered species must also be considered. Protection of endangered species during development largely falls to the provincial government, as the federal Species at Risk Act has limited authority outside of federally owned land. There is no singular legislation for protection of endangered species at the provincial level; rather, it is addressed through several different pieces of

legislation, including the Wildlife Act and Water Sustainability Act. For instance, a species like the Red-legged frog whose habitat includes wetlands and moist forested sites, is protected under the B.C. Wildlife Act and is a species of Identified Wildlife. Modifications to frog habitat may require authorization under the Water Sustainability Act and/or Riparian Areas Regulation, depending upon the extent of the proposed activity.

Endangered species protection guidelines can be operationalized during development activities by local governments. For example, the City of Abbotsford requires development proponents to demonstrate they have addressed wildlife/species-at-risk requirements and expectations of federal and provincial governments (City of Abbotsford 2014). This can be accomplished in several ways: through submitting approvals or correspondence with authorized staff or by submitting an analysis from a qualified environmental professional. Protection measures could include creating buffer areas adjacent to watercourses and otherwise locating development to avoid disturbance to critical habitat, as well as timing restrictions, and construction best management practices like erosion and sedimentation control and protective fencing.

Local jurisdictions may also have bylaws or other mechanisms in place for stormwater management, clearing and grading, tree removal, and other zoning or bylaw provisions.

Subsidy and Market Approaches

In 2014, then Prime Minister Stephan Harper, released the federal government's first ever National Conservation Plan. The Plan contains investments over five years to secure ecologically-sensitive lands, support voluntary conservation and restoration actions, and strengthen marine and coastal conservation. In addition, it contains new initiatives designed to restore wetlands. Funds from this Plan have gone to support the Habitat Stewardship program, which funds restoration projects addressing species at risk and other species, as well as other programs.

British Columbia has generally limited subsidy and market approaches that could be used to conserve and preserve riparian and wetland areas. The City of Vancouver has a transfer of density policy in place, but this has been focused on preservation of heritage properties. There is a new initiative to explore an ecosystem services initiative. For example, a pilot project has been initiated by the Langley Sustainable Agricultural Foundation in the Township of Langley that will provide financial payments to farmers to enhance their stewardship practices (Langley Sustainable Agricultural Foundation 2016).

Voluntary Approaches and Education and Information-Based Strategies

The federal and provincial governments both support a number of programs and initiatives to promote conservation and preservation efforts. Financial support from such federally supported programs as EcoAction and the Habitat Stewardship Program for Species at Risk provides financial support to community-based, non-profit organizations for restoration and education projects (Government of Canada 2007; Government of Canada 2003). Financial support also comes from provincial sources, including the Living Rivers Trust, a $21 million fund created by the BC government, and the Habitat Conservation Trust Foundation, which receives on-going financial support from the purchase of hunting and fishing licenses (Ministry of Agriculture 2015c).

In addition, the Environmental Farm Plan (EFP) Program operated by the BC Agricultural Research and Development Corporation supports farm operations to complete agri-environmental risk assessments. Under this program, a qualified planning advisor works with qualified farmers to complete a Farm Plan Assessment that outlines recommended actions to improve farm operations.

There are also guides that have been produced to assist landowners and developers, such as the Develop with Care guidelines for urban and rural development in British Columbia (Ministry of Environment 2016a).

There are also active community stewardship programs, such as "Stream Teams." These programs enlist volunteers to help address water quality and habitat issues. Volunteers may work on monitoring, eradicating noxious weeds, planting vegetation, salmon habitat improvements, etc.

Collaborative Governance

There are currently a broad range of different organizations working on water and watershed-related issues; these organizations often have different roles and work at different scales. In the early to mid-1990s, funding was available through both the Federal and Provincial Governments to assist stewardship organizations with their mandates. Funding support has continued through such programs as the Living Rivers Trust, which funds projects to improve watershed governance, fisheries management, habitat,

and public engagement in watershed stewardship, as well as the Habitat Conservation Trust Foundation, which invests in projects that maintain and enhance the health and biological diversity of British Columbia's fish, wildlife, and habitats. There are currently a broad range of different organizations working on water and watershed-related issues; these organizations often have different roles and work at different scales. Other trends have also been a driver toward collaborative watershed governance throughout British Columbia, including decreasing capacity of government, emerging role of First Nations, and population growth and environmental stressors (Fraser Basin Council 2015).

The new Water Sustainability Act has provisions for the development of Water Sustainability Plans, which are generally focused on surface and ground water, as well as water quantity and use. The new Act allows the development of these plans to be delegated to other groups. This may open the door to further establishment of collaborative watershed planning processes.

Critiques and Concerns about Current Protection Approach

Concerns have been expressed about the ability of the current protection approach to adequately protect riparian areas. More generally, there are concerns that are typical of many command-and-control approaches: that there is divided responsibility for managing the system, and that the management is framed in response to policies and laws that otherwise address resource extraction or economic development, and are therefore less focused on resource stewardship (Brandes et al. 2014).

More specifically, there has been concern expressed over the declining federal involvement in fisheries management. In 2013, substantive amendments to the Canadian Fisheries Act were implemented (Hutchings 2014). Previously, the Fisheries Act prohibited activities that would cause harmful alteration, disruption, or destruction of fish habitat (HADD), but the revisions changed this to instead focus on prohibited activities that cause serious harm to fish habitat and fish — but only if they are part of a commercial, recreational or aboriginal fishery. Further, the definition of harm was narrowed to the death of fish or any permanent alteration or destruction of fish habitat. As reported by Pynn in his series on stream protection, "The new legislation raises legal confusion over what constitutes serious harm, permanent alteration, and the fish deemed to support a fishery" (Pynn 2014b). The destruction of fish habitat has to be of a spatial scale, duration, or intensity that fish can no longer rely upon such habitats for use as spawning grounds, or as nursery, rearing, or food supply areas, or as a migration corridor, or any other area in order to carry out one or more of their life processes (Hutchings 2014). In addition, DFO has new policies that allow proponents of some projects to self-assess compliance with the Act without DFO review. There is concern that this will lead to cumulative impacts, and that impacts will be overlooked because site specific reviews are not completed.

With respect to the RAR, these concerns prompted an Ombudsperson examination of the RAR in 2014; the Ombudsperson is an independent agency with the mandate to hold government accountable for its stewardship of public resources. The results of the Ombudsperson review outlined 25 recommendations for regulatory and implementation changes, organized into four broad categories: Regulatory Authority, Oversight of the Professional Reliance Model, Oversight of Reports and Development, and Public Information, Access and Complaints (British Columbia and Office of the Ombudsperson 2014).

The report raised several significant concerns with respect to the implementation of the RAR, including:

- Lack of oversight and authority to ensure local governments implement the RAR;

- Lack of oversight of completed Assessment Reports;
- Lack of government authority and ability to compel revisions to assessment reports and/or serve in a gatekeeper capacity;
- Lack of proper oversight to ensure that QEPs have proper knowledge, training, or professional credentials and are held to a professional code of conduct;
- Lack of clarity and guidance in using assessment methods set out in the RAR; and
- Lack of compliance monitoring.

In addition, the report highlighted the need for an overall review of the RAR's effectiveness, noting that "It is essential that the government assess whether this environmental protection program is achieving its stated goals of protecting and enhancing riparian areas and fish habitat" (p. 103). At this time, no coordinated review of effectiveness is being conducted, though the Ministry of Forests, Lands and Natural Resource Operations is exploring mechanisms to assess environmental impacts on a watershed scale, and has requested bids for development of a comprehensive evaluation framework for the RAR (Ministry of Forests, Lands and Natural Resource Operations 2016).

The Ministry of Forests, Lands and Natural Resource Operations has accepted 24 of the recommendations and is moving forward with a number of initiatives in response to this report. For example, the Ministry is now reviewing all Assessment Reports and undertook a review of local government implementation of RAR (Ministry of Forests, Lands and Natural Resource Operations 2015). This report found that an overwhelming majority of jurisdictions taking steps to implement the RAR, with many having some mechanism in place to implement the RAR. Despite this, there remain concerns that there were sometimes unclear, conflicting or incomplete language within these bylaws and policies that impacted their effective implementation. Implementation was also impacted by varying degrees of resources at local jurisdictions; many jurisdictions lacked capacity and resources to implement the RAR. One significant issue was raised by local government feedback during the compliance review: enforcement of RAR standards. The RAR lacks enforcement capabilities for ministry staff, and many local jurisdictions lack the resources and capacity to enforce these provisions.

In other venues, there has been concern expressed about the use of the professional reliance model (West Coast Environmental Law 2005; Gage 2013; Haddock 2015). As reported by Haddock (2015), the professional reliance model was intended to respond to industry complaints that the previous regime was too costly, bureaucratic and restrictive, as well as meet the provincial government's desire to cut costs and the size of the civil service. A review of professional reliance models used in British Columbia by the Environmental Law Centre at the University of Victoria concluded that "…much of BC's deregulation goes too far in handing over what are essentially matters of public interest to those employed by industry. Proponents should not be decision makers for matters involving the weighing and balancing of multiple, often competing, environmental and societal values" (Haddock 2015, p. 10). Of the 27 regulatory regimes reviewed, the RAR under the Fish Protection Act were rated more poorly than others. Several specific concerns were identified, including: expert shopping, in which case consultants may feel pressured to deliver results in line with their client's expectations or where multiple consultants may be engaged by a proponent in order to find a consultant that will provide a recommendation in line with the proponent's plans; lack of clarity and overly broad allowances in defining professional qualifications; lack of government oversight/quality control and ability to compel revisions to assessment reports and/or serve in a gatekeeper capacity; and lack of monitoring to ensure compliance.

With respect to agricultural uses, the Ministry of the Environment has been working over several years to update the Agricultural Waste Control Regulations (AWCR) that date back to 1992 (Ministry of Environment 2015 and 2016b). The revisions are being pursued to address cumulative impacts from agricultural related activities, including higher nitrates in groundwater, and nutrient and pathogens in surface waters. As part of the consultation process for development of revised regulations, the Ministry of Environment invited comments on the effectiveness of British Columbia's current agricultural management policies and regulations. Most commonly, respondents commented that enforcement is the most significant regulatory gap (C. Rankin & Associates 2015). Related comments included: "there needs to be rules, not guidelines to follow"; "there is no enforcement… until after damage has been done"; and "there doesn't appear to be
enforcement of regulations" (C. Rankin & Associates 2015 p. 2). Several respondents pointed to contradictions or overlaps in regulations and policies related to agricultural operations. For example, respondents comments included: "the Farm Practices Protection Act… allows farmers to 'side step' the [current AWCR] regulation"; and "the AWCR is just one of many regulations pursuant to different Acts [relevant to] farming waste, result[ing] in cross-regulatory confusion to a level beyond the capacity/authority for regulatory line staff to decipher, or those in farming practice to take an interest… there is a dire need to streamline for clarity, reduced confusion, ease of interpretation and the promotion of compliance for the sake of the environment, health, and well-being".

Critiques of the current AWCR is that is focuses on pollution prevention rather than on protection of the environmental and human health; this limits the ability of the regulations to protect habitat and creates confusion, as different parties may disagree over what constitutes pollution. Because there is no permitting process, the regulation is also perceived as being reactive to sources of pollution. There have also been changes in practices that may be inadvertently increasing pollutant load. For instance, agricultural operators may be able to access agricultural waste from other operators, like poultry farms, that no longer have space to accommodate waste storage. These nutrients are then added to the base nutrients that have historically been used, creating conditions in which excess nutrients may runoff and enter surface waters (Confidential Interview 2016).

In drafting new regulations, several themes were raised: 1) the need for clear requirements, 2) the need for education, and 3) the need for a management system that is enforceable and measurable. Generally, the consultation revealed support for the Ministry's goals in updating the AWCR, as follows:

- Enhance and improve water and air quality by ensuring that good agricultural practices are followed.
- Provide regulatory certainty – through clear requirements and guidance on desired environmental outcomes.
- Facilitate appropriate and beneficial use of manure, agricultural byproducts and other nutrient sources.
- Ensure that manure, other nutrient sources and materials are stored and used so that watercourses and groundwater are protected

The Ministry of Environment has proposed that the updated AWCR be based upon a risk-based framework, where farmers would be responsible for completing a self-administered environmental risk assessment to evaluate any special environmental features specific to the farm location (e.g. location atop or near vulnerable aquifers, drinking water sources, watercourses, sensitive receiving environments, wetlands), as well as specific climate and weather conditions, and the type of framing operations or activities. These factors will be used to assess potential risk areas (e.g. vulnerable

aquifer), risk conditions (e.g. intense rainfall) and risk operations to determine the appropriate level of protection.

OVERVIEW OF WASHINGTON STATE PROTECTION MEASURES[16]

Federal, state, and local governments all have authority to regulate streams and wetlands, resulting in multiple, overlapping regulations and agency oversight. For example, local jurisdictions (Counties and Cities) are the primary managers of urban and rural development along streams and wetlands, but the state and federal government also have a role in reviewing development activities within streams and wetlands. Water quality management, assessment and monitoring is largely delegated to the State's Department of Ecology, with federal oversight. However, water quality compliance with respect to some agricultural activities (e.g. dairy operators) has been delegated to the Washington Department of Agriculture. Finally, unlike Canada, the United States has a coordinated Coastal Management Act that applies to streams of a certain flow as well as wetlands associated with the shoreline. Table 3, together with the information below, provides an overview of some of the key federal and state laws and regulations that affect riparian and wetland areas.

Regulatory Approaches

Table 3 provides a high-level overview of key regulations in British Columbia that are used in managing riparian and wetland areas.

[16] For a deeper analysis of Washington State Environmental Policy, please refer to Braddock 2015.

TABLE 3: OVERVIEW OF KEY LAWS AND REGULATIONS ADDRESSING PROTECTION OF RIPARIAN AND WETLAND AREAS IN WA[17],[18]

Legislation	Purpose	Implementing Agency/Organization
	Federal	
Clean Water Act	Restore and maintain the chemical, physical, and biological integrity of the Nation's waters	• Washington State Department of Ecology (Sections 301, 303, 319, 401) • Washington State Department of Agriculture (for inspections associated with Concentrated Animal Feeding Operations that require NPDES permit under the CWA) • Puget Sound Partnership (Section 320) • Army Corps of Engineers (Section 404) • Environmental Protection Agency (on federal lands)
Endangered Species Act	Protect and recover imperiled species and the ecosystems upon which they depend.	• U.S. Fish and Wildlife Service (marine wildlife such as whales and anadromous fish such as salmon) • Commerce Department's National Marine Fisheries Service (terrestrial and freshwater organisms)
Coastal Zone Management Act	Preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone	Washington State Department of Ecology
Federal Farm Bill/Food Security Act	Provides authorization for services and programs in support of Agricultural production	• Natural Resources Conservation Service • Farm Services Agency • Conservation Districts work collaboratively with agriculture operators to implement these programs

[17] There are other regulations that impact riparian and wetland areas that are not addressed in this evaluation, including the National Environmental Policy Act, the state Forest Practices Act, and other legislation passed addressing pesticide management and salmon recovery.
[18] See Appendix C for a more detailed table with information on the key laws and regulations.

State		
Water Pollution Control Act	Maintain the highest possible standards to insure the purity of all waters of the state…	Washington State Department of Ecology
Watershed Planning Act (Chapter 90.82 RCW)	Authorized local development of watershed plans for managing water resources and for protecting existing water rights, which was found by the Legislature to be vital to both state and local interests.	Watershed Resource Inventory Areas (WRIA)
Watershed Improvement Districts	Provide construction, improvement, maintenance, and operation of irrigation systems	Watershed Improvement Districts (WIDs) Note: Bill pending in 2016 legislative session to enable WIDs to receive funds for watershed management actions from any eligible federal or state grant or loan program.
Growth Management Act	Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.	• Local municipalities • Washington State Department of Ecology
Shoreline Management Act	Prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.	Local municipalities Washington State Department of Ecology
State Environmental Policy Act	Provide information to agencies, applicants, and the public to encourage the development of environmentally sound proposals	• Lead agency (with many local land use decisions, this is the local municipality) • Washington State Department of Ecology
Dairy Nutrient Management Act	Establish a clear and understandable process that provides for the proper and effective management of dairy nutrients that affect the quality of surface or ground waters in the state of Washington	Washington State Department of Agriculture
Hydraulic Code	Protects fish life by managing activities in state waters	Washington State Department of Fish and Wildlife

Regulatory riparian buffers

Under Washington State's Growth Management Act (GMA) (RCW 36.70A.06 0), all cities and counties are required to adopt critical areas regulations. Wetlands[19] and "Fish and wildlife habitat conservation areas"[20] (FWHCAs) are two of five "critical areas" defined under the GMA. As defined in WAC 365 - 190 - 130, FWHCAs are land management tools for the cities and counties to use for maintaining fish and wildlife populations in suitable habitats within their native geographic distribution. Under WAC 365 - 190 - 130, FWHCAs are intended as a long - term approach to supporting viable populations and preventing the creation of isolated subpopulations.

Under the establishment of the GMA's critical areas and the FWHCAs, cities and counties adopt critical areas ordinances (CAO). Because each community may assess the values of the critical areas in their local environment differently, there can be variation in the provisions contained within each jurisdiction's CAO. However, there are generally several key provisions that are common amongst CAOs: 1) it establishes which waterbodies are to be managed under the regulation; 2) it establishes which development activities require review (and which do not); 3) it requires a mechanism by which development proposed in FWHCAs triggers a review to protect the critical areas from development activity; 4) it establishes buffer standards that must be maintained for development; and 5) it provides mechanisms to vary the minimum buffer standards, particularly in those cases needed to avoid a constitutional taking of property (Washington State Department of Community, Trade and Economic Development 2007).

If a proposed development activity is within, adjacent to, or is likely to impact a critical area, the city or county would apply the provisions of its CAO to review the activity. The CAO ordinance would typically require a critical area report from the applicant, prepared by a qualified professional[21] to evaluate the development activity. The municipality may have in-house staff to do this work, or may require an independent 3rd party qualified professional to review the critical area report on behalf of the municipality, to ensure compliance with the local standards.

CAOs generally include a list of exemptions for developing activities that are considered to be minor in scope. These exemptions allow the development to occur without local municipality review, sometimes subject to the incorporation of best management practices. Examples of exempt activities include operation, maintenance, or repair of existing structures and improvements and passive outdoor activities (Washington State Department of Community, Trade and Economic Development 2007).

---

[19] Wetlands are defined as 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 non-wetland sites, 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. However, wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate conversion of wetlands, if permitted by the county or city.

[20] "Fish and wildlife habitat conservation areas" does not include such artificial features or constructs as irrigation delivery systems, irrigation infrastructure, irrigation canals, or drainage ditches that lie within the boundaries of, and are maintained by, a port district or an irrigation district or company.

[21] The definition of a qualified professional can vary between jurisdictions, but it should be clear that a qualified professional is one with expertise from training and experience. For some professions, licensing is required.

Unlike the system in British Columbia, the provisions apply to agricultural activities, except in Counties that have opted in to a newly designed Voluntary Stewardship Program (Washington State Conservation Commission 2016). Instead of updating regulations addressing agricultural uses in their CAO, Counties may instead opt to engage in a watershed-based, collaborative stewardship planning process that uses incentives to promote agricultural and environmental stewardship. Counties participating in the program are eligible for funding for base stewardship program operations and may nominate specific watersheds as priority watersheds for additional incentives and project funding. Counties not participating in the program must ensure that agricultural activities are addressed in their CAO.

The functions of wetlands and streams are typically protected with fixed-width buffers, the width of which is established using best available science[22]. For streams, the buffer zones around riparian areas should be used to protect population species, their habitat, and separate incompatible land uses from the FWHAs (WAC 365 - 190 - 130). The buffer width for streams is based on a stream typing classification system. Stream typing and classification allows some flexibility in the appropriate level of protection necessary to maintain specific functions and processes of a stream depending on whether it is used by fish, and whether or not the stream experiences perennial or seasonal flow. For instance, intermittent streams without fish present require less restrictive buffer widths. Alternatively, fish-bearing require a larger, more restrictive buffer width to ensure stream health (Washington State Department of Community, Trade and Economic Development 2007). Under a model ordinance developed by Washington State (Washington State Department of Community, Trade and Economic Development 2007), recommended buffer standards were established as outlined in Table 4.

TABLE 4: OVERVIEW OF WASHINGTON STATE MODEL ORDINANCE BUFFER REQUIREMENTS FOR FISH AND WILDLIFE HABITAT CONSERVATION AREAS[23]

Stream Classification	Description	Buffer Standard (feet/meters)
Type S	Designated "shorelines of the state" as defined in chapter 90.58.030 RCW	250 feet (76 meters)
Type F	Known to be used by fish, or meet the physical criteria to be potentially used by fish. Fish streams may or may not have flowing water all year; they may be perennial or seasonal.	150 feet (45 meters) to 200 feet (61 meters) depending on stream width

[22] RCW 36.70A.172 (1) requires cities and counties to "include the best available science" when drafting policies and development regulations. In meeting this requirement, communities may refer to compilations of scientific information to locate locally appropriate science. The State has produced one such source in 2002: *Citations of Recommended Sources of Best Available Science for Designating and Protecting Critical Areas*. Many counties and cities have also compiled similar sources of scientific information, which may be applicable within a specific geographic area. If a community wishes to adopt standards that are different from those indicated by the best available science, it needs to document the reason for this deviation in accordance with WAC 365 - 195 - 915. It also needs to describe how it will protect the functions and values of these critical areas, which may include the need for ongoing monitoring and adaptive management.

[23] These buffer widths are consistent with National Oceanic and Atmospheric Agency's (NOAA) 2008 Biological Opinion (BiOp) for the National Flood Insurance Program (NFIP) as carried out in Puget Sound, which was based on Knutson and Naef (1997) literature review and synthesis of scientific literature related to riparian management. These wider buffer widths have not been included in jurisdictional regulations up to this point.

Stream Classification	Description	Buffer Standard (feet/meters)
Type NP	Flow year round and may have spatially intermittent dry reaches downstream of perennial flow. Type Np streams do not meet the physical criteria of a Type F stream.	150 feet (45 meters) to 225 feet (69 meters) depending on bank stability
Type NS	Do not have surface flow during at least some portion of the year, and do not meet the physical criteria of a Type F stream.	150 feet (45 meters) to 225 feet (69 meters) depending on bank stability

A city or county may choose to allow these buffers to be averaged, provided that it does not reduce the stream or habitat functions, adversely impact salmonid habitat, and provide additional protection, such as improved buffer functions. Generally, there is a minimum buffer width that must be retained in a buffer averaging process (e.g. The buffer area width is not reduced by more than twenty-five percent (25%) in any location). In addition, a city or county may choose to allow buffers to be reduced, in exchange for buffer enhancement, provided that it does not reduce the stream or habitat functions, adversely impact salmonid habitat, and provide additional protection, such as improved buffer functions. Similar to buffer averaging, there is a minimum buffer width that must be retained.

For wetlands, cities and counties are required to use a rating system that evaluates the existing wetland functions and values to determine what functions must be protected. Under the model ordinance developed by Washington State, recommended buffer standards were established as outlined in Table 5.

TABLE 5: OVERVIEW OF WASHINGTON STATE MODEL ORDINANCE BUFFER REQUIREMENTS FOR WETLANDS

Wetland Type	Description	Adjoining Land Use Intensity	Buffer Standard
Category I	Habitat for federal or state listed endangered or threatened fish, animal, or plant species; or otherwise high quality or rare wetland community	High Intensity	300 feet (91 meters)
		Moderate Intensity	250 feet (76 meters)
		Low Intensity	200 feet (61 meters)
Category II	Habitat for state listed sensitive fish, animal, or plant species; or wetlands of local significance or certain point score in habitat rating system	High Intensity	200 feet (61 meters)
		Moderate Intensity	150 feet (45 meters)
		Low Intensity	100 feet (30.5 meters)
Category III	Do not satisfy criteria for Category I or II wetland, but have certain point score in habitat rating system	High Intensity	100 feet (30.5 meters)
		Moderate Intensity	75 feet (23 meters)
		Low Intensity	50 feet (15 meters)
Category IV	Hydrologically isolated wetlands	High Intensity	50 feet (15 meters)
		Moderate Intensity	35 feet (11 meters)
		Low Intensity	35 feet (11 meters)

Similar to streams, a city or county may choose to allow these buffers to be averaged, provided that it does not reduce the wetland functions and the total areas protected in the buffer is no less than the standard buffer. Generally, there is a minimum buffer width that must be retained in a buffer averaging process (e.g. the buffer width is not reduced to less than 75 percent (75%) of the standard width or thirty-five (35) feet. In addition, a city or county may choose to allow buffers to be reduced, in exchange for mitigation that "compensates" by replacing, enhancing or substituting wetlands, which can be comprised of a combination of restoration or wetland creation. The local jurisdiction typically applies preferences for the type of mitigation (e.g. the applicant must first try to restore wetlands on upland sites that were former wetlands, then creating wetlands on disturbed sites, then enhance degraded wetlands, etc.). There are also typically minimum mitigation ratios that are applied. Under the model ordinance developed by Washington State, recommended mitigation ratios were established as outlined in Table 6.

TABLE 6: OVERVIEW OF WASHINGTON STATE MODEL ORDINANCE BUFFER REQUIREMENTS FOR WETLAND MITIGATION RATIOS

Wetland Type	Mitigation Ratio	
	Wetland Creation (Acreage of replacement wetlands-to-acreage of wetlands altered by development)	**Wetland Enhancement** (Acreage of enhanced wetlands-to-acreage of wetlands altered by development)
Category I	6-to-1	
Category II	3-to-1	
Category III	2-to-1	6-to-1
Category IV	1.5-to-1	3-to-1

In addition, a city or county may authorize proponents to purchase credits from a certified wetland mitigation bank[24], provided that the proposed development is located within the receiving area established for the mitigation bank (Washington State Department of Ecology 2016g). Alternatively, a jurisdiction could opt to institute an In-Lieu Fee, which is a type of mitigation used to compensate for unavoidable impacts to wetlands. In this approach to mitigation, a permittee pays a fee to a third party instead of conducting project-specific mitigation or buying credits from a wetland mitigation bank.

For both wetlands and streams, there are typically provisions in place to ensure that all economically viable use of the property is not precluded by the provisions contained in the CAO, termed 'reasonable use'.

For proposed modifications to the standard buffer, the proponent's qualified professional typically needs to document that all reasonable efforts have been examined with the intent to avoid and minimize impacts to critical areas. Termed mitigation sequencing, applicants must first demonstrate an inability to avoid or reduce impacts, before restoration and compensation of impacts will be allowed.

[24] A wetland mitigation bank (bank) is a site where wetlands are restored, created, enhanced, or in exceptional circumstances, preserved, expressly for the purpose of providing compensatory mitigation in advance of unavoidable impacts to wetlands or other aquatic resources. Banks typically involve the consolidation of many small wetland mitigation projects into a larger, potentially more ecologically valuable site.

In addition to the CAO, under Washington State's Shoreline Management Act, cities and counties must also adopt Shoreline Management Plans (SMP) that address development near "shorelines of the state" including marine waters, certain streams and lakes, uplands within 200 feet of said waters, and some associated wetlands, deltas and floodplains. The Act is concerned with three main subjects: shoreline use (what types of uses are appropriate for a shoreline, based on its characteristics), environmental protection (mitigation of impacts allowed uses might have) and public access (provision of access to publicly owned areas). Jurisdictions must create a Shoreline Master Plan (SMP) that acts as a comprehensive plan for shoreline areas, defining what uses may be located in different shoreline zones, based on local conditions and circumstances. The local SMP is essentially a shoreline-specific combined comprehensive plan, zoning ordinance, and development permit system. It is also required to have a restoration plan. It addresses streams and wetlands that are considered shorelines of the state in several different ways:

- It requires that local governments demonstrate a standard of "no net loss" of shoreline ecological functions. The no net loss standard is designed to halt the introduction of new impacts to shoreline ecological functions resulting from new development. Both protection and restoration are needed to achieve no net loss.
- In terms of protection, local governments must put into place appropriate "zoning" to limit overall impacts within the watershed, as well as appropriate buffers and other standards to protect environmentally sensitive areas like streams and wetlands. Development must mitigate for impacts.
- Restoration is needed to address incremental, cumulative impacts associated with development. As a result, local governments must develop a local restoration plan to address these impacts.

The local SMPs must be approved by the Washington State Department of Ecology. Implementation of approved plans is largely conducted by local governments, with some State oversight and involvement in larger or more substantial project proposals.

This local protection and review of development activities in and near wetlands and streams is complimented by other agency staff at different levels of government. For example, for fill or grading activities that occur directly within the wetland, a US Army Corps approval of a Section 404 Permit is required, in addition to local permitting. The Corps has their own requirements for mitigation requirements (33 CFR Part 322) and other provisions. The Washington State Department of Ecology is also involved in wetland fill projects in their capacity administering Section 401 of the Clean Water Act.

In-Water Work

In-water work is addressed by several different levels of government: federal, state, and local (see Figure 3.4). Section 401 of the CWA requires issuing a Section 401 Water Quality Certification for activities that involve depositing fill or excavating in navigable waters or associated wetlands. The certification states that the project is consistent with federal discharge requirements and the aquatic protection requirement of state law. In Washington State, EPA has delegated its CWA authority to the Department of Ecology, including issuing NPDES permits and Section 401 Water Quality Certification and establishing TMDLs. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S., which include wetlands as well as navigable waterways. The Corps implements Section 404 of the CWA[25].

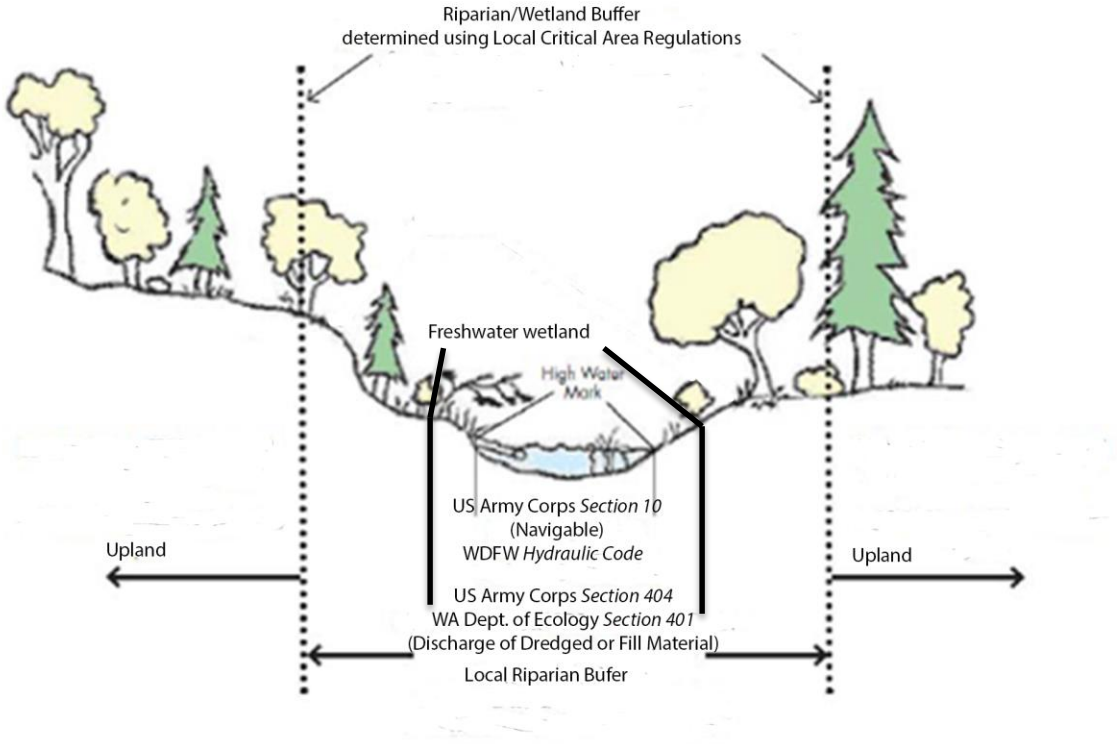

Figure 3.4: Jurisdiction over Fish and Habitat Conservation Areas (adapted from City of Abbotsford 2015)

In addition, the Washington State Department of Fish and Wildlife administers the Hydraulic Code, which requires a permit for "the construction or performance of work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or freshwater of the state." The construction permit issued by the department is called a Hydraulic Project Approval (HPA). The purpose of HPA is to protect fish life from construction and other work in or near the water. The HPA has conditions a permittee must follow that mitigate impacts to fish life caused by the project.

At the local level, work within wetlands and streams is regulated under the CAO and SMP, noted above.

[25] For navigable waters, the Rivers and Harbors Act would also apply. Since there are no navigable waters in study area, this is not discussed further.

Point and non-point source pollution control

The Clean Water Act addresses point and non-point source pollution control. Nonpoint source pollution is a significant threat, and within this category of pollutants, agriculture is a major source of nonpoint source pollution (Washington State Department of Ecology 2014). There are some regulatory programs in place to address specific aspects of agriculture.

First, operators of large livestock operations need to obtain permit approval to operate a Concentrated Animal Feeding Operation (CAFO) under the National Pollutant Discharge Elimination System (NPDES). Only the largest operations are regulated under this permit, but it provides guidance for best management practices that could be applied to other smaller operators.

Second, operators of cow dairies are required under State law to develop and implement nutrient management plans, register with Washington State Department of Agriculture, and participate in a program of regular inspections and compliance. The nutrient management plan (NMP) development process is completed by the dairy producer, in consultation with a local conservation district, the Natural Resources Conservation Service (NRCS), or a private planner. The NMP process includes an assessment of animal and nutrient inventory, surface and ground water risk(s), manure, and process waste water collection, conveyance and storage needs, crop production history, and land application acreage needs. The NMP process identifies the producer's goals, resource risk(s), and the selection of best management practices to be implemented, to protect the resource (Washington State Department of Ecology. 2014).

Other categories of NPS include abandoned mine drainage; forestry; hydromodification[26] and habitat alteration; marinas and boating; roads, highways, and bridges; urban areas; and wetland and riparian management (Washington State Department of Ecology 2014). Some of these categories also have specific regulatory programs designed to minimize NPS.

Beyond specifically establishing regulatory permitting standards and process for some NPS sources, the Clean Water Act also requires the Department of Ecology to develop total maximum daily loads (TMDLs) for state waters that have been declared polluted. The TMDL will:

- Assign a maximum allowable discharge from all the nonpoint sources (called a load allocation).
- Assign a maximum allowable discharge from all the point sources (those requiring NPDES permits). This process may require more stringent NPDES permit limits.
- Designate suites of best management practices (BMPs) for various land-use categories.
- Detail the actions needed to attain standards and return waters to good health.

TMDLs describe the type, amount and sources of water pollution in a particular water body; they analyze how much the pollution needs to be reduced or eliminated to meet water quality standards; and they provide targets and strategies to control the pollution.

For NPS, the Washington State Department of Ecology may use a number of techniques to reduce the pollution sources on individual properties by working with landowners and conservation districts to get

[26] This category of activity generally refers to modifications to the geomorphological channel structure that impair water quality or aquatic habitat.

water pollution best management practices and controls applied. As noted by Ecology, "To the greatest extent feasible, Ecology uses educational and incentive-based approaches to accomplish this task. However, enforcement is used to prevent and reduce sources when immediate action in required, or when pollution threatens the beneficial uses of that water" (Washington State Department of Ecology 2016c).

Other regulatory approaches

The Endangered Species Act also provides various mechanisms that protect listed species, including Section 9 which prohibits a taking of the species[27], and Section 7, which creates a general rule that instructs federal agencies to consult with the listing agency prior to engaging in an activity that may have potential impacts on a listed species[28]. In Washington, the Growth Management Act has attempted to integrate issues of salmon protection and recovery into its management of critical areas, requiring jurisdictions to "give special consideration to conservation and protection measures necessary to preserve or enhance anadromous fisheries." [RCW 36.70A.172 (1)]

Local jurisdictions may also have codes or other mechanisms in place for stormwater management, clearing and grading, tree removal, environmental review and other zoning provisions that address wetlands and streams.

Subsidy and Market Approaches

In Washington State, there are a number of different approaches that have been used to support riparian and wetland area protection and restoration, with programs available at the local, state, and federal level. The following are a sample of different mechanisms; a fuller picture of the variety of programs and agencies involved can be accessed through the Washington State Department of Ecology's Guide *Exploring Wetlands Stewardship: A Guide for Washington Landowners and Communities.*

Acquisition is one approach that has been used, with many different types of programs used throughout the Puget Sound area. For instance, several counties have established purchase or transfer of development rights programs. In return for compensation from the sale of development potential, a sending site landowner places a conservation easement on the property that permanently prohibits development of the land. The landowner retains ownership of the land and may continue to use it for other purposes, such as forestry or agriculture. Many counties in the State also have established Conservation Futures, which is a land preservation program that has been used for protection of habitat areas, including wetlands and streams. Conservation Futures funds, acquired through a property tax levy, are used to purchase the land or the rights to future development of the land. Counties can levy a property tax to pay for flood hazard reduction to water resource protection projects. These range from acquisition and restoration of wetlands and riparian systems to storm sewer systems.

[27] The term "take" includes injuring the endangered species as well as damage to its habitat (Laschever 2016).
[28] Common activities subject to Section 7 consultation include projects requiring federal permits, such as Army Corps of Engineers' dredge and fill permitting under Section 404 of the federal Clean Water Act, and projects receiving federal funds, such as road construction and transportation funding (Laschever 2016).

In addition, financial incentives have been used to facilitate protection and restoration efforts. These might include preferential tax incentives (such as Open Space Taxation) to encourage private landowners to preserve these resources. The Open Space Taxation Act, allows property owners to have their open space, farm and agricultural, and timberlands valued at their current use rather than their highest and best use. The act allows for property tax abatement for land designated as open space land in local comprehensive and zoned accordingly or otherwise meeting certain criteria.

With the listing of several salmon species under the Endangered Species Act, there has been significant financial resources devoted to supporting habitat restoration projects and acquisition projects to protect salmon habitat. For example, funding under the Salmon Recovery Funding Board has been awarded to different lead entities to purchase conservation easements or similar agreements; these are voluntary agreements between a landowner and private land conservation organization or a government agency. The landowner maintains ownership of the land, continues to manage it, and receives compensation, such as cash, reduced taxes, or other incentives, in exchange for limiting development on the land.

There are several incentive programs that have been specifically targeted toward encouraging environmentally responsible practices on agricultural operations. There are a variety of federal programs that compensate landowners for voluntarily protecting and enhancing certain critical areas functions. Some examples of federal programs that are available include:

- Conservation Reserve Enhancement Program (CREP) – CREP is a joint partnership between the state of Washington and U.S. Department of Agriculture that is administered by the Washington State Conservation Commission and the Farm Services Agency (FSA) to restore riparian habitat. Under the voluntary program, land enrolled in CREP is removed from production and grazing under ten- or 15-year contracts. In return for planting trees and shrubs to stabilize the stream bank and to provide a number of additional ecological functions, landowners receive payments to cover annual rent, incentive and maintenance payments, and cost share for practice installations. Payments can result in no cost to the landowner for participation.

- Conservation Reserve Program (CRP) – CRP provides technical and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. Funding from the Commodity Credit Corporation (CCC) provides assistance to farmers and ranchers in complying with federal, state, and tribal environmental laws, and encourages environmental enhancement.

- Environmental Quality Incentives Program (EQIP) – EQIP provides technical and financial assistance to eligible farmers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial manner. Contracts of up to ten years are made with eligible producers to implement one or more eligible conservation practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Incentive payments can be made to implement one or more land management practices.

The Environmental Protection Agency provides Section 319 grant funds to Washington State to support eligible nonpoint source pollution control projects. These can include incentives to support the use of agricultural best management practices, and as well as financial support to complete riparian and wetlands habitat restoration and enhancement projects.

There are also other funding programs that can provide financial assistance for restoration activities, including the Interagency Committee on Outdoor Recreation's Washington Wildlife and Recreation Program, and the Washington State Department of Natural Resources' Aquatic Land Enhancement Grants.

Voluntary Approaches and Education and Information-Based Strategies

Many municipalities, citizen groups, tribes and other entities also work with property owners to engage in non-compensatory restoration and enhancement projects. Many counties and larger cities have active community stewardship programs, such as "Stream Teams." These programs enlist volunteers to help address water quality and habitat issues. Volunteers may work on monitoring, eradicating noxious weeds, planting vegetation, salmon habitat improvements, etc.

Technical and financial assistance for landowners seeking to preserve soil and other natural resources is authorized by the federal government under provisions of the Food Security Act. Conservation Districts often serve in this capacity, working with landowners on a voluntary basis, providing incentive-based conservation help on private lands.

Numerous websites and guides have been produced to provide educational resources for residents on how to minimize the impact of their activities on stream and wetland health.

Collaborative Governance

Formalized, collaborative planning efforts in Washington State have been underway since the 1990s, focusing on different water-related issues, including water quantity and in-stream flows, salmon recovery, and agriculture-related watershed issues. There are several different legislative mechanisms in Washington State that foster collaborative planning on a watershed-level basis, including:

- Watershed plans developed under chapter 90.82 RCW;
- Salmon recovery plans developed under chapter 77.85 RCW;
- Watershed management elements of comprehensive land use plans developed under the GMA, chapter 36.70A RCW;
- Watershed management elements of SMPs developed under the shoreline management act, chapter 90.58 RCW;
- Nonpoint pollution action plans developed under the Puget Sound water quality management planning authorities of chapter 90.71 RCW and chapter 400-12 WAC;
- Other comprehensive management plans addressing watershed health at a WRIA level or sub-WRIA basin drainage level; and
- Coordinated water system plans under chapter 70.116 RCW and similar regional plans for water supply.

Critiques and Concerns about Current Protection Approach

Similar to British Columbia, concerns have been expressed about the ability of the current protection approach to adequately protect riparian areas and wetlands. A 2008 *Making Mitigation Work* report by the Washington State Department of Ecology highlighted several issues with the current regulatory approach to riparian and wetland areas. The report states: "Many mitigation projects continue to be poorly sited, poorly designed and implemented, and poorly maintained (if they are maintained at all),

and not enough attention has been devoted to monitoring, compliance, and adaptive management. As a result, ecological values and functions continue to be lost and the cumulative impact of many poor decisions (or failure to mitigate at all) is increasingly degrading watershed conditions, especially in developing areas" (Washington State Department of Ecology 2008b, p. 3).

Recommendations stemming from the report were focused on five key issues:

- Reinforcing the mitigation sequencing framework, in which impacts to highly valuable or difficult to replace resources should be avoided and minimized;
- Establishing an ecosystem or watershed-based approach to mitigation and land use planning, using tools like watershed characterization;
- Developing and implementing a wide variety of compensatory mitigation tools, like wetland mitigation banks;
- Developing more coordinated, predicable approaches to reviewing development projects and associated mitigation plans; and
- Use an adaptive management approach, continually evaluating outcomes and making adjustments as needed.

The State has made progress addressing some of the issues raised in the report. The State, with funding from the Environmental Protection Agency, has completed a watershed characterization of 19 watersheds within the Puget Sound, which provides a decision-support tool for land use planning, permitting, and restoration activities. These characterizations identify the most important areas, across the entire Sound and within each of the 19 WRIA, to protect and restore, and those areas more suitable for development (Washington State Department of Ecology 2016d and e). The State has published interagency wetland mitigation guidance (Washington State Department of Ecology 2016b) and has been working with parties to review and approve wetland mitigation bank sites. In addition, Ecology has developed a tool for calculating when a proposed wetland mitigation project adequately replaces the functions and values lost when wetlands are impacted. Improvements are also being made to the land use mapping conducted by NOAA in the Coastal Change Analysis Program (C-Cap) to more accurately map wetland status and trends, so that wetland loss can be evaluated over time (Washington State Department of Ecology 2016f).

Further, a recent review of salmon recovery efforts conducted by NOAA Fisheries identified on-going habitat loss and degradation as factors that impede recover of the Puget Sound Chinook salmon and steelhead (NOAA Fisheries 2011). The quality of salmon habitat is still declining, despite ongoing protection and recovery efforts. Habitat concerns remain with respect to water quantity, water quality, and freshwater riparian corridors. In their analysis, NOAA Fisheries expressed concerns about existing regulatory mechanisms, including:

- "Lack of reporting and tracking of enforcement for local regulations and permits[29].
- Funding/budget limitations at the local, state and federal level may further limit resources for enforcing regulations and providing critical monitoring data.
- Continued inadequacy of stormwater management and regulatory enforcement.

[29] A study by Lucchetti et al (2013) of King County's enforcement of local critical area regulations along Juanita Creek indicated that "…the current process works at the watershed scale to protect against environmental impacts of development while resulting in mostly small individual areas of noncompliant change, much of it potentially hazard tree removal that may not have needed permits" (p. 95).

- NMFS has not reviewed the majority of non-federal actions that have the potential to degrade habitat. Critical area ordinances, shoreline permitting, and conditional use permits are all under the purview of local and state regulatory agencies (non-federal actions)" (p. 27).

NOAA recommends strengthening regulatory mechanisms, as well as other recommendations on issues such as hatchery management, monitoring and evaluation activities, and other items. In conclusion of their analysis, NOAA states "We therefore conclude that the risk to the species' persistence because of habitat destruction or modification has not changed appreciably since the last status reviews" (NOAA Fisheries 2011, p. 24).

The Treaty Tribes of Puget Sound and the Coast have also been critical of protection efforts. In their paper, "Treaty Rights at Risk –Ongoing habitat loss, the decline of the salmon resource, and Recommendations for change" (Northwest Indian Fisheries Commission 2015a) the Tribes raise numerous concerns about the current habitat protection measures. The report states "Habitat loss and degradation are the biggest contributors to the decline of the salmon resource, yet the federal government's primary response is to restrict harvest" (p. 7). The report raises concern that the current management approaches are focused on maintaining a degraded status quo, rather than focusing on improvements that would contribute to the recovery of salmon. Further, the report is critical of mitigation for encroachment into critical areas like riparian zones and wetlands, because it fails to alleviate the impacts of development in sensitive areas. Moreover, the report is critical of the implementation and enforcement of existing environmental rules, including the State's Shoreline Management Program, federal Coastal Zone Management Act (and Coastal Zone Act Reauthorization Amendments that required coastal states to develop and implement nonpoint pollution control programs and restore coastal waters), federal Clean Water Act, federal Endangered Species Act, federal National Flood Insurance program, and federal registration of pesticides. Further, the report is critical of the alignment of federal funding sources to support recovery efforts, and raises concerns that despite significant investments, "recovery may not be realized because the rate of habitat loss continues to outpace restoration" (p. 21).

The 2014/2015 Action Agenda for Puget Sound, the region's near-term strategic plan for salmon recovery (Puget Sound Partnership 2014), has identified these criticisms and lays out several strategies in response, including:

- Identify and prioritize areas for protection, restoration, and best suitable for (low impact) development;
- Support local governments to adopt and implement plans, regulations, and policies consistent with protection and recovery targets, and incorporate climate change forecasts;
- Improve, strengthen, and streamline implementation and enforcement of laws, plans, regulations, and permits consistent with protection and recovery targets;
- Ensure full, effective compensatory mitigation for impacts that cannot be avoided.

Similar to British Columbia, concerns have been expressed about the agricultural management strategies. Large-scale animal feeding operations that confine large numbers of animals in a small area (CAFO) are required under the federal Clean Water Act to have National Pollutant Discharge Elimination System (NPDES) permits designed to protect water from the manure discharge from these facilities, yet many operational dairy farms are not covered under this program (Northwest Indian Fisheries Commission 2015b). Under the current framework, a permit is not required unless there is or was a documented discharge to surface waters, which can result in lack of clarity and does not prevent pollution (Washington State Department of Ecology 2015). Further, though Washington State

Department of Ecology has been delegated the administration of the State's NPDES permitting program, its CAFO permit expired in 2011. The update process has generated significant public comment, with concerns revealing a deep divide in perceptions about the need for this management technique. The Department of Ecology's summary of some of the comments received reveals this divide: "The proposed permit needlessly adds regulatory burdens for little or no environmental benefit. Others believe environmental protections in the proposed permit are inadequate and need to be made significantly more protective" (Howard 2016).

There are also concerns about the administration of the State's Dairy Nutrient Management Program, which requires all licensed dairies to develop and implement nutrient management plans. In 2003, management of the program was transferred from the Department of Ecology, the state's environmental protection agency, to the Department of Agriculture, the agency that chiefly supports the agricultural community. There was concern expressed at the time, with testimony against summarized as follows: "The dairy nutrient management program is a water quality program and should be managed by the Department of Ecology (DOE). The bill strips the dairy nutrient management program from the DOE, where it has been a great success. The WSDA is not well equipped to take over all aspects of this program. Transfer of federally delegated authority under the Clean Water Act may be problematic and will trigger an Endangered Species Act review" (Washington State House Committee on Agriculture and Natural Resources 2003).

Further, despite the fact that agriculture has been identified by the Environmental Protection Agency (2011) as a significant contributor to water quality impairment, the federal government has transferred authority to regulate agricultural waste to the States. Critics have raised concerns that state regulators are under significant political pressure that limits their ability to strictly enforce water pollution laws. As reported by InvestigateWest (2012), an employee of the Washington State Department of Ecology has acknowledged that "Unfortunately, having the authority to do it [enforce the Clean Water Act] doesn't mean, politically, that you always can…That makes a difference." There are concerns about reliance upon voluntary measures and best management practices, as those can be loosely enforced (McClure 2012).

CHAPTER FOUR: CASE STUDY COMPARISON OF BRITISH COLUMBIA/WASHINGTON STATE PROTECTION MEASURES

CASE STUDY OVERVIEW

The next section turns to comparatively examine the regulatory protection strategies and stewardship activities that exist in two transboundary watersheds located in British Columbia and Washington State. The Bertrand Creek and Fishtrap Creek watersheds provide an interesting context for research into transboundary watershed management. These are small transboundary watersheds located in the eastern portion of the Fraser Lowlands border region (see Figure 4.1).

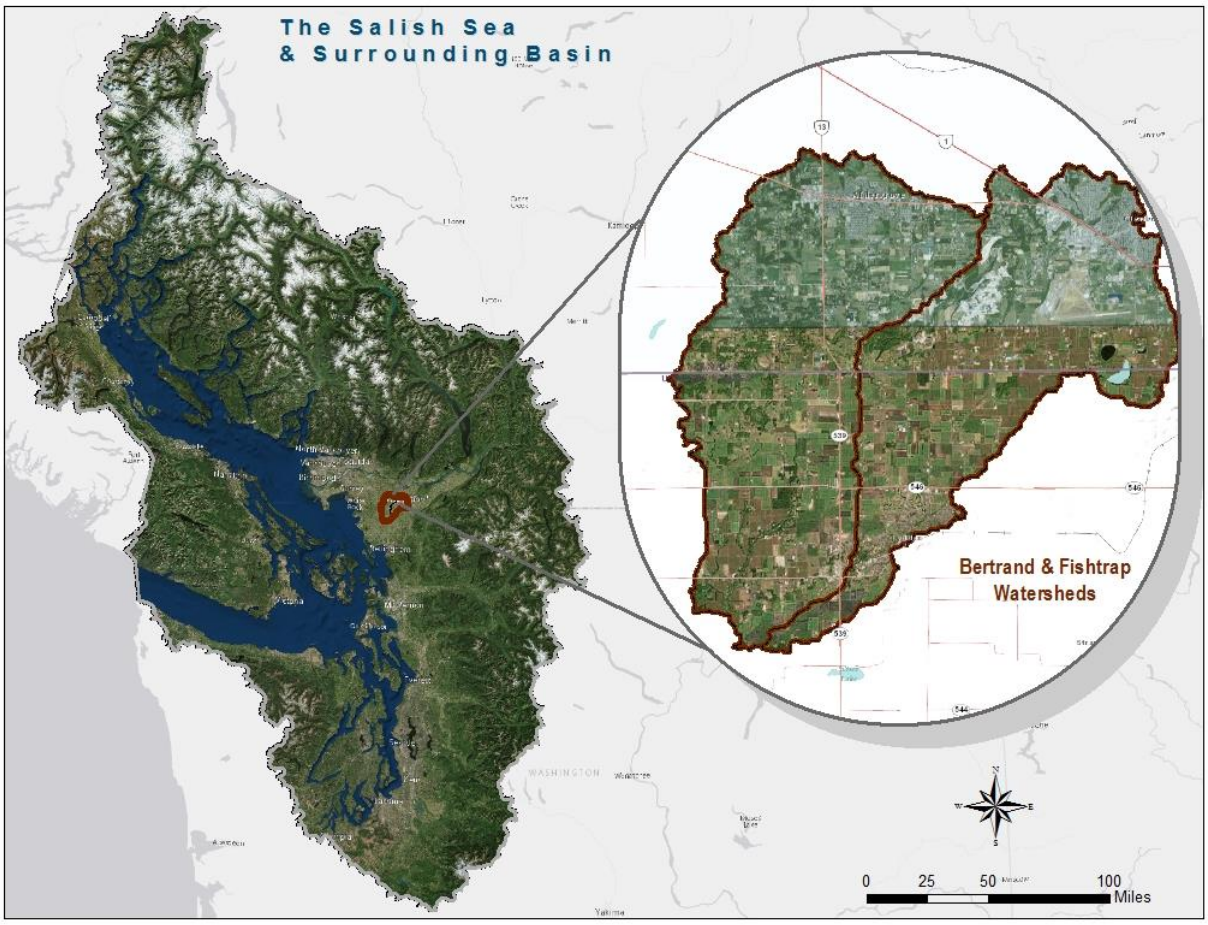

Figure 4.1: Map depicting the Study Area, which is comprised of the Bertrand and Fishtrap Creek Watersheds.

These small, transboundary watersheds were selected because they provide an opportunity to examine issues that relate back to the larger context of riparian and wetland protection and restoration in the Salish Sea region, yet on a smaller, more in-depth scale:

- The watersheds are bisected by an international border, providing an opportunity to examine parallel policies at the federal and state/provincial levels relating to riparian and wetland areas;

- The land within the watersheds are part of several different local governments, which each exercise local bylaw/zoning provisions that regulate development activities, providing an opportunity to examine the downscaling of environmental management to local levels that is occurring on both sides of the border;
- The watersheds are developed with agricultural and urbanized areas, representing two key upland uses that contribute to impacts to riparian and wetland areas;
- These watersheds are experiencing a number of 'downstream' water quality and quantity issues, with both sides of the border experiencing impacts from 'upstream' users in the watershed;
- The watersheds drain to the Salish Sea, and therefore at the larger scale all activities within the watershed contribute to the overall health of the transboundary Salish Sea; and
- There have been previous initiatives and studies conducted by the Border Policy Research and university students investigating water governance in these watersheds.

There are a number of transboundary water management issues within these subbasins, ranging from surface and ground water quality to water quantity and flooding. Activities within the watersheds are significant contributors of nutrients and pathogens that are impacting downstream shellfish operations in Portage Bay near Bellingham, WA.[30] Historic development practices, loss of wetlands, and stream hardening and reconfigurations have also resulted in flooding in the Fishtrap Creek watershed near the City of Lynden. The Sumas/Abbotsford Aquifer, over which Fishtrap Creek and its tributaries flow, has shown higher than allowable levels of nitrogen. Finally, development and water use is impacting the availability of water during the summer months, threatening instream water conditions to support fish populations.

The following section provides a comparative analysis of the regulatory and non-regulatory tools being used to address the riparian and wetland-related environmental issues. It also describes areas where there is transboundary collaboration on these issues.

Overview

Bertrand Creek and Fishtrap Creek watershed are approximately 79 square miles acres (204 sq. km) in size and drain southward to the Nooksack River, and ultimately drain to Bellingham Bay and the Salish Sea. The watersheds are bifurcated by an international border, as well as a number of separate jurisdictions, with approximately half of the area of the watersheds located on either side of the border. Portions of both watersheds extend into the Township of Langley and the City of Abbotsford in British Columbia, as well as Lynden and Whatcom County in Washington State (see Figure 4.2). The study area is located within the traditional territories of the Nooksack Indian Tribe, Lummi Nation, Stó:lō and Semiahmoo First Nations. The Nooksack Indian Tribe and Lummi Nation both have usual and accustomed fishing grounds that extend into the study area, and thus are involved in decisions that impact these treaty protected rights.[31] A reserve of the Matsqui First Nation is also located within the study area.[32]

[30] While the Bertrand Creek provides a small amount of flow to the Nooksack, it contributes a large portion of the annual fecal coliform bacteria load (NOAA, 2004).

[31] The Nooksack Indian Tribe and Lummi Nation also manage riparian and wetland issues on their respective Reservation Lands. Since the Bertrand and Fishtrap watersheds do not encompass these lands, the comparative analysis of these provisions is not included.

[32] The author did not successfully make contact with representatives from the Stó:lō Nation or Matsqui First Nation.

History

The region in which these watersheds are located was originally known as the "Sekomehkl" to the Coast Salish communities who have inhabited and managed the area for thousands of years prior to European settlement (Steensma 2015; Bertrand WID 2006). The area was traditionally a prairie with a mixture of wetlands, grasses, low scrub and forest on largely flat lands. It was some of the first land in Whatcom County to be cleared and placed in agriculture in the 1890s (Steensma 2015).

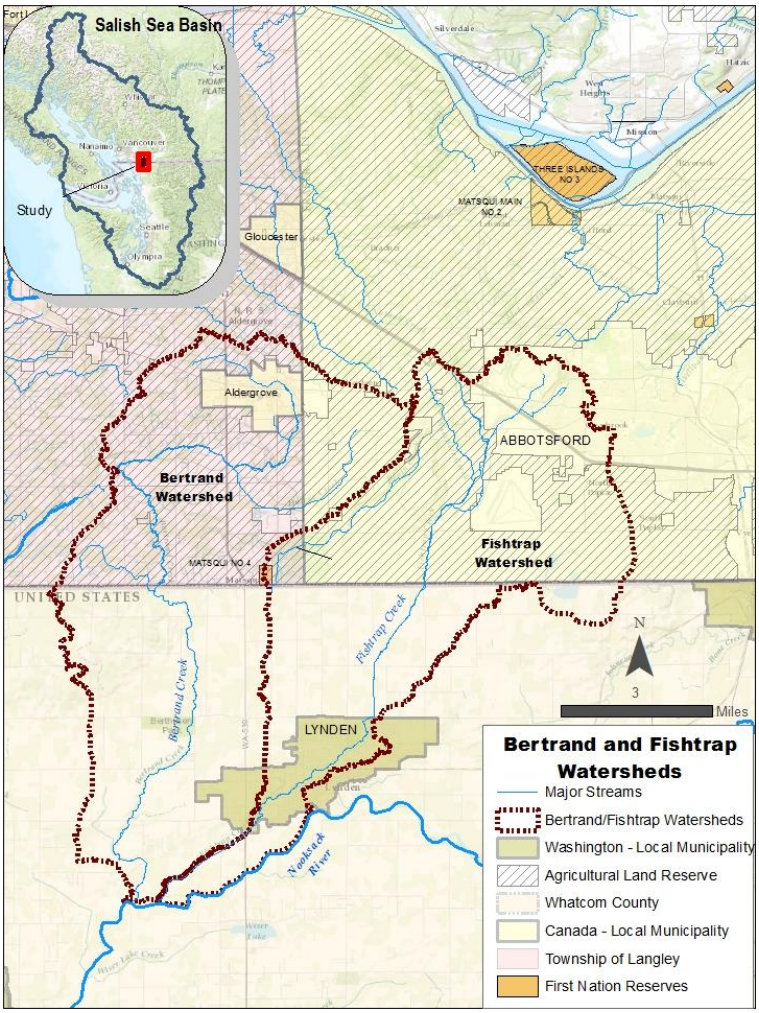

Figure 4.2: Map of Government Jurisdictions in Bertrand and Fishtrap Watersheds

Development and Land Use

The majority of both watersheds are rural and used for agricultural activities, small hobby farms, and residential uses. A significant portion of the land in British Columbia is located within the Agricultural Land Reserve, a provincial zone in which agriculture is recognized as the priority use. Farming is encouraged and non-agricultural uses are restricted. Agricultural activities consist of dairy operations and berry farms. Approximately 61% of the land use in the Bertrand Creek subbasin is in agricultural production (the U.S. portion is approximately half of the entire watershed) including 20% which is currently producing blueberries, caneberries (raspberries, blackberries, and marionberries), and strawberries (Tuttle 2014).

Urban development is confined mostly to Aldergrove and portions of Abbotsford in British Columbia, and Lynden in Washington State, consisting of residential, commercial, institutional and industrial uses (see Figure 4.3).

Environmental Conditions

Bertrand and Fishtrap Creek both support a diverse fish community including populations of Chinook, chum, coho, steelhead, cutthroat trout, lamprey, stickleback, Salish sucker, and Nooksack dace. Several of these species of fish are threatened or endangered: in the United States, Chinook salmon and steelhead trout are listed as threatened under the Endangered Species Act. The Salish sucker is listed at the state level by the Washington Department of Fish and Wildlife as a monitor species, a designation that reflects the need for more research and monitoring to prevent a threatened or endangered listing in the future. In Canada, the Nooksack Dace and Salish Sucker are listed as endangered under the Species at Risk Act, and portions of the Bertrand and Fishtrap Creek serve as critical habitat for these species. The Oregon Spotted Frog also has habitat in the headwater wetlands of the Bertrand Creek (Marples 2015; Kerr Wood Leidal 2009). In addition, the Coastal Cutthroat Trout is listed on the provincial blue list.

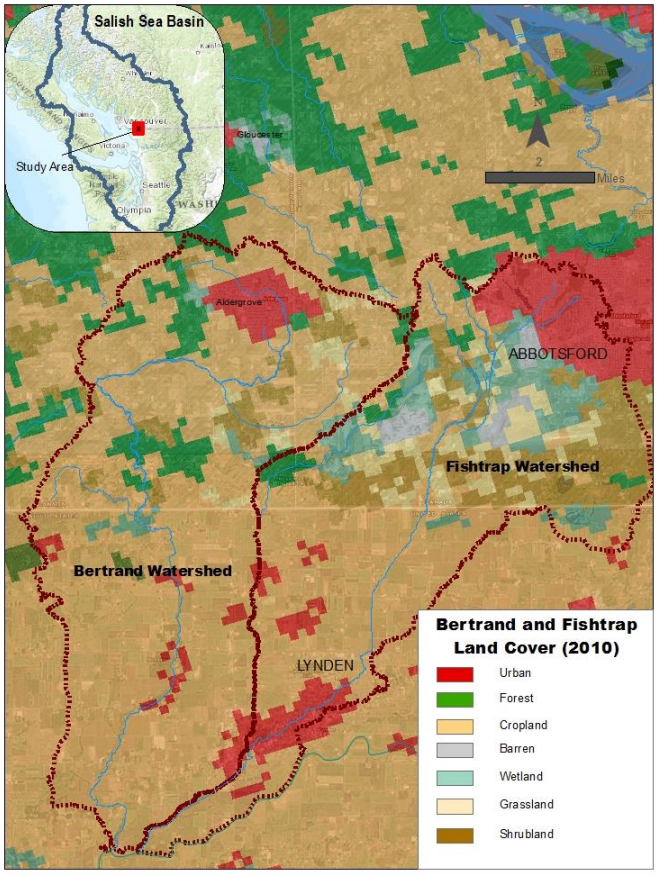

Figure 4.3: Land Cover in Bertrand and Fishtrap Watersheds

Like many lowland streams in southern mainland British Columbia and Whatcom County Washington, the watercourses in these watersheds reflect a history of channel clearing, dredging, realignment and wetland draining to accommodate urbanization, road construction and the drainage needs of agricultural land uses. Riparian forest cover is generally low and highly fragmented. Invasive plant species, such as Himalayan blackberry (introduced) and reed canary grass (native) form dense patches that prevent the development of native tree and shrub communities. More recent urbanization has also added impervious surfaces, which has reduced the infiltration capability within the watershed, particularly in the northern extent of the watershed, which is more developed.

This practice has left watercourses in modified channels lacking desired levels of complex cover, functional large woody debris, riparian cover, and key in-stream habitat in the form of pools and gravel riffles. Increasing impervious areas in upland areas in the watershed and water withdrawals have impaired stream flows, resulted in a 'flashy' system during storm events and low flow during the dry season. These conditions result in high summer water temperature and high fine and suspended sediment conditions.

On-going practices continue to further stress the system, from various land uses in the system. Runoff from upland sources bring pollutants, including pathogens and nutrients. The resulting water quality is impacted by these inputs. In the upper reaches of Bertrand Creek, water quality is moderate to poor,

with low dissolved oxygen, elevated water temperature, and elevated concentrations of nutrients and metals (Kerr Wood Leidal 2009). In Washington State, portions of both Bertrand and Fishtrap Creek have been identified as having impaired water conditions (Category 4 or 5[33]) for the following parameters:

TABLE 7: SECTION 303D IMPAIRED WATER QUALITY CONDITIONS ON BERTRAND AND FISHTRAP STREAMS (WASHINGTON STATE DEPARTMENT OF ECOLOGY N.D.)

Bertand Creek	Fishtrap Creek
Category 5 (impaired, requires EPA-approved TMDL)	
Dissolved Oxygen	Dissolved Oxygen
	Temperature
Category 4 (impaired, does not require EPA-approved TMDL or already has TMDL)	
Bacteria	Bacteria
Ammonia-N	In-Stream Flow
In-Stream Flow	

Other modified water features, such as Double Ditch, Benson Road Ditch, Bender Road Ditch, and Duffner Ditch, also have similar impaired water conditions. Dissolved oxygen is a critical water quality concern in both creeks and is expected to worsen if summer flows decline.

The Puget Sound Watershed Characterization for WRIA 1 shows that these watersheds are degraded for a number of environmental factors, including phosphorous, nitrogen, metals, and pathogens (Watershed Characterization Technical Assistance Team 2015).

Fecal coliform has emerged in the last couple of years as a significant concern. This is due to observed increases in monitored levels of fecal coliform in the Nooksack River basin, in which the Bertrand and Fishtrap Creek are located. In particular, long-term monitoring in both Bertrand and Fishtrap show recent levels to be on the increase (see Figures 4.4 and 4.5).

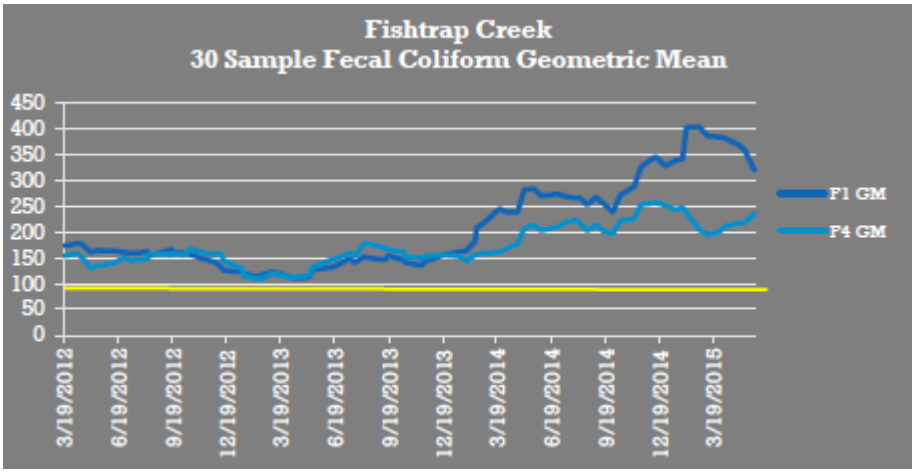

Figure 4.4: Fecal Coliform Monitoring Results, Fishtrap Creek, 2012-2015 (Douglas 2015)

[33] Category 5 waters require the preparation of water quality improvement projects, known as TMDLs, in accordance with the United States Clean Water Act.

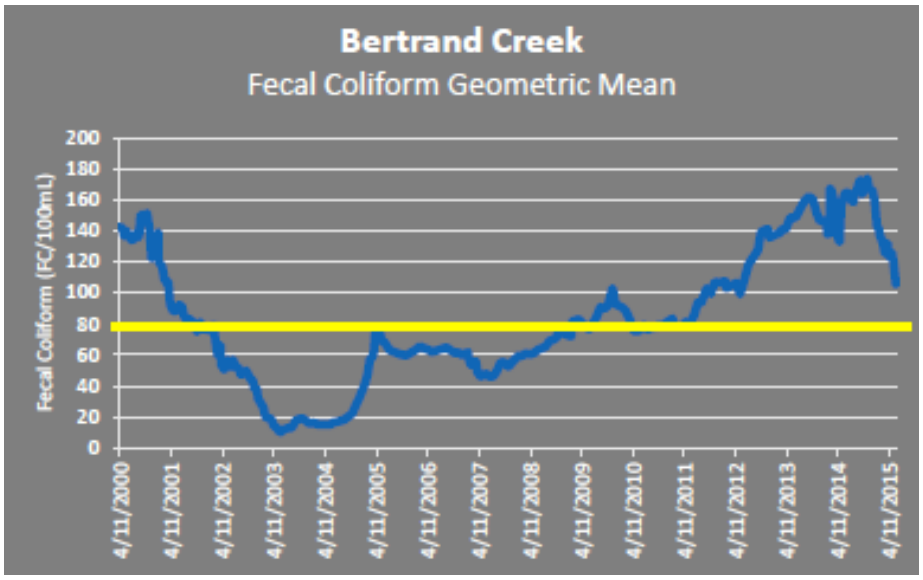

Figure 4.5: Fecal Coliform Monitoring Results, Bertrand Creek, 2000-2015 (Douglas 2015)

As a result of the increases in observed fecal coliform levels, and additionally because these watersheds contribute the largest flows to the Nooksack basin, there has been more focused monitoring, pollution identification, and pollution correction efforts underway in these watersheds (Douglas 2015). Under this effort, Whatcom County has been coordinating with Whatcom Conservation District (WCD), and State Departments of Agriculture (WSDA) and Ecology (DOE) to monitor water quality in Bertrand and Fishtrap watersheds. Figure 4.6 shows preliminary results from a sampling in February 2016. Red dots depict monitoring sites where water quality is impaired.

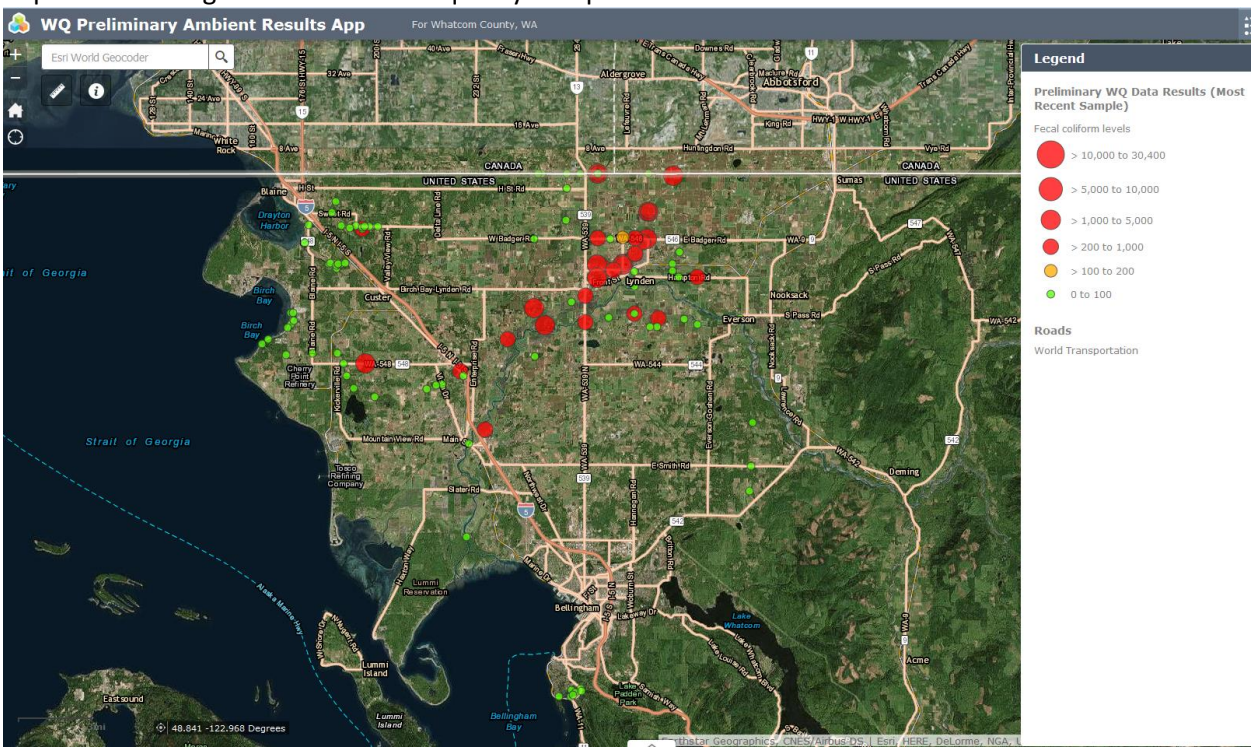

Figure 4.6: Bacteria Monitoring Results for Whatcom County (Whatcom County 2016b)

The monitoring shows high levels of bacteria at monitoring stations along the border, increasing as the streams cross through the rural, agricultural lowlands in Whatcom County. This coordinated monitoring allows the agencies to identify pollution problems and hotspots, and then outreach to property owners to identify corrections (Sweeney 2015).

While fecal coliform remains a problem, monitoring has not shown pesticide runoff to be a significant contributor to impaired water conditions. In 2013, the Washington State Department of Agriculture added the Bertrand watershed to its pesticide monitoring program (McClain 2015), in coordination with berry farmers in Whatcom County. Pesticide monitoring has been conducted at two stations along Bertrand Creek, one near the border and another in the lower reaches of Bertrand Creek. The monitoring done over the growing seasons of 2013 and 2014 has detected pesticides or pesticide related compounds, but the magnitude of detection is below the assessment criteria and state water quality standards (Tuttle 2014). These preliminary results show that pesticide application practices and riparian buffers in the system appear to be doing a good job keeping pesticides out of stream or in lower levels (McClain 2015). However, pesticides and other chemicals have been detected – some are transported downstream from Canada and some are being introduced while passing through agricultural activities (particularly berry farming) in the United States. Sources for these pesticides and related compounds can include agricultural activities, as well as urban development and roadway and utility maintenance. While there have been no exceedances of standards, there is still incomplete knowledge of how the different chemicals interact with each other (McClain 2015). The Washington State Department of Agriculture has also initiated a new effort in the Fishtrap watershed to examine the impact of hedgerows in mitigating pesticide flow into waterways (McClain 2015).

The water quality concerns in the study area have been reported in several news sources. Larry Pynn with the Vancouver Sun completed a series focusing on stream protection in the Fraser Valley. The series focused on Bertrand Creek, with the reporter canoeing down the stream with a fisheries biologist and encountering numerous impacts to the stream riparian area and banks, including tree removal from development activity, removal of streamside vegetation from commercial storage, littering and garbage clogging the stream, and pollutants entering the stream and resulting in fish die offs (Pynn 2014a). Pynn's investigation revealed concerns by critics of British Columbia's management of streams, noting: "…weak provincial laws fail to compel farmers to protect streams. That combined with lax enforcement, exacerbated by cuts to the federal Fisheries department, and revisions to the Fisheries Act are making prosecutions more difficult than ever before" (Pynn 2014d).

Regulatory Setting

There are a variety of regulatory and non-regulatory approaches that are being used to address wetland and riparian area conditions in the study area.

Regulatory Riparian Buffers

Riparian buffers are used as one protection mechanism in the study area. In order to compare waterbody classifications from different jurisdictions, I applied a standardized template of waterbody types to each jurisdiction. The criteria for the template was based on a preliminary review of the respective zoning or bylaw standards for protection of riparian and wetland areas. Buffer widths and other management prescriptions from each jurisdiction were then applied to each waterbody type.

TABLE 8: COMPARISON OF RIPARIAN AND WETLAND AREA STANDARDS[34]

Waterbody	Washington State		British Columbia	
	Whatcom County[35]	City of Lynden[36]	City of Abbotsford	Township of Langley[37]
Standard Stream Buffer				
Class 1 – Fish Bearing, Highest functions	150 feet[1] (46 meters)	150 feet[2] (46 meters)	98 feet (30 meters) [4] OR 32 feet (10 meters) [7]	98 feet (30 meters) OR 24 feet (7.5 meters) for roadside ditches
Class 2 – Fish Bearing	100 feet (30.5 meters)	100 feet[3] (30.5 meters)	49 feet (15 meters) [5,6] OR 32 feet (10 meters) [7]	98 feet (30 meters) OR 24 feet (7.5 meters) for roadside ditches
Class 3 – Non-Fish Bearing	50 feet (15 meters)	50 feet (15 meters)	98 feet (30 meters) [3,10] OR 49 feet (15 meters) [5,10] OR 49 feet (15 meters) [4,11] OR 16 feet (5 meters) to 49 feet (15 meters)[8]	65 feet (20 meters)[9,12] OR 49 feet (15 meters)[13] OR 19 feet (6 meters) for roadside ditches
Standard Wetland Buffer				
Category I	50-300 feet, depending on level of intensity of development	200 feet (61 meters)	Same as above	Same as above
Category II	50-275 feet, depending on level of intensity of development	100 feet (30.5 meters)		
Category III	50-150 feet, depending on level of intensity of development	50 feet (15 meters)		
Category IV	25-50 feet, depending on level of intensity of development and wetland habitat function	25 feet (8 meters)		

[34] Appendix D contains a more detailed table.
[35] Shoreline Master Program refers to buffers established under CAO
[36] Shoreline Master Program also establishes buffers, but these are less restrictive than the CAO ordinance, which is noted above.
[37] Only applies to lands located outside of Agricultural Land Reserve.

1. Flow (>20 cubic feet/second)
2. Presence of species listed as threatened or endangered by a state or federal agency
3. Presence of species listed as sensitive by a state or federal agency
4. Intact riparian zone Continuous areas ≥ 30 m or discontinuous but occasionally > 30 m to 50 m)
5. Narrow but continuous areas of Existing Vegetation or Potential Vegetation equal to 15 meters wide or discontinuous but occasionally wider areas of Existing Vegetation or Potential between 15 and 30 meters wide
6. Very narrow but continuous areas up to 5 m, or discontinuous but occasionally > 5 m to 15 m
7. Bank Width (>60 meters);
8. Very narrow but continuous areas up to 5 m, or discontinuous but occasionally > 5 m to 15 m
9. Significant source of food, nutrients or cool water supplies to downstream fish
10. Permanent stream
11. Non-permanent stream
12. Natural watercourse
13. Constructed watercourse, channel width < 0.5m

Both Abbotsford and Township of Langley have adopted streamside setbacks that can be larger than the setbacks that would otherwise be established under the Provincial Riparian Area Regulation (RAR). As a result, these jurisdictions are responsible for regulating the buffer area that falls outside of the RAR established buffer; within the RAR established buffer (e.g. if the RAR established setback was equivalent to the local setback or the proponent requests a variance from the local setback), the Province would also have jurisdiction and the local jurisdiction could not authorize a buffer less than that required by the Province.

The Township of Langley has structured their provisions so that the streamside setback bylaw does not apply within the Agricultural Land Reserve; in Abbotsford, the streamside bylaw would apply on agricultural lands, but only to residential construction on those lands. Therefore, the buffers noted in Table 8 apply to urbanized areas in the Township of Langley, and to all of Abbotsford, but only to non-agricultural uses.[38]

When these standards were adopted in the Township of Langley (2006) and Abbotsford (2006), there were concerns expressed during public meetings about the potential impacts. During the public hearing process for adoption of the Streamside Protection Bylaw in the Township of Langley, participants expressed concerns about over-regulation, with one participant commenting that the new bylaw was "an example of expropriation without compensation" (Special Meeting of the Township Council 2006, p. 170). In contrast, others noted that the streams were "critical to MOE, DFO and the community, and requested the streams remain in their existing locations unless there was a compelling reason otherwise" (Special Meeting of the Township Council 2006, p. 170).

Since adoption, local officials report that there have been few variance requests, likely because of the potential uncertainty and cost of obtaining variance approval (Confidential Interview 2016). An example of variance request is depicted in Figure 4.7.

[38] The RAR does not apply to agricultural activities, but local jurisdictions may adopt bylaws that address construction of agricultural facilities. The City of Abbotsford has established setbacks for buildings and structures in their agricultural zones, ranging from 98 feet (30 meters) to 49 feet (15 meters). Similarly, the Township of Langley has setbacks for buildings and structures. For instance, a building associated with a cattle feedlot is required to be 100 meters from any watercourse (Zoning Bylaw Section 201.7). However, these provisions are focused on construction of buildings, not other activities that can impact riparian and wetland areas, which can include a range of activities from drainage runoff, removal or cutting of vegetation, to animal access. Instead, these activities are addressed at either the federal or provincial levels, under the provincial Environmental Management Act and Water Sustainability Act, or federal Fisheries Act.

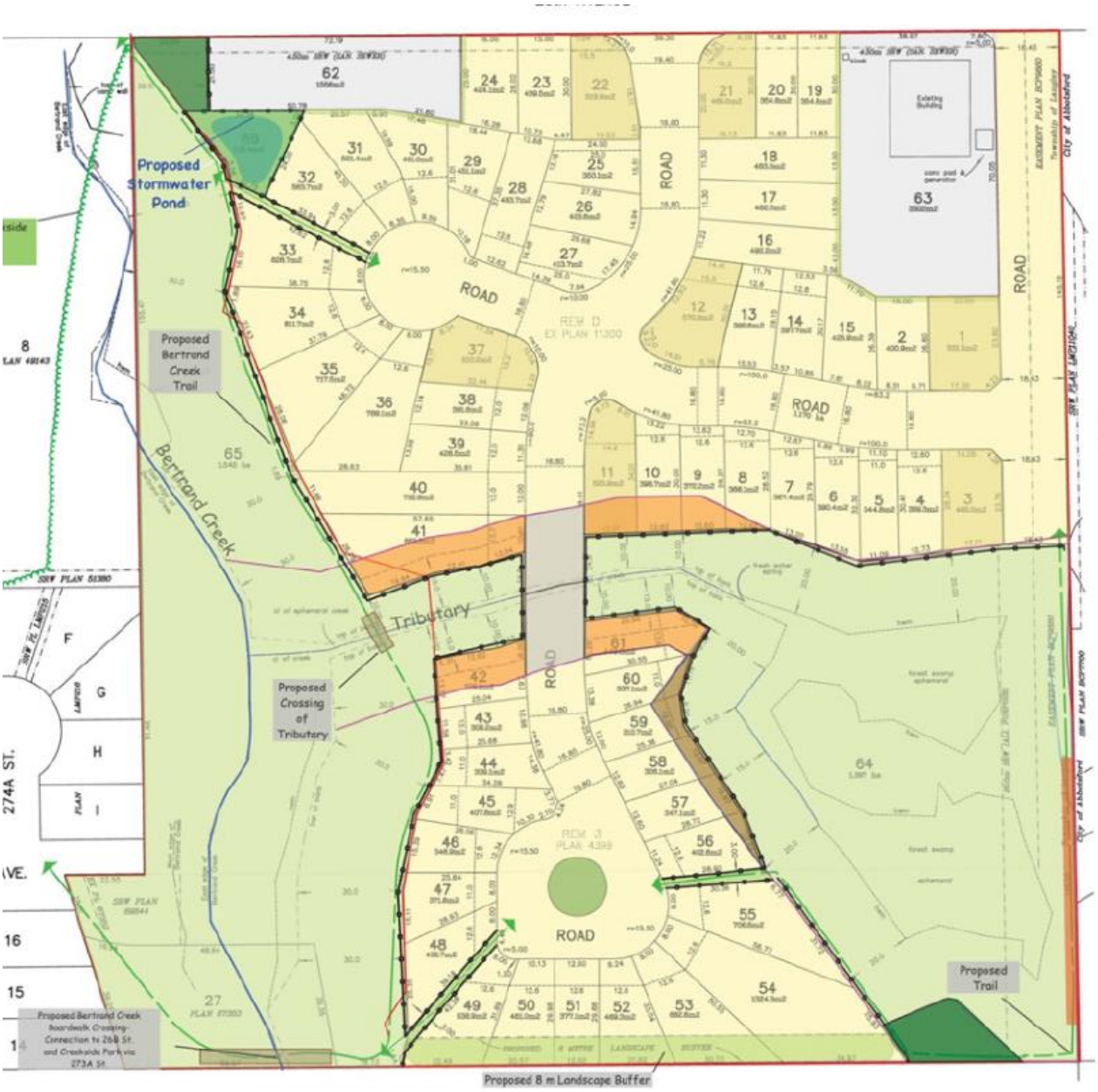

Figure 4.7: Riparian and Wetland Buffer Modification for Residential Development in BC

The proposal included a modification to a buffer for a tributary and headland wetland to Bertrand Creek. The standard buffer for the tributary was 65 feet (20 meters), while the standard setback to the wetland was 49 feet (15 meters). The proponent requested modifying these buffers in several ways: 1) requesting approval for an access road to cross the tributary, 2) requesting approval for a reduction in the setback of the tributary stream to accommodate several planned lots and 3) requesting approval for a reduction in the setback of the wetland to accommodate several planned lots. In total, approximately 0.66 acres (0.27 hectares) of buffers were proposed to be impacted. The proponent planned to mitigate for this impact by 1) preserving sensitive areas located adjacent to but outside of the standard buffer (0.36 acres or 0.15 hectares) and 2) completing restoration in the areas to be preserved on the site.

In Washington State, management of riparian and wetland buffers is predominately done at the local level, though State overview can occur if modifications are requested to buffers established under each jurisdiction's Shoreline Master Program. Standards were first adopted as part of planning under the Growth Management Act in 1997. Planning under the Growth Management Act has long been a source of contention in Whatcom County. When the County first acted to pass a temporary critical areas ordinance in 1992, a referendum was passed in 1993 by citizens concerned about impacts to property rights within the County to remove many of the protections afforded in the CAO; this action was later overturned by the State Supreme Court, but the ordinance was later challenged by several environmental organizations concerned about the lack of protective standards. The Critical Areas Ordinance was last updated by Whatcom County in 2005, and is now under review as part of a State-required update process. At this time, proposed changes have to do with clarifications, incorporation of standard practices, and updated references. Public comments submitted as part of the update process reveal key differences in opinion as to the current management approach for riparian and wetland areas, with some involved participants expressing their beliefs that the standards go too far, while others are concerned about any changes to reduce existing standards (Whatcom County 2016a).

As reported by staff planners, there has not been a lot of development activity along riparian areas or wetlands within the study area (Confidential Interview 2016). An example of a buffer modification request is depicted in Figure 4.8.

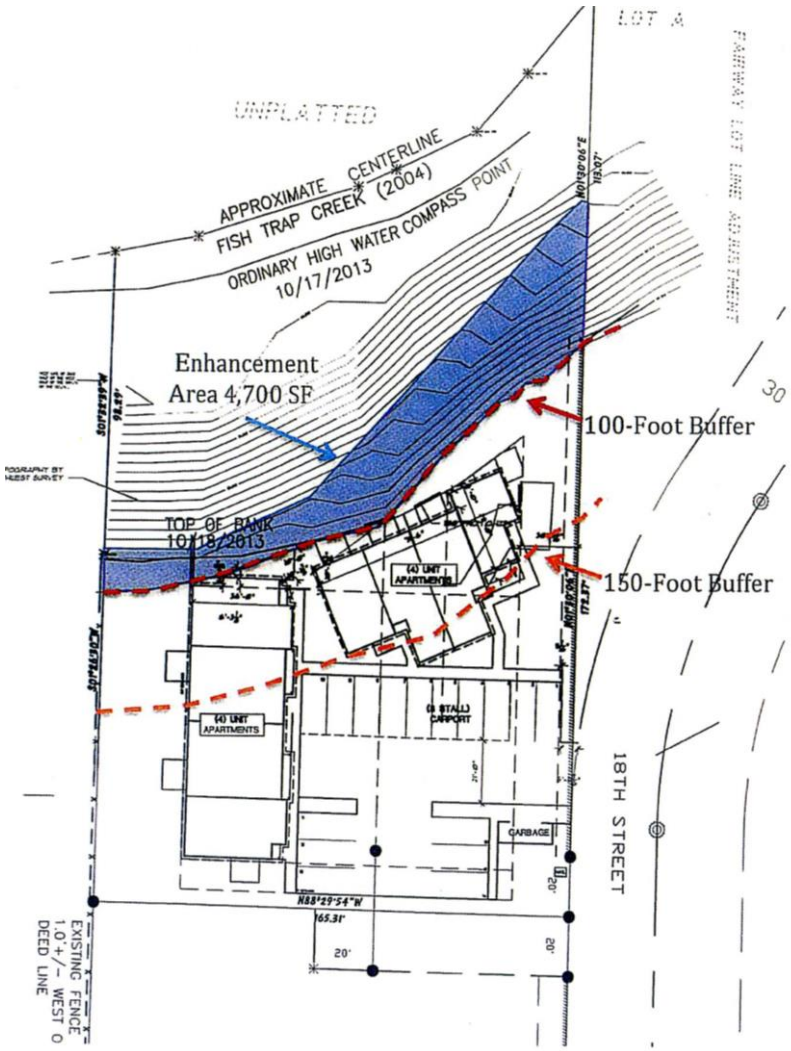

Figure 4.8: Riparian Buffer Reduction for Residential Development in WA

The proposal included a modification to a 150-foot required stream buffer from Fishtrap Creek to accommodate construction of two-four unit residential buildings and associated improvements. The standard buffer is proposed to be reduced to 100-feet (33 percent reduction), and the reduction in buffer width is proposed to be mitigated with enhancement of 4,700 square foot area of the remaining 100-foot buffer.

In-Water Work

In British Columbia, the provincial Water Sustainability Act and federal Fisheries Act have traditionally focused on activities occurring within the stream channel (e.g. stream channel straightening, hardening, etc.), though the revisions to the Water Sustainability Act open up the possibility of additional management of activities happening in the protective riparian area under Section 46, which addresses releases of materials to the ecosystem supporting streams. These provisions are not in full force and regulations have yet to be developed. There are concerns with declining federal involvement, since

recent changes to the Federal Fisheries Act modified the authority of the Act. The Act previously prohibited activities that could cause harmful alteration, disruption, or destruction of fish habitat. The revised authority prohibits activities that can cause serious harm to fish, eliminating some of the previous authority to consider activities that harmed riparian habitat (Confidential Interview 2016).

In Washington, in-water work is addressed by several different levels of government: federal, state, and local. Staff review of records also show a small number of in-water projects, most associated with maintenance of existing road crossings (Confidential Interview 2016).

Non-point Source Pollution Control

A large contributor to non-point pollution within these watersheds is runoff from agriculture. In British Columbia, protection of riparian areas from upland agricultural activities has largely been under the provincial Environmental Management Act, and more specifically the Agricultural Waste Control (AWCR) regulations. These regulations do establish some prescriptive setbacks from watercourses, such as for long-term storage of agricultural waste, but currently the approach is based on standards that more generally focus on preventing pollution, without prescriptive standards in place that describe how compliance is achieved. As noted by one participant, "Farming is a real challenge…You look at some of our agriculture areas, where agricultural uses are right to the top of the bank with pesticide use and there are all sorts of impacts" (Confidential Interview 2016).

A number of guidelines have been developed to assist farmers in achieving compliance, and the Environmental Farm Plan (EFP) Program operated by the BC Agricultural Research and Development Corporation supports farm operators in completing Farm Plan Assessments to guide farm operations to meeting the intent of the AWCR. The EFP is voluntary and, as such, nutrient management planning is largely voluntary and confidential (Confidential Interview 2016). However, participants cited lack of information being available to gauge the success of the program, including information about the number of farm operators engaging in this process and the overall effectiveness of the program in preventing disturbances to riparian areas (Confidential Interview 2016).

In Washington, agricultural operations are addressed at multiple levels. At the local level, in Whatcom County ongoing agricultural activities must comply with the standard CAO regulations (see Table 8 above), unless the farmer applies and receives approval for a Farm Conservation Plan. The Farm Conservation Plan provides for a site-specific evaluation of the operations to identify potential changes that would allow the operation to comply with critical area buffers, or mitigate for impacts. Fecal coliform has been the main focus of farm plans. A number of Farm Conservation Plans have been completed, but compliance rates are suspected to be low (Confidential Interview 2016). Farm plans are also only required if there is an encroachment into the required riparian buffers of features protected under the CAO– it would not apply to situations in which livestock waste sheetflows into a ditch that is otherwise not classified as a stream; this situation would instead be addressed by water quality regulations administered by the Department of Ecology (Confidential Interview 2016).

At the State level, the Department of Ecology is responsible for implementing the Clean Water Act. Several streams within the Bertrand and Fishtrap watershed are listed as water-quality impaired. Due to the impaired water quality conditions, a total maximum daily load plan (TMDL) is required to be developed and approved by the Environmental Protection Agency. In 2002 Fishtrap and Bertrand Creek, along with other tributaries to the lower Nooksack River, was included in a plan adopted by the Washington State Department of Ecology and Environmental Protection Agency to reduce fecal coliform

pollution originating from agriculture, on-site septic systems, sediment, and overflow events at municipal waste treatment plants (Hood 2002). For the Fishtrap and Bertrand watershed, the goal was to reduce fecal coliform bacteria to a geometric mean of no more than 39 fecal colonies per 100ml and 49 fecal colonies per 100ml, respectively (Hood 2002). Under the TMDL plan, ambient monitoring was to be used to identify persistent hot spots; once identified, an Ecology inspector was to follow up with additional sampling to track the bacteria source and make referrals to the agency with the most direct authority to address the problem.

One of the key pollutant sources[39] addressed in the plan was runoff from agriculture (specifically animal waste pollution from improper grazing, manure application or storage practices) which were to be addressed by several mechanisms: 1) NPDES permitting of confined animal feeding operations (CAFO); 2) Nutrient management planning for dairy operators, and 3) education and technical assistance. Dairy farms are subject to the Dairy Nutrient Management Act, which requires operators to develop and implement nutrient management plans, register with WSDA, and participate in a program of regular inspections and compliance. Yet, there are concerns from some representatives involved in water quality management about lack of compliance and enforcement of this and other programs focused on agricultural operations (Confidential Interview 2016). Further, there are concerns that TMDL implementation lacks the regulatory bite needed to compel implementation (Confidential Interview 2016), as evidenced by declining water quality conditions that have led to the 2014 and 2015 closure of shellfish beds in Portage Bay, located downstream of the Bertrand and Fishtrap Watersheds (see Figure 4.9). [40]

[39] Other sources included On-Site Septic Systems (OSS), sediment and sewage treatment plants

[40] It should be noted that though representatives from Whatcom County Farms were not interviewed for this research, review of available materials indicates that farmers are concerned with what they perceive as mischaracterization that dairy operators are the primary sources of fecal coliform pollution (Whatcom Family Farming 2016)

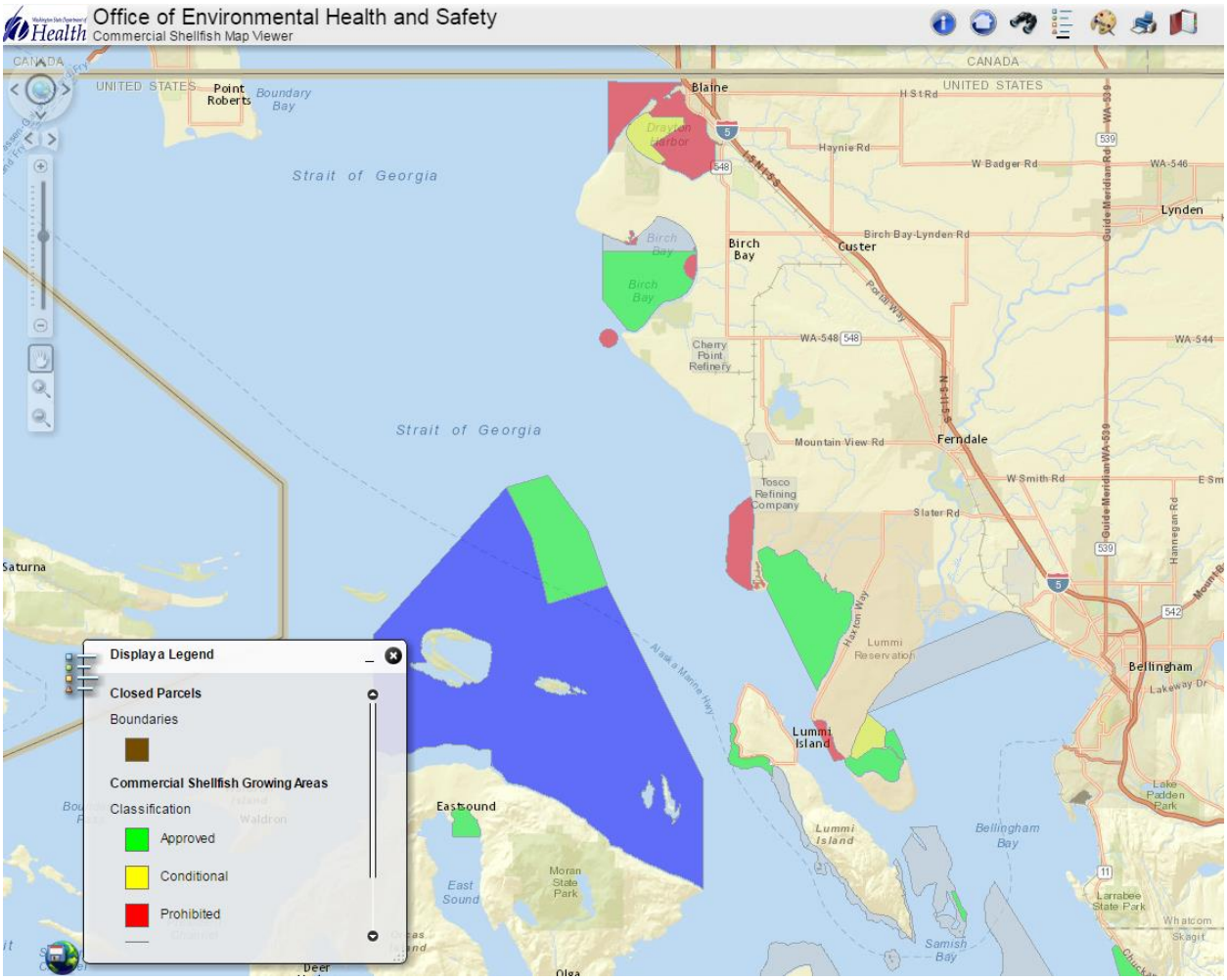

Figure 4.9: Washington State Department of Health Commercial Shellfish Area Status, February 2016 (Whatcom County 2016b)

Over the last several years, there has been a number of new initiatives aimed at assessing and improving water quality in the watersheds, including:

- In 2013, the Bertrand Creek watershed became the first focus area of a County-wide interagency effort focused on reducing bacteria pollution. Under the Whatcom Clean Water program, partners have expanded bacteria pollution identification and correction efforts (Washington State Department of Ecology 2015a and 2016h).
- Whatcom County is the recipient of National Estuary Program funds to support its pollution and identification correction program (PIC) (Washington State Department of Health, n.d.). Under the PIC program, Whatcom Public Works is working with the Whatcom Conservation District, Planning Department, Washington Departments of Agriculture and Ecology and other partners to engage landowners in finding solutions to livestock and OSS pollution. The Conservation District is providing risk assessments for farmers to help them make changes to protect water quality.
- In 2014, the Washington State Department of Agriculture received grant funds to support water quality monitoring and pollution identification (Isensee 2015).

- In 2015, the EPA issued compliance orders against multiple farms within the watershed for violations of the Clean Water Act, including violations for wetland filling and violations for operating a large-scale dairy farm that discharged to surface waters without a required NPDES permit (EPA 2016 a and b).

Other Regulatory Activities

Under the Washington State Watershed Management Act, citizens, local governments, tribes, and state and federal agencies have worked together as part of the WRIA 1 Watershed Management Project to address water quantity, quality, instream flow and fish habitat. The goals of the WRIA 1 Watershed Management Project is to have water of sufficient quantity and quality to meet the needs of current and future human generations, including the restoration of salmon, steelhead, and trout populations to healthy harvestable levels, and the improvement of habitats on which fish and shellfish rely. As part of this planning effort, Bertrand Creek was selected as a pilot study area for parties to work together to collaboratively establish instream flows and develop an action plan. The parties, thus far, have not been able to come to agreement. Formal negotiations have been suspended and the Nooksack Tribe and Lummi Nation have submitted separate requests to the Department of Interior seeking litigation over tribal instream flow water rights. As this litigation moves forward, the Tribes have been re-engaging with water resource users to discuss potential settlement proposals, but negotiations have been complicated by shellfish bed closures in Portage Bay.

In addition, as part of salmon recovery planning efforts, several projects are identified in the Watershed Resource Inventory Area (WRIA) 1 Salmonid Recovery Plan, including implementation of best management practices in agricultural and urban areas (e.g., filter strips, stormwater management, pesticide and nutrient application in agricultural and urban areas) and restoration of Bertrand and Fishtrap Creek riparian, channel structure and wetland habitat. Inclusion on the WRIA 1 list enables these projects to be eligible for funding opportunities, such as allocation of salmon recovery funding by the Washington State Salmon Recovery Board.

In British Columbia, municipalities are required to develop Liquid Waste Management Plans, which are plans authorizing discharges to the environment associated with the management of liquid waste. These plans are authorized and regulated through the BC Environmental Management Act. Under Metro Vancouver's Plan, member municipalities such as the Township of Langley have committed to creating Integrated Stormwater Management Plans (ISMP) on a watershed scale for all watersheds within the region. Under this commitment, the Township of Langley has created the Bertrand ISMP. While the ISMP specifically focuses on stormwater management (and addresses control of runoff), it also includes a summary of the ecological health of the watershed and identifies a number of instream and riparian habitat restoration opportunities and agricultural management activities that, if undertaken, could improve watershed health (Kerr Wood Leidal 2009). Though not located within Metro Vancouver, the City of Abbotsford is also undertaking integrated stormwater management plans throughout the City; an ISMP for Fishtrap Creek has yet to be approved.

Similarly, the City of Lynden's recent growth has triggered requirements for the City to develop a Stormwater Management Program, and addresses public education and outreach, illicit discharges, control of runoff, pollution prevention, and water quality monitoring. Whatcom County also has a Stormwater Management Program, but this addresses targeted watersheds within the County where more urbanized development has previously occurred.

Non-Regulatory Setting

Subsidy and Market Approaches

In British Columbia, while few market-based incentive mechanisms currently exist to foster preservation and restoration, a pilot project has been initiated by the Langley Sustainable Agricultural Foundation in the Township of Langley that will provide financial payments to farmers to enhance their stewardship practices (Langley Sustainable Agricultural Foundation 2016). This initiative is a response to recommendations stemming from the Agricultural Viability Study conducted by the Township of Langley, to assist the Township in achieving its agricultural potential.

This strategy identified a number of initiates, one of which was to undertake a pilot project to support the principle of farmer compensation when there is an environmental benefit and when the investments undertaken on farms exceed existing requirements of law and regulation and result in benefits to citizens at large (Township of Langley 2013).

In contrast, in Washington there are a number of examples of different programs operating that provide market-based incentives to promote preservation and restoration efforts. There are several programs active in the study area (Whatcom Clean Water Program, n.d.), examples of which include:

- National Estuary Program (NEP) funding is available to help landowners pay for fencing and offstream watering facilities, manure storage, and heavy use area protection. Landowners may receive up to 75 percent of costs for qualifying projects.
- Through Washington Conservation Commission, Whatcom Conservation District has funds available to help landowners install best management practices (BMPs) to protect surface water from livestock manure related fecal pollution. The funding is available to properties within watersheds flowing to shellfish growing areas. Whatcom Conservation District also administers the Conservation Reserve Enhancement Program.
- USDA Natural Resources Conservation Service (NRCS) offers financial and technical assistance to plan and implement BMPs to protect surface water and other resources. Voluntary programs offered by NRCS include the Environmental Quality Incentive Program.

In 2011, Whatcom County was awarded a Watershed Protection and Restoration Grant to develop policy recommendations that enhance both watershed health and agricultural viability, and test these through a pilot project (Whatcom County Ag-Watershed Pilot Project, n.d). The pilot will include two voluntary enhancement projects with agricultural land owners. This project has generated a watershed characterization of several agricultural-intensive watersheds in Whatcom County, including the U.S. portions of the Bertrand and Fishtrap watersheds. It has also identified agricultural enhancement needs within these watersheds, including flood protection and drainage, drainage maintenance, and additional upper watershed irrigation water. Complimenting this is identification of watershed enhancement opportunities that would address water flow process needs (Whatcom County Ag-Watershed Project. 2013). This information will support efforts to establish an ecosystem services or natural resources marketplace in Whatcom County (MacKay 2013). The marketplace, if established, could allow farmers to trade or sell benefit credits generated from their actions, if their actions go beyond the standards required by regulations to protection land, water, and natural resources.

Voluntary Approaches and Education

There are a number of different programs offered by different organizations throughout the study area. In Langley, the Langley Environmental Partners Society (LEPS) operates a number of education initiatives and works with citizen volunteers to implement stream monitoring and restoration projects.

In Whatcom County, the Whatcom Conservation District provides technical assistance to farmers and landowners to minimize the impacts of livestock operations on soil and water resources. The Whatcom Conservation District is also initiating a program to use social marketing methodologies and surveys to reinforce and help farmers be more sustainable. The effort will also be engaging the Whatcom Community as a whole, to recognize and strengthen their response towards farming and the contribution it brings to the community, jobs, and environment. This effort is trying to build toward an ecosystem services marketplace where agricultural operators could get compensation for environmental services that go beyond mitigating impacts (Confidential Interview 2016).

As part of the Whatcom Clean Waters program, there has also been resources and funding devoted to education efforts focused on waste management activities within the priority watersheds, with Figure 4.10 (Whatcom County 2016c) providing an example. Further, monitoring results are being shared with property owners so that they can take action if results identify potential problems. As stated by Michael Isensee of the Washington State Department of Agriculture (2015), "Equally important for us is collecting the data, but also getting it into the hands of producers – they are the folks that are on the ground and can actually do something. I can collect data, I can regulate, but unless we have producers that care and have information to act upon, things won't change."

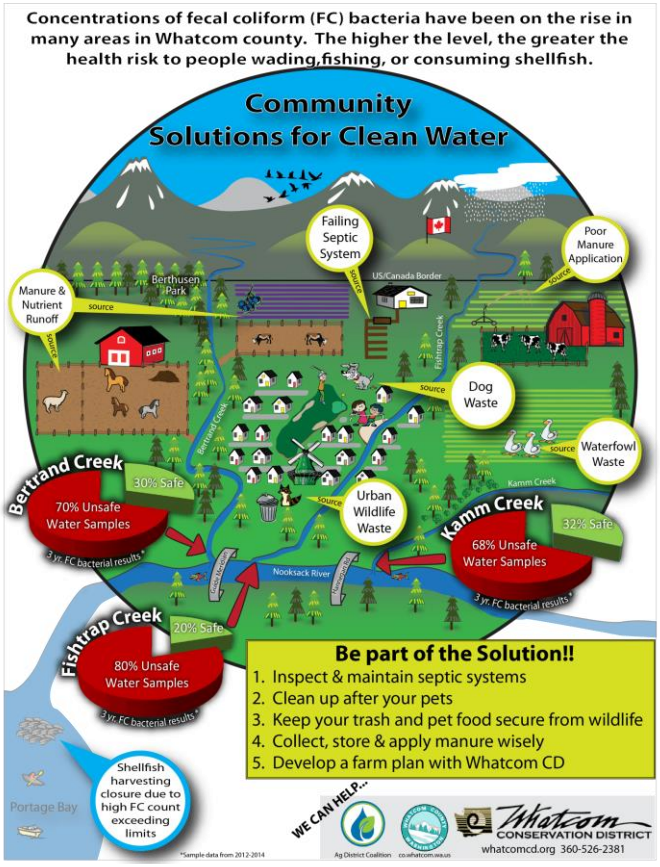

Figure 4.10: Example of Waste Management Education Materials (Whatcom County 2016c)

Beyond these types of programs, there has also been effort to conduct on the ground projects. The City of Lynden has designed and is beginning implementation of a project to improve channel morphology along Double Ditch stream. Historically, Double Ditch was a sinuous channel that originated in Canada and discharged into Nooksack River. Over the years, it has been straightened and ditched from the Canadian border down to City of Lynden. Currently, the stream is divided into two channels on both sides of road, which provides limited fish habitat and poses a safety hazard for pedestrians and vehicles traveling along the roadways. The City of Lynden has been working to combine these two ditches, creating one stream channel that has a level of sinuosity to it, with planted riparian areas, and setback levies for flood control (Confidential Interview 2016). Presently, this project is confined to an area within the City limits, but there is interest in extending this further to the north, towards the border.

Collaborative Governance

Collaborative forms of governance are evident on both sides of the border. In the study area in British Columbia, LEPS has acted as a bridge between government, industry, and citizen-led watershed societies. LEPS has a partnership agreement with the municipalities, and conducts a number of projects in coordination with the local governments in the area. The organization also works with community groups, providing an umbrella role for their monitoring and stewardship activities. Further, LEPS works with property owners on a voluntary basis to complete restoration projects and other activities to improve habitat along streams and wetlands.

In the study area within Washington State, there are several different examples of collaborative governance working at different scales. At the federal level, Whatcom County, the City of Lynden and the Nooksack Indian Tribe and Lummi Nation engage with other jurisdictions in Whatcom County in salmon recovery efforts, participating in the Salmon Recovery Board, a partnership between local governments, Tribes and State agencies, and community organizations that develops actions, projects, and programs to restore and protect salmon habitat. At the state level, members of the watershed engage in watershed planning issues including water quality, water quantity, instream flows, and fish habitat through the WRIA 1 planning efforts. These organizations operate under a unified decision-making structure.

In addition, agricultural operators within the two watersheds have each come together and formed Watershed Improvement Districts (WID). The WIDs were established by a vote of residents within the district, with 70 and 90 percent of voters in the Bertrand and Fishtrap voting to approve the districts, respectively (Brown 2015). The Bertrand WID and North Lynden WID work with landowners, government agencies, and other organizations to complete a number of projects, including fish passage, flood reduction, drainage and fish habitat projects. Funding to support this work comes through tax assessments based on acreage and grants. These organizations also have the authority to conduct watershed planning (Brown 2015).

Finally, tribal entities are involved in information exchange. The Nooksack Indian Tribe, Lummi Nation and Stillaguamish Tribe have collaborated to share information on riparian enhancement and restoration between the entities (Confidential Interview 2016). The Nooksack Indian Tribe and Lummi Nation also participate in a number of task forces, work groups, and ad hoc committees at the local/regional, state, and federal level.

Transboundary Coordination and Collaboration

Clearly, on both sides of the border, there is a lot of activity with respect to riparian and wetland areas, yet how much of that work is able to be shared across the border is another issue. With respect to riparian and wetland areas, there are different pathways for coordination, information exchange and policy transfer.

Information Exchange Mechanisms

Research participants acknowledged several different mechanisms for information exchange. Conferences like the Salish Sea Conference, which convenes researchers, policymakers, and industry

representatives from both British Columbia and Washington State, were recognized as providing an opportunity for various stakeholders to come together and share information.

In British Columbia, a multi—stakeholder working group has been established to advise on nutrient management regulation development. The working group is comprised of provincial regulatory agencies, federal environmental officials, local officials, and industries representatives. Representatives from the United States, principally the Whatcom County Conservation District, regularly attend these meetings.

In Whatcom County, the Bertrand Watershed Improvement District recently held a meeting to inform members of the District about the State of the Watershed, including water quality monitoring, regulation and policy compliance monitoring, and other activities. As part of this meeting, representatives from the Langley Environmental Partners Society (LEPS) in British Columbia were invited to present the status of monitoring and restoration activities on the other side of the border. Out of this information sharing effort, an opportunity for extending LEPS water quality monitoring techniques to include fecal coliform monitoring was identified, and now funding support is being provided by the Washington State Department of Health for LEPS to conduct fecal coliform monitoring; this work is intended to supplement hotspot identification of pollution sources contributing to the shellfish bed closures in parts of Whatcom County (Confidential Interview 2016).

Yet, at the local level, representatives in local government generally reported a lack of information exchange (Confidential Interview 2016). Representatives reported being unaware of existing coordination mechanisms and not having information on how their colleagues across the border manage shared environmental resources.

Formal Transboundary Policy Coordination Mechanisms

At the federal level, there are long-standing partnerships between the governments of Canada and the United States. The Boundary Waters Treaty of 1909 established the International Joint Commission, a transboundary watershed management framework for cooperation. This provides just one example of the agreements that have been established (Clauson and Trautman 2015; Norman 2015). With respect to the Salish Sea, in 2002 EPA and Environment Canada signed a Joint Statement of Cooperation that commits the governments to work collaboratively to achieve common goals (Clauson and Trautman 2015; Norman 2015; Confidential Interview 2016). This agreement laid the foundation for the following coordination mechanisms:

- Information sharing through the Salish Sea Ecosystem Conference, a joint conference with representatives from the scientific community, First Nations and tribal government representatives, resource managers, community/business leaders, policy makers, educators and students to present the latest scientific research on the state of the ecosystem, and to guide future actions for protecting and restoring the Salish Sea Ecosystem;
- Identification and tracking of ecosystem indicators as part of the Health of the Salish Sea reporting;
- Establishment of joint standard working groups that provide agency representatives the opportunity to regularly meet and discuss issues; and
- Development of 2-3 year action plans to guide work within the two environmental agencies with the aim of achieving the goals outlined in the Statement of Cooperation.

This commitment to partnership ensures that there is information exchange occurring between management officials at the federal environmental institutions, including EPA and Environment Canada. Yet, these meetings generally do not focus on small resources such as the Bertrand and Fishtrap Creeks. However, this framework does provide the potential for regional concerns to be highlighted. For instance, as reported by the Northwest Treaty Tribes (2015), in 2015 EPA Region 10 Administrator Dennis McLerran and EPA Deputy Regional Administrator Michelle Pirzadeh met with their counterparts in Canada to discuss updating a statement of cooperation between EPA and Environment Canada. At this meeting, McLerren emphasized "… the high priority EPA places on recovery of shellfish beds in Puget Sound, and specifically identified water quality problems and shellfish bed closures near the border as one of EPA Region 10's highest priorities for our agencies to focus on in the coming year" (Northwest Treaty Tribes 2015). In June 2015, a two-day session was held with the Statement of Cooperation Working Group, at which the second day was devoted to water quality issues at the border, in large part due to high fecal coliform counts in border watersheds (Confidential Interview 2016). This working group meeting identified the need to improve the exchange of data as well as the need to provide additional opportunities to convene various stakeholders involved in water quality management to exchange information and ideas. Since the meeting, steps have been taken to facilitate exchange of data and a special session has been convened at the Salish Sea Conference to bring together a range of stakeholders to talk about water quality and best management practices in border watersheds (Confidential Interview 2016).

At the state and provincial level, there have been a number of agreements solidifying cooperation. In 1992, the Environmental Cooperation Agreement signed by the Governor of Washington State and Premier of British Columbia established the Environmental Cooperation Council (ECC), whose purpose is to ensure coordinated action and information sharing on environmental matters of mutual concern. Under this agreement, wetlands protection was identified as an issue of on-going interest to both parties, with exchange of information on wetland and habitat protection forming the basis for cooperation. In addition, a number of Task Forces were initially established around specific issue areas to facilitate information sharing, coordination and cooperation. One Task Force was focused on groundwater contamination in the Abbotsford-Sumas aquifer that extends into the study area. The area is located over an unconfined aquifer, making the aquifer highly vulnerable to contamination from surface activities, such as agricultural practices, failing septic systems, and other activities. Coordination has occurred to support nitrate studies and to discuss compliance efforts, including nutrient management programs in place on either side of the border. Groundwater protection area signs have been installed at strategic locations in Abbotsford and Sumas, Washington to promote a greater awareness of, and the need to protect, the Abbotsford-Sumas Aquifer. The Task Force was active for a number of years, but activity has declined in recent years (Confidential Interview 2016).

With respect to salmon recovery efforts, the Puget Sound Partnership's Ecosystem Coordination Board, which is an advisory Board to the Leadership Council, now has several ex-officio representatives from British Columbia. In addition, the Science Panel, whose expertise and advice are critical to the Puget Sound Partnership's efforts to develop a comprehensive, science-based plan to restore Puget Sound, also includes scientists based in British Columbia.

Policy Transfer Mechanisms

There are limited examples of policy transfer in the area of riparian and wetland management. Recently, the Application Risk Management (ARM) program developed by Whatcom Conservation District, with support from the U.S. Environmental Protection Agency, was approved for a pilot project in

British Columbia (Ministry of Agriculture 2015b). Under ARM, appropriate times for manure spreading are determined based upon a risk assessment evaluation that considers specific soil, weather, and crop conditions. This allows farmers to move away from fixed dates for manure spreading and instead apply at times that will allow for best use of manure with minimal environmental risks.

COMPARATIVE ANALYSIS

Table 9 provides a high-level overview of the different tools used for riparian and wetland area management.

TABLE 9: COMPARISON OF BRITISH COLUMBIA AND WASHINGTON STATE RIPARIAN AND WETLAND AREA MANAGEMENT

Tool	Key Similarities	Key Differences
Regulatory Riparian Buffers	Standards • Use buffer area to protect riparian zone functions and values. • Regulate development activities on site-by-site basis. • Buffer widths based on protection of ecological functions, using assessment methods designed by agency staff. • Certain types of activities are exempt from regulation or allowed to encroach into buffers. • Mechanisms in place to vary buffer widths to take into account site-specific conditions. Implementation • Concerns expressed about implementation of regulations and overall compliance. • Limited assessment of cumulative impacts. Both expanding efforts to look at watershed scale processes (e.g. Water Sustainability Plans as well as pending comprehensive evaluation framework for the RAR in BC and Watershed Characterization process in WA)	Standards • Wider prescriptive buffers in WA. • Buffers in BC apply to residential, commercial and industrial uses, whereas in Whatcom County buffers apply to wider range of activities, including on-going agricultural practices (unless a Farm Management Plan is completed). • Wetlands are addressed more specifically in WA (e.g. wetland identification and delineation methods, classification approach, mitigation standards). • More developed guidance and emphasis on mitigation in WA (e.g. mitigation sequencing, mitigation ratios, mitigation banking, etc.). • Principal of No Net Loss integrated into review of projects on larger stream systems (>20 cfs) in WA, due to Shoreline Master Program. (Note: There is no similar unified coastal protection program in BC). Implementation • Use of professional reliance model in BC (though many lower mainland municipalities also have local review processes with staff review of projects). • Local municipalities have limitations on their authority to modify buffer area defined in an assessment report prepared by QEPs.
In-Water Work	Standards • Activities within stream channels and wetlands addressed. • Regulate development activities on site-by-site basis. Implementation Limited assessment of cumulative impacts. Both expanding efforts to look at watershed scale processes (e.g. Water Sustainability Plans as well as pending comprehensive evaluation framework for the RAR in BC and Watershed Characterization process in WA)	Standards Different management authorities – in BC, most activities in stream channels addressed by Province or Federal government (but declining role of Federal government), while in WA activities in wetlands addressed by all levels of government and activities in stream channels addressed at local and state level. Implementation Strong federal involvement (Corps) in wetland dredging and fill activities in WA, whereas federal involvement is declining in BC.

Tool	Key Similarities	Key Differences
Non-point Pollution Control	Standards • Focus is on voluntary compliance, with education and technical assistance. • Both updating standards for nutrient management from dairy operators. Implementation • Permitting and/or registration system in place for dairy operators (either through CAFO NPDES permit under Clean Water Act or Dairy Nutrient Management Act in WA, and the Environmental Management Act Schedule 1 permit in BC) • Other agricultural operators generally do not require permit authorization, but compliance with applicable water quality or pollution prevention standards is legally enforceable. • Concerns expressed about implementation of regulations and overall compliance.	Standards • Generally, more prescriptive standards in WA, with BC emphasis on broader policy outcomes. • Surface water quality standards established in WA, which if not met result in listing surface water as impaired. Requirement for development of TMDL program when waterbodies are listed as being water quality impaired. In contrast, in BC, water quality guidelines have been established, which are policy statements and do not have same legally binding requirements for water pollutant reduction planning. No water quality objectives have been established for the watershed.
Subsidy and Market Approaches	Both investigating types of ecosystem marketplaces to provide financial assistance and incentives for agricultural producers to protect and restore riparian and wetlands areas.	• More funding mechanisms currently available in WA to support preservation and restoration activities.
Education and Voluntary Approaches	Both have programs in place.	Contributions of salmon recovery and clean water federal funds have allowed significant work to be carried out in the Puget Sound
Collaborative Governance	Both have evolving forms of collaborative governance.	Federal and state enabling legislation for salmon recovery, coastal management, and watershed planning has fostered a broader framework for interagency and multi-stakeholder collaborative governance in WA, occurring at multiple scales.

Areas of Convergence

Looking across the border, officials in Canada and the United States manage riparian areas and wetlands in many similar ways. Both use a mixture of command-and-control and other management tools. There are a variety of different command-and-control tools, including implementation of fixed-buffer widths, protection measures for in-water work, and point and non-point pollution prevention strategies. Both are actively working on nutrient management – in Canada by amending its Agricultural Waste Control Regulations and in Washington State by amending its permitting for Concentrated Animal Feeding Operations and conducting on-going registration and inspections of dairy operators.

Despite the connectedness between different issues (e.g. water quality, riparian areas, wetlands, in-water work, sector-specific pollution prevention), both address issues through a variety of regulatory mechanisms. As a result, different agencies have authority and mandate for specific issues, potentially resulting in a silo-approach. Multiple agencies operating at different scales may have overlapping jurisdiction, but may be unaware of each other's activities or unable to combine resources to address larger issues. In some settings, interagency coordination is used to resolve these issues, but this is often done in response to an emerging or persistent problem or when temporary funding to support coordination becomes available.

Further, both largely manage issues at the individual site-by-site level, rather than on a watershed-scale. This is partly due to the design of the management strategy, which is responsive to potential impacts from development activities or pollution hotspots. Local agencies have increasingly been delegated a larger role in managing these issues, due to their interactions at the site-specific level, leading to the potential for a variety of different management approaches. Both are taking steps to balance their management approach, integrating small-scale tools (e.g. buffer areas along riparian corridors) with basin-wide planning strategies such as watershed assessments, consideration of cumulative impacts and no net loss. Yet, both currently lack systematic monitoring mechanisms to gauge changes in habitat over time. For instance, the Puget Sound Partnership and Puget Sound Ecosystem Monitoring Program have teamed up to provide an overview of the progress in Puget Sound recovery. The *State of the Sound* tracks progress toward meeting six recovery goals established by the Washington State Legislature, using 21 different monitoring metrics. The metrics used account for habitat gains over time, by tracking miles of riparian restoration. However, there are no indicators accounting for the degradation or loss of riparian habitat (Puget Sound Partnership 2015). As a result, there is no information in this report on whether these types of habitats are disappearing faster than they are being protected or restored. British Columbia is initiating a research effort to develop a comprehensive evaluation framework for the RAR, but that work is not yet underway.

Finally, both are struggling to balance competing values in a highly politicized environment. In both British Columbia and Washington State there are significant tensions between parties that are concerned about overregulation and infringement of individual rights, and parties who are concerned about loss of community resources. There are also concerns about shoehorning activities and property into a one-size fits all management approach that is not reflective of the variety of environmental conditions and risks within watersheds.

In response to these pressures, collaborative frameworks for watershed stewardship and restoration have started to emerge on both sides of the border.

Areas of Divergence

Despite many similarities, there are differences of note. First, the riparian and wetland buffer area protections are more restrictive in Washington State, largely due to the integration of buffer protection as a key strategy in minimizing further threats to endangered salmon species habitat. In addition, the mandate for protection of critical areas planning was put into place earlier than in British Columbia (1995 versus 2004) allowing time for standards to evolve and adapt. This is especially true for Washington State's mitigation policies, where the Department of Ecology has recently been able to develop and distribute guidance for mitigation measures and authorize the establishment of mitigation banks.

The implementation approach is an area of divergence. British Columbia has adopted a Professional Reliance Model for many different programs, including the Riparian Area Regulations. Under this model, qualified environmental professionals hired by the project proponent are responsible for ensuring that the proposal is consistent with the Riparian Area Regulations. Agency staff do not have authority to require the professional to modify information contained in an assessment report. In contrast, in Washington State, proponents are required to hired qualified professionals to interpret and assess project compliance, but this analysis is peer reviewed by either agency staff or peer qualified professionals. In addition, as opposed to Washington State where there are permitting requirements that typically go hand-in-hand with prescriptive standards, British Columbia is exploring a risk assessment framework for its nutrient planning efforts. This could allow farmers to continue to operate without permit authorizations or approvals by government agency staff – operators are thus tasked with managing risks and ensuring their operations are conducted in compliance with established policies and regulations.

Further, in Washington State, there is a coordinated coastal zone management planning – there is no similar program in lower mainland British Columbia. This provides an additional opportunity for local jurisdictions to consider cumulative impacts and consider how to manage issues at the watershed-level to prevent and/or restore impacts from both on-going and new development.

In Washington State, litigation continues to have a significant impact on environmental management. Related specifically to riparian and wetland areas, there are several issues that have been or are in the process of being addressed through litigation, including

- Requirements for Washington State to repair or replace culverts that impede salmon migration to or from spawning grounds, in violation of tribal treaty rights (Note: The decision in this case is currently being appealed by Washington State in 9th Federal Circuit Court of Appeals),
- Requirements for Federal Emergency Management Agency (FEMA) to modify its floodplain management criteria to ensure that development does not adversely affect salmon habitat needs, in violation of the Endangered Species Act (Municipal Research and Services Center 2016), and
- Assessment of the potential impacts of pesticides on threatened and endangered species and aquatic ecosystems to ensure that pesticide use is not a limiting factor in the recovery of threatened and endangered species in Washington State, in violation of the Endangered Species Act (Washington State Department of Agriculture 2015).

Tribes also appear to have a more significant role in management issues, in part due to their treaty-protected rights. The instream water flow provides a good example of this. Tribes are actively seeking

to quantify and protect their water supply and water quality both on- and off-Reservation through negotiation and litigation, if necessary. The resolution to these issues will likely need to be an integrated approach that addresses instream flow levels, fish habitat impacts, water quality impacts, and include enforcement and accountability measures (Confidential Interview 2016), which has the potential to significantly modify current management approaches.

With respect to funding preservation and restoration, Washington State appears to have more funding capacity than is currently available in British Columbia. For example, the Puget Sound Action Agenda Report Card reports that over $304 million has been budgeted for salmon recovery efforts in Puget Sound for the years 2014 to 2016 (Puget Sound Partnership 2016)[41]. This is larger than the Canadian federal government's $252 million investment in the 5-year National Conservation Plan (Department of the Environment 2014).

In addition, in recent years there has been significant disinvestment in federal funding for environmental management activities and, as a result, declines in staffing levels and resources at DFO and other agencies involved in environmental management (Confidential Interview 2016). This may change with a shift in government, but there has been loss of capacity and knowledge that may take time and effort to recover.

Washington State also appears to have more mechanisms for collaborative governance in place, with federal and state-enabling legislation for salmon recovery, coastal management, and watershed planning. Collaborative watershed governance is present in British Columbia, and is expected to be more active with the recent enabling legislation provided in the Water Sustainability Act.

PATHWAYS FORWARD FOR COLLABORATIVE TRANSBOUNDARY MANAGEMENT

Collaboration has a variety of definitions and names but is generally treated as meaning the cooperative way that two or more entities work together toward a shared goal. Collaboration has the potential to provide many benefits in a transboundary environmental management context, among them:

- Building a level of trust between stakeholders,
- Recognizing areas of mutual interest and potential joint action,
- Recognizing areas of overlap and gaps or inconsistencies,
- Identifying and working through areas of potential conflict,
- Creating a fuller understanding among stakeholders of the values, policies and statutes that drive funding and practice issues,
- Identifying opportunities to leverage investments, resulting in less duplication of efforts and improved efficiency, especially in times of limited funding, and
- Allowing for a more holistic, coordinated, and integrated response to the multiple stressors that impact a common resource.

Collaboration can take many forms, reflective of the existing context, institutional arrangements, and agreements. There is no one-size fits all approach, reflective of the spectrum of collaboration that exists – on one side are loose relationships, focused on establishing connections and networking, while on the other are integrated collaborative relationships, in which stakeholders belong to one system that may

[41] Within the boundary of the case study, funding has supported Whatcom County efforts to buy the development rights, in perpetuity, of local agricultural land (Project 08-1638).

have a unified, consensus-based decision-making structure. A number of varying factors can influence the level of commitment to collaborate by different stakeholders in a transboundary context, including:

- Values – Parallel norms and values exist that are used to guide choices.
- Trust – Mutual trust in one another, allowing for open dialogue and exchange of ideas.
- Knowledge – Sufficient, correct information is available to allow for a thorough understanding of issues.
- Capacity –Sufficient resources and knowledge allow for participation.
- Voice – Multitude of views are recognized and considered.
- Credibility and Openness – Process has broad-based involvement and has community support.
- Accountability – There is a potential for delivery of benefits as a result of participation.
- Autonomy – Participants retain their sense of sovereignty and the ability to act on behalf of their constituents.
- Equity - There is fairness in decision-making and the distribution of benefits.
- Support – The stakeholders have confidence in the longevity of the collaborative effort.

The following section will provide a brief assessment of the opportunities and barriers for collaborative transboundary governance in the Salish Sea.

Collaborative Assessment

The following collaborative assessment attempts to distill the outputs from this research to assess whether the conditions are ripe for collaboration, whether it is necessary, and whether it is possible. This initial assessment considers the history and context for cooperation, the shared sense of purpose, and the ability to initiate collaborative efforts.

History and Context

An understanding of the context and history of cooperation can help to determine if there are existing opportunities or barriers that may affect the likelihood for cooperation. This case study analysis has revealed that there are many parallel efforts occurring between British Columbia and Washington State, including:

- Implementing fixed-buffer widths for new urban development;
- Promoting environmental farm planning to reduce the impacts from agricultural activities;
- Revising nutrient management planning provisions to respond to evolving management practices and pollution impacts;
- Implementing projects to fund agricultural operators to preserve and restore riparian areas; and
- Working with community-based organizations to undertake monitoring and watershed planning and restoration activities.

While there may be differences in the specific approaches taken to address particular issues, this degree of parallel or aligned action suggests that there are similar underlying values that are pushing forward action on riparian and wetland areas, namely the value of clean water. Further, in the area of the Bertrand and Fishtrap watersheds in particular, there is a strong connection to agricultural based economies and resulting shared value around agricultural vitality (Anaka 2012).

Despite the apparent presence of areas of mutual interest, there are limited efforts thus far to move beyond working in parallel to collaboration. There are some notable exceptions to this: 1) Federal engagement around the Salish Sea under the Joint Statement of Cooperation; 2) State/provincial engagement around the Salish Sea under the Environmental Cooperation Agreement, and 3) Non-governmental organization collaboration across the border.

So far, there are limitations with these three endeavors and their involvement in issues influencing riparian and wetland management. The federal cooperative agreements have thus far not translated into relationships with organizations working at the local scale within small watersheds like the Bertrand and Fishtrap[42]. The state/provincial relationship did involve work at the local level, such as the Abbotsford-Sumas Aquifer, but these were associated with commitments from both parties to form a specific Task Force for this purpose, and engagement appears to have waned over time.[43] Non-governmental interaction has been a key area of collaboration, but it has been largely ad hoc, related to specific issues like nutrient management planning.

There are also challenges with current riparian and wetland management approaches that may act as barriers. While participants noted the need to rescale protection and preservation efforts to better integrate watershed-level issues, there were also concerns expressed that the current management approach, which is largely focusing on fixed-width buffers managed at the local level, functions as a barrier to this rescaling effort.

> *"While you have really great hydrologic and water quality processes that are being protected, habitat - riparian and upland habitat - is the thing that loses. Larger tracts of upland connected corridors are continually being sliced away…If you could get things to be done at watershed level, you could achieve that in a better way, you could connect corridors that is really hard to do on a piecemeal basis."*

Participants also noted a disconnect between local regulatory management and regional planning at the watershed scale. Government officials contacted for this study reported that there is a lack of crossover from permitting to watershed planning.

Thus, there appear to be challenges working at both the local and large-scale. The tradeoffs between these different spatial scales is reflected in this comment by a government official:

> *"There is a lot of data and there is an understanding that we need to work at things at a watershed level, it is just that when it is broken up into five different cities, they don't cooperate in the way that you hope. The other thing that is happening in the State is that there are WRIAs [that are implementing the salmon recovery funding] - those are being managed at larger levels…the Puget Sound Partnership is thinking at the watershed level, but it gets bogged down when you start to implement something."*

Further, coordination between agencies operating at different scales does not always result in collaboration. As noted by one government official:

[42] Though the recent focus on water quality has the potential to lead to further action in this area.

[43] Anaka (2012), who surveyed stakeholders working in the Bertrand and Fishtrap watersheds, identified a lack of knowledge about transboundary federal and provincial/state collaboration efforts, but did identify interest from respondents in trying new forms of transboundary management.

"[An] intergovernmental approach can be a strength and a real weakness. If we are all on the same page with what is happening, it can be really strong. In the past, there were cases where we are all concerned - at all levels - and we all work together well, and it is difficult for developer not to do right thing if all three levels [of government] are on them. In that case it can be great. You can get some really good working relationships with local governments and DFO. But it can also go the other way…At the staff level, there might be that appetite to work together, but there might be political reasons that make it difficult. There can be all these different aspects."

Shared Sense of Purpose

In addition to context, an assessment of whether there is general agreement on the problem or a shared sense of purpose is key. A review of the information gathered as part of this study suggests that there may be an opportunity to build off the sense of shared geography that is present.[44] A consistent theme raised in this case study is the importance of shared geography – the watershed connects these border communities across otherwise rigid political and institutional boundaries. As one study participant noted:

"Regardless of whether there is a border, it is very arbitrary – water flows and air flows. If we are impacting the environment, it does not stop at the border – we do know that. It is that recognition that what we do impacts others and how we deal with it also impacts others."

Some participants noted that reorienting the discussion to focus on the watershed as a whole can build a broader sense of place that could then serve as a catalyst for further coordination. As noted by one participant:

"I think [coordination] makes perfect sense. Bertrand – look at all this great stuff that is going on. Wouldn't it be great if we had a bigger picture watershed approach to that? Instead of 'They are doing this, but we don't have access to the North. We are doing this, but we don't have access to the South'. How can we better work together to share this information so that we can get a broader picture and therefore better management?"

Where there was a strong history of coordination, it typically coincided with a focus on a common issue of mutual concern and shared goals. Coordination across the border on agricultural related activities provides a good example. Agriculture is a key economic component for the borderland area in the study area. Research and information has been exchanged across the border for a number of years in order to promote these activities, while limiting their environmental impacts. This work has now extended itself to coordination on nutrient management planning.

Similarly, salmon recovery has motivated governments to better coordinate in Washington State. As noted by one participant:

[44] This is consistent with findings by Brown (2015) who noted that the shared nature of regional resources provides a strong motivation for cross-border cooperation. Networking and information exchange are key to building regional connections across the border.

"[Participation in WRIA 1 planning] helps us coordinate and get everyone on same picture as to what is important to Whatcom County - the cities might have some different priorities, we may have some other priorities, but we get together through these processes to iron those out."

Some of the participants contacted for this study expressed concern that on-the-ground work is bogged down at larger scales, such as with salmon recovery efforts of the Puget Sound Partnership. As noted by one participant:

"WRIA 1 project is very ineffective because it is top heavy, very administrative, very little gets done on the ground. It is very irritating to sit back and see how much time is spent on administering a concept, but nothing ever happens on the ground."

The framework around critical area and shoreline planning, with its focus on no net loss, has also focused attention on common goals. As noted by one agency participant:

"Having stronger management approach all along these reaches and watersheds is important because we do have these issues…Having a cooperative approach as we look at our plans – and that is what part of what the Growth Management Act requires us to do…look at how things come into one jurisdiction and leaving that jurisdiction into another – making sure we have some consistency through that in standards and management. Our approach to that management may be a little more flexible [than other jurisdictions], but we are also working on the same goals – no net loss of functions and values, improving water quality – we all have those same goals in mind as that ultimate task that we are working toward."

Several participants noted issues that have arisen when there was not an identified issue of mutual concern and shared goals. As one participant noted:

"On the federal level, Bertrand has always gotten less attention because DFO views the fish in Bertrand as U.S. fish because they come from Bellingham Bay, up the Nooksack. DFO has not provided the level of support... there has been lower level of support, so the stewardship groups have stepped up to fill this role."

Water quality concerns in the study area also appear to be hampered by a lack of collective responsibility for existing problems. Several participants noted a tendency for stakeholders within the watershed to deflect blame for water quality issues onto others, rather than collectively recognizing issues and moving toward solutions. As one participant noted:

"We are not just talking about U.S. Bertrand or Canada Bertrand; we are talking about Bertrand as a whole system. That is where a lot of it comes from. It is being able to take an approach that is not just looking at one side or the other, or one focus or the other."

Thus, it appears from this research that the idea of reaching across traditional boundaries and working in greater collaboration holds promise, though there are some potential barriers related to trust and the identification of shared problems to overcome.[45]

[45] It should be noted that Anaka (2012), who surveyed stakeholders working in the Bertrand and Fishtrap watersheds, identified a difference between WA and BC respondents' level of personal involvement in issues related to transboundary watershed management. Anaka attributed this finding to different potential causes,

Fostering Collaborative Efforts

As noted above, there have been some previous efforts toward transboundary collaboration, yet there appears to be potential appetite for additional or continuing evolution of these existing efforts. This section will discuss several conditions that may foster collaborative efforts.

Convening and Relationship Development

Information exchange and networking are key components to fostering collaboration – it is, in many ways, the basis for collaboration. Continuous communication among collaborative stakeholders[46] allows participants to build up experience with each other and recognize and appreciate common motivations and values. Further, it allows them to see that their own interests will be treated fairly. It further allows for cross-pollination of ideas. Information exchange provides the necessary data to support decisions, and allows stakeholders to feel confident that decisions are made based on objective evidence. Fostering this type of information exchange and networking takes energy, time and commitment. Even the process of creating a common vocabulary takes time, and it is an essential prerequisite to developing effective communication.

A review of the information gathered as part of this study suggests the importance of information exchange and networking, but also the barriers in meeting this need. Connections, communication, and dialogue were all identified as necessary components to support coordination of activities.

> *"The more we communicate what is happening, what are our concerns, what we are doing with other people in other jurisdictions and other agencies, the better it is."*

Conversely, lack of communication and information exchange were identified as barriers to more effective collaboration.

> *"One of the other things I have had problems with in a communication aspect is just understanding what is out there and what information is available. Communication thing between researchers, academics and field staff. That has not always been as good as it could be."*

The Salish Sea Conference was identified as an opportunity, where scientists, citizens, industry, and policymakers could convene to share information. While this type of convening was recognized as contributing to a sense of collaboration, some participants noted that those activities could not be sustained after the event, largely due to other pressing priorities and resource constraints. This points to a large barrier to fostering communication and information exchange: lack of resources.

---

including: WA being the downstream resource user, and the smaller, local government approach that is used in WA. Anaka (2012) noted this difference as a lack of social capital, which may provide a hindrance to transboundary collaboration.

[46] Identification of stakeholders is an important task of any collaborative effort, and requires a consideration of the people, interest groups or organizations that are necessary to implement solutions, can block action, or control needed resources. This study did not reach all potential stakeholders that may be involved in collaborative efforts, suggesting an area of further study.

This case study also highlights ways in which information exchange and networking can lead to mutual benefits and potentially serve as a catalyst to move beyond parallel action. First, the Bertrand Watershed Improvement District convening in Summer, 2015 brought together numerous stakeholders in the watershed to learn about environmental monitoring and initiatives that were occurring within the watershed. Out of this conference, connections were made that eventually led to a collaborative effort between the Washington State Department of Health and the Langley Environmental Partners Society (LEPS) to complete fecal coliform monitoring in BC that will help to further identify pollution hotspots and sources. This information will allow LEPS to move forward with plans to implement projects in BC that will reduce pollutant loading to these upstream waters. Second, the Whatcom Conservation District has long collaborated with different agricultural organizations in BC, allowing for the exchange of information that is leading to the ARM pilot project in BC to modify nutrient application in fields to reduce pollutant loading in these upstream waters.

Leadership

Another key component to collaboration is the presence of champions that can serve to galvanize action. Champions can help to build political and institutional will to promote the need for collaboration. At this time, it appears that while there may be champions operating separately on different issue areas within British Columbia and Washington State, there is a lack of strategic leadership to promote the idea of transboundary collaboration in the area of riparian and wetland management. This appears to be a key gap, but it may only be filled if there is sense of urgency around the problem or strong agreement that a shift in existing collaborative arrangements will result in additional benefits. Riparian and wetland management may need to be linked with other efforts, like a broader focus on water quality and instream flow.

Involvement of Coast Salish Peoples

Coast Salish peoples have a vital role to play in any collaborative initiative to ensure that the initiative and related activities appropriately respect treaty rights and title to traditional lands and waters.

Identification of Scale(s) for Effectively Addressing Problems

As exemplified in this case study, local governments in lower mainland British Columbia and Washington State now have a key regulatory role in managing development activities within their respective jurisdictions located near streams and wetlands.[47] This role stems from their authority for land use and development. This suggests the need for transboundary collaboration to have the support from and partnership with local government to ensure appropriate local context and accountability.[48]

[47] This is consistent with much analysis of environmental management and the role of subnational actors, which has identified that more localized actors have overtaken a larger responsibility for environmental policy formation and implementation, due to devolution processes taking place in both Canada and the United States (Brown 2015).
[48] Brown (2015) addresses disagreements among researchers over issues of scale, concluding that the scale at which management issues exist has a major influence on both the degree to which collaborative processes and entities are formed and the success of these endeavors. This caused Brown, in his evaluation of several collaborative initiatives working at different scales (e.g. local, regional, and federal) to conclude that there are greater potential effectiveness of local efforts across smaller regions, which can garner a greater degree of local participation and leadership, over larger coordination efforts that involve a larger number of players and federal involvement. Local involvement is also identified as a key condition by the Fraser Basin Council (2015). Anaka (2012), who surveyed stakeholders working in the Bertrand and Fishtrap watersheds, also identified that support for transboundary collaboration declined if it was designed to occur at higher levels of government. Anaka found

As noted by several government officials participating in this research, the integration of local management also ensures that local values are considered when decisions are made about development activities that may impact streams and wetlands. As stated by one official:

> *"It makes more sense for local governments to protect streamside areas because we can do that as part of development. We can look at not just streamside component of things, but also other things like risk management, making sure we are protecting streams and ravines slopes from erosion, climate change and other factors. When you have other levels of government approving setbacks around streams and these setbacks only recognize fisheries values and not these other matters that can affect local governments, it can create a lot of challenges years down the road when we find that these setbacks were not big enough and we have stream erosion, slope bank, etc."*

It also provides a local perspective in balancing competing interests that occur during development activities. As stated by another government official: "My job as a regulator is to try and make it understandable and find that balance between practicality and protection."

Yet, there are concerns that the flexibility for local governments to develop and implement regulations creates an uneven patchwork of laws and policy. As a government official from Washington State noted: "There can be day and night difference in approaches…both the rules themselves and how rigorous they are implemented."

There are also comments about the way in which multiple agencies are involved in regulating resources, which often result in different rules for different types of activities (e.g. agriculture, forestry, and urban development). As noted by a British Columbian government official:

> *"We have so many different laws and depending on what you are doing, have to protect riparian to some extent, but then other activities there may be no protection. There is kind of a patchiness to what we protect, and that is probably true in a lot of places. We struggle with whether you put all your protection in one place, or do we just keep it by activity and hope it is all covered. That is a big challenge for us."*

A Washington State government official concurred, adding:

> *"There are lots of different levels to this, which makes it super complicated and why everyone always goes 'there are too many regulations."*

With this rescaling to local levels, there is a potential danger that these organizations do not have the resources, capacity, or leadership support to administer the regulations. Several government officials participating in this study expressed concern about the challenges that local governments face in administering riparian and wetland area regulations. As noted by the Puget Sound Partnership's 2014-2015 Action Agenda,

---

WA respondents supported local scale of government, while BC respondents favored a mixed approach. However, there are researchers who have raised issues that local involvement does not necessarily translate into more decision-making power, which may impact overall effectiveness of these mechanisms (Norman 2012 and 2015).

> *Local governments operate in a highly dynamic environment with various levels of laws and regulations governing planning for land development. They must balance economic and ecological pressures along with adherence to local, regional, and state laws and regulations. Further, local conditions, demographics, and preferences factor into local land use decisions. In our resource-constrained environment, the ability of local governments to implement and support the land development and cover strategies is both the single most important success factor and also the most challenging (Puget Sound Partnership 2014, p. 3A-8).*

Shifting political priorities can affect funding and resource allocation for permit review, monitoring, and compliance. The sentiment that politics plays a major role in implementation of laws and policies (and at all levels of government) was a dominant theme among participants.

If local governments are experiencing challenges within, it makes it that much more difficult to collaborate with others, as there may not be a mandate or priority placed upon coordination and collaboration. Several government officials participating in this study indicated that they do not have the time or resources to focus on coordination issues. As explained by one participant:

> *"How does that fall into political will? …is the Mayor or Council telling staff that we should be working at a watershed level and you should be talking and sharing information? Probably not…it is not on their radar. Maybe a little more at the federal and provincial level, but not at the municipal level. They are looking at their land, and not at that bigger picture."*

Another participant echoed this concept, noting:

> *"[Government agencies] will do something when [they] get the money and the staffing to do that, and that is not going to happen until politicians hear a cry from the populace, and right now…residents don't care enough to complain. It is painfully obvious that if you are not squeaking, you are not going to get any grease. So, no, [government agencies] have other things they are working on."*

A government official explained the competing pressures for time and lack of resources as follows:

> *"I don't [work with colleagues across the border]. I am the only professional planner on staff. I can barely can keep my head above water, without doing anything that is advancing something else. I spend most of my time putting out fires, rather than working proactively."*

Representatives from non-government agencies working at the local level reported a much different experience. These organizations, by their design, work as a bridge between government, citizens, property owners and industry operators. With the establishment of collaborative planning enabling legislation they are increasingly taking on a larger role in riparian and wetland area management, particularly in prioritizing and implementing preservation and restoration activities. These organizations have been involved in cross border work. Participants noted that this is largely due to different models of conducting business – whereas local jurisdictions need a mandate and funding to support activities, many non-governmental organizations must innovate in order to find funding resources, leading them to explore working with new partners and engaging in new activities. As one non-governmental agency participant observed:

"I don't see that kind of entrepreneurial initiative from bureaucracies. We are an exception because we live on grants and if we don't produce people will not invest in us, so we are always hungry."

If local government involvement is seen as a key condition of transboundary collaboration, this study reveals the need for more support to build the local capacity to engage in these efforts. Further, there needs to be work done to ensure that there are issues of mutual concern and shared goals; if these components are not present, discussions can quickly devolve and efforts toward developing cooperative solutions can stall.

Capacity

While there was strong need for coordination across the border identified by participants in this study, one of the principal barriers noted was lack of resources to support coordination. As noted by one participant:

"For us, it all comes down to workload. There are only so many work hours in day… [It is] important to work with [people on the other side of the border], but there are enough issues to work on in this side of the border."

Having the resources to support on-going coordination was noted as a potential opportunity to expand coordination. As noted by one participant:

"People get busy in their own stuff and their own priorities (in all levels), to have those people to be able to move it forward and bring people together (to take on that coordination role) - I think it goes a long way."

However, resources can be impacted by a number of factors, including political climate, the priorities of the funding agency, and even staff turnover.

The border itself was also noted as a major barrier. It adds significant administrative requirements and travel across the border may be limited by funding or other mechanisms. Also, despite the connected resources, the border does carry with it very real policy differences that can impact respective management approaches. As noted by one governmental representative:

"There are different political jurisdictions, we have different regulations and rules and laws. So while we are doing one way here, it might be done a different way there. That is just inherent and we cannot do much about that. Regardless, it comes down to talking, communicating, working with and collaborating with people and saying 'Hey we have this same issue to deal with and maybe being a little open to see how you are doing it."

CHAPTER FIVE: CONCLUSION

Finally, this section outlines major conclusions, as well as identifies areas for further study, and personal reflections.

KEY STUDY FINDINGS

This study had several main objectives: to describe how wetland and riparian policies and management approaches were converging or diverging, to compare how the two management systems in British Columbia and Washington State work, and to identify what formal and informal institutional arrangement potentially limit or foster transboundary watershed management.

An analysis of the policy tools used on both sides of the border (e.g. regulatory, subsidy and market, voluntary and education, and collaborative governance) reveals that officials in British Columbia and Washington State manage riparian areas and wetlands in many similar ways, using a mixture of regulatory and non-regulatory tools. Both are moving to address concerns expressed about implementation of regulations, as well as consideration of cumulative impacts.

Viewed from this perspective, there appears to be alignment in key policy areas, including:

- Implementing fixed-buffer widths for new urban development;
- Promoting environmental farm planning to reduce the impacts from agricultural activities;
- Revising nutrient management planning provisions to respond to evolving management practices and pollution impacts;
- Implementing projects to fund agricultural operators to preserve and restore riparian areas; and
- Working with community-based organizations to undertake monitoring and watershed planning and restoration activities.

Despite this similarities, there are areas of divergence. There are mismatched approaches to riparian buffer widths, functional assessment methods, and delegated responsibility for ensuring compliance with riparian area regulations. There are also differences in approaches to coastal planning, litigation, funding resources, and mechanisms to support collaborative governance.

Moreover, despite the degree of existing alignment, there has been continuing decline in the health of the Salish Sea and within the study area, suggesting that more work is needed to collaboratively identify and implement shared solutions.

The degree of similarity or parallelism that is present provides several opportunities to support transboundary collaboration toward shared solutions. First, it suggests that there are similar underlying values that are pushing forward action on riparian and wetland areas, namely the value of clean water. In agricultural areas such as the Bertrand and Fishtrap watersheds, these values also extend to agricultural vitality. Second, it provides a similar management framework that can be leveraged to build the foundation for trust and knowledge exchange. In other words, if there are similarities in the basic management approaches across the border, these similarities can provide a springboard from which parties can share information on mutual problems and collaboratively identify and implement solutions. Third, it can highlight areas where simultaneous action is taking place, providing an opportunity for cross-pollination and integration of efforts. In this case, several related and simultaneous efforts appear

to be underway on both sides of the border, from nutrient planning, farm planning, development of ecosystem service markets, to cumulative impact and watershed-scale assessment. These initiatives provide an opportunity to, at minimum, learn from or leverage the work of each other, and potentially further to integrate efforts.

Identifying areas where there is a lack of alignment is also important, providing an opportunity to reveal and acknowledge potential differences in values or priorities. Thus, while there may be shared values centering around clean water that provide an opportunity to bring parties together, there may also be differing values about the role of government, social responsibility, and other issues that may serve as obstacles to collaboration. While lack of policy alignment may not be a barrier in itself, it must be carefully considered in collaboration efforts to ensure that coordination is not stymied by issues of accountability, autonomy and support.

A review of transboundary collaboration efforts reveals that there are existing pathways for information sharing. There have been clear benefits deriving from these efforts. For example, this study highlighted the catalytic power of information exchange in leading to additional collaboration, as groups such as Langley Environmental Partners Society and the Whatcom Conservation District were able to build on existing avenues of information exchange to create new transboundary projects, which may in turn result in long-term benefits to water quality.

In talking with the individuals in this study, however, there also appear to be limitations to these existing efforts. First, it appears that this exchange is not consistently reaching all stakeholders, particularly those at the local level as well as Coast Salish peoples. The Task Forces that were established under the BC-WA Environmental Cooperation Agreement, which did include local governments, are a notable exception to this this, though these initiatives were narrowly scoped to address a limited number of place-based issues. Second, it appears that many areas where there are related and simultaneous efforts occurring on both sides of the border are not being addressed through these existing collaboration efforts – this is a lost opportunity. Finally, in the spectrum of collaboration, efforts have been largely targeted toward base level, minimally integrative forms of collaboration: namely information sharing. While information sharing is a key component and important building block for collaboration, alone it may not be sufficient to support the system-wide transformation needed to restore and preserve the health of the Salish Sea.

Thus, it appears that there may be appetite for the evolution of existing collaboration mechanisms or the creation of new ones. Despite this appetite, there are barriers to more integrative forms of collaboration, including:

- *Lack of resources to maintain avenues for communication and information exchange over the long-term.* While events like the Salish Sea Ecosystem Conference can provide opportunities for cross-pollination, some participants noted that there was no way of sustaining coordination between these types of events. This point drives home the need for sustained information sharing, networking, and building and maintaining relationships at the working level and at the different scales at which management is occurring. A backbone administrative body is likely needed to facilitate this needed level of coordination over the long-term;
- *Lack of strategic leadership or champion(s) that would promote the value of transboundary collaboration.* There needs to be more coordinated messaging to a range of stakeholders about the potential value of collaboration, less this type of activity be consumed by other priorities in a resource-constrained environment. Further, there needs to be more effort to build the political

will to support collaboration – without broad-based community support and buy in from leadership at local levels, political pressures and bureaucratic inertia can thwart these activities. Community groups such as Langley Environmental Partners Society and Watershed Improvement Districts in Washington State may function in a unique position to bridge this gap.

- *Lack of clear identification for the scale at which collaboration should occur.* There is currently limited transboundary collaboration that involves local communities, yet this is the site where many management decisions occur that impact riparian and wetland areas. If local government level involvement is going to occur, it will likely need to be supported by additional funding and resources. If collaboration remains at higher levels, there will need to be added support to better involve representatives from local areas that may be most impacted by or are tasked with the responsibility to address issues of mutual concern.
- *Lack of capacity and funding support.* This is a unifying theme throughout this study. Collaboration takes time and effort, and without the funding to support this, nor the support from organizations to do so, these efforts will languish.

These observations echo, in part, other findings stemming from transboundary work on the Salish Sea, such as Anaka (2012) and Norman and Bakker (2005).

If collaboration efforts are going to evolve to address some of the identified limitations, new forms will need to respond to the issues highlighted above concerning information exchange and networking, leadership, involvement of local levels and Coast Salish peoples, identification of the scale(s) at which collaboration should occur, and capacity. Further, collaborative efforts will need to be responsive to the varying factors that can influence participants' commitment levels, including values, trust, knowledge, capacity, voice, credibility and openness, accountability, autonomy, equity and support.

AREAS FOR FURTHER RESEARCH

Due to time and resource constraints, a limited but important collection of voices from various stakeholders are represented herein – there are clearly many additional important stakeholders that should be consulted. While there are no specific recommendations for fostering collaborative transboundary governance provided herein, this study does provide a comparative analysis and preliminary assessment of collaboration that could be extended by other researchers to provide detailed recommendations.

The experience and role of the Coast Salish peoples is not fully integrated into this analysis. Alliances with Coast Salish peoples is an integral part of watershed collaboration, yet how to involve representatives in discussions of transboundary governance is challenging, as the very nature of the discussion can reify the idea that watersheds exist as bordered landscapes. This study does not address this important issue, but suggests it is an area for future research.

Urban development and agriculture were the main 'sectors' focused on in this study, due to the place-based issues arising out of the study area, but it is recognized that there are other important contributors to impaired water quality conditions. Future research could examine other issue areas, including forestry activities, urban stormwater runoff, and wastewater management, to name a few. In

addition, policy research to address transboundary collaboration on watershed-scale land conversion would provide an intriguing and important area of research.

While this research identifies areas where existing management approaches do not align, it stops short of identifying whether these areas of divergence serve as barriers to transboundary collaboration. Future research should begin to address to what extent this lack of alignment impacts the potential to collaborate and whether avenues exist that could better align the management systems.

The study incorporates the concept of a spectrum for collaboration, as well as factors that may influence participants' willingness to engage in collaboration and at what level along the spectrum. Future work could extend this idea to consider where along the spectrum transboundary collaboration should occur and under what context and conditions. In other words, future research could explore when it would make sense to move from information exchange to more in-depth forms of collaboration.

REFLECTIONS

This work is the culmination of several separate but integrated research initiatives supported by the Border Policy Research Institute. These studies collectively provide comprehensive, baseline materials to support larger efforts to assess the value and possibility of developing a cross-border policy framework for governance of the Salish Sea. These products include: 1) a baseline inventory of the policies (ranging from local to federal) and the policy actors (including governmental agencies, NGOs, and indigenous populations) that are shaping how the Salish Sea is governed (Clauson and Trautman 2015); 2) a web-based database platform for researchers to query information on policies and policy actors; 3) an in-depth comparative analysis of riparian and wetland area management in British Columbia and Washington State; and 4) a case study analysis of riparian and wetland area management in the Bertrand and Fishtrap watersheds.

In stepping back to reflect, there are several key themes emerging from this body of work that relate back to the larger issue of environmental governance in a transboundary context:

- *We have shared resources and problems, we need shared solutions*. This simple truth links the communities within the Salish Sea and surrounding basin together. Under this motto, management would be reoriented away from fixed and territorial borders, and instead would focus on the resource, where the greatest stressors occur, and programs and projects that could be deployed to best minimize and avoid these problems. But in some ways the simplicity of this statement masks the complexity of issues that need to be addressed in order to more effectively work towards shared solutions. First, there is a need to identify and recognize shared values around clean water. At the same time, there is a need to identify and understand where there may be differences in values that could serve as obstacles. Second, there is a need to consider the shared nature of resources at multiple scales – from the local to the regional. Concentration on a resource at one scale may allow problems occurring at another scale to go unaddressed. We need to move beyond upstream/downstream conflicts and recognize our connection to a larger system, while at the same time being responsive to the often more immediate issues that arise at the local scale. Finally, there is a need to move toward a more integrative approach. Environmental issues are currently addressed in multiple silo-approaches, organized by different economic sectors and by different resource uses. Integration across these silos will allow more

holistic characterization of the shared resources and problems, as well as the potential solutions.

- *Borders matter*. As much as it may be desirable to transcend borders, the immediate reality is that these borders exist and present obstacles in many different ways. At a broad perspective, borders reinforce identities and values, which in turn influence potential partners' willingness to participate in collaboration. At a more immediate level, borders create barriers to communication, capacity building, and resource allocation and funding, which are all vital components to collaboration.
- *Collaboration is key*. Despite these challenges, moving beyond a bordered management approach is needed to ensure that the key stressors are being addressed in an integrated approach. This will take committed energy and effort from a broad-range of parties. Champions are needed to reinforce the importance of collaboration, and leadership from all levels is needed to bring a strong mandate for collaboration. Relationship building and information exchange are key starting points, but this needs to catalyze to actions. Development of a common agenda; implementation of coordinated, mutually reinforcing sets of activities; continuous communication; and implementation of a "backbone" organization to manage the overall process and communication are principles that can be instituted to help move from relationship building and communication to action. Moreover, there needs to be shared accountability measures built-in to show the benefits that can be derived from collaboration.

While water links us in profound and complex ways, these linkages do not always translate into governance solutions. In order to respond to the complexity of issues threatening the health of the Salish Sea, this region will need to respond in new and innovative ways. It will require these two nations, as well as the multitude of associated subnational and non-state actors, to adapt and intentionally work together through a common agenda to solve the shared problems that impact the Salish Sea.

BIBLIOGRAPHY

Anaka, Ryan. 2012. “Transboundary Watershed Management in the Fraser Lowlands: Bertrand Creek and Fishtrap Creek.” http://cedar.wwu.edu/wwuet/241/.

Beckplumb, Penny. 2013. “Federal and Provincial Jurisdiction to Regulate Environmental Issues.” Background Paper 2013 - 86 - E. Ottawa, Canada: Library of Parliament. http://www.parl.gc.ca/Content/LOP/ResearchPublications/2013-86-e.pdf.

Bertrand Watershed Improvement District (Bertrand WID). 2006. “Bertrand Creek: State of the Watershed Report.” Bertrand Watershed Improvement District. https://www.piersystem.com/external/content/document/2011/271781/1/BetrandCreek_State%20of%20Watershed_fall%202006.pdf.

Biber, Eric. 2012. “Comparing Canadian and US Environmental Law: Judicial Review.” Legal Planet. May 13. http://legal-planet.org/2012/05/13/comparing-canadian-and-us-environmental-law-judicial-review/.

Braddock, Theda. 2015. Washington Environmental Law Handbook. Bernan Press.

Branch, Legislative Services. 2014. “Consolidated Federal Laws of Canada, Regulations Establishing Conditions for Making Regulations Under Subsection 36(5.2) of the Fisheries Act.” April 11. http://laws.justice.gc.ca/eng/regulations/SOR-2014-91/page-1.html.

Brandes, Oliver M, Timothy O’Riordan, Jon O’Riordan, Laura Brandes, and POLIS Project on Ecological Governance. 2014. A Blueprint for Watershed Governance in British Columbia.
British Columbia Ministry of Agriculture. 2011. “Riparian Factsheet: AGRICULTURAL BUILDING SETBACKS FROM WATERCOURSES IN FARMING AREAS.” http://www.abbotsford.ca/Assets/2014+Abbotsford/Planning+and+Development/Planning/Environment/Agricultural+Building+Setbacks+from+Watercourses+in+Farmed+Areas.pdf.

British Columbia, and Office of the Ombudsperson. 2014. Striking a Balance: The Challenges of Using a Professional Reliance Model in Environmental Protection : British Columbia’s Riparian Areas Regulation. http://alltitles.ebrary.com/Doc?id=10886046.

British Columbia Geographical Names (BC-Geographical Names), 2010. Salish Sea: Origin Notes and History. Available at http://apps.gov.bc.ca/pub/bcgnws/names/53200.html . Accessed September 2, 2015

Brown, Christopher. 2015. “Scale and Subnational Resource Management: Transnational Initiatives in the Salish Sea Region.” Review of Policy Research 32 (1): 60–78. doi:10.1111/ropr.12112.

City of Abbotsford. 2005a. “CITY OF ABBOTSFORD STREAMSIDE PROTECTION BYLAW Bylaw No. 1465-2005.” https://abbotsford.civicweb.net/document/7203/Streamside%20Protection%20Bylaw%201465-2005.pdf?handle=F4C9100987F646BCA05CD4910AFC2906.

———. 2005b. “CITY OF ABBOTSFORD DEVELOPMENT PERMIT GUIDELINES - Appendix B.” https://abbotsford.civicweb.net/document/17249/Appendix%20B%20DP%20Guidelines.pdf?handle=C3C01A85D9164DDCBCB5BAC7664517C8.

———. 2005c. “Development Permit Areas.” https://abbotsford.civicweb.net/filepro/document/17268/Map%2010%20Development%20Permit%20Areas.pdf?handle=D662598B8DC549E783B70EC336CFDCDD.

———. 2014. “Wildlife Assessment Report Guidelines.” https://www.abbotsford.ca/Assets/2014+Abbotsford/Planning+and+Development/Planning/Environment/Wildlife+Assessment+Report+Guidelines.pdf.

———. 2015. “Information Package for Developing Near Streams and Ravines.” https://www.abbotsford.ca/Assets/2014+Abbotsford/Planning+and+Development/Planning/Environment/Information+Package+For+Developing+Near+Streams+And+Ravines.pdf.

City of Lynden. 2003. Critical Areas. Municipal Code. Chapter 16.16. https://www.municode.com/library/wa/lynden/codes/code_of_ordinances?nodeId=TIT16ENPO_CH16.16CRAR.

Clauson, Stacy and Laurie Trautman. 2015. “An Inventory of Policy Actors and Instruments Relevant to the Salish Sea.” Working Paper No. 7. Bellingham, WA: Border Policy Research Institute.

Collyard, Scott, and Markus VonPrause. 2015. “Monitoring the Effectiveness of Pollution Control Activities in Bertrand Creek.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/03_BertrandCreekStateOfTheWatershed2015.pdf.

C. Rankin & Associates. 2015. “Agricultural Waste Control Regulation Review: Summary of Public Comment on the 2nd Intentions Paper.” Ministry of Environment. http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/agriculture/summary_of_comments-awcr_pip2.pdf.

Department of Fisheries and Oceans. 2013. “A SYNTHESIS OF THE OUTCOMES FROM THE STRAIT OF GEORGIA ECOSYSTEM RESEARCH INITIATIVE, AND DEVELOPMENT OF AN ECOSYSTEM APPROACH TO MANAGEMENT.” DFO Canadian Science Advisory Report 2012/072. http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2012/2012_072-eng.pdf.

Department of the Environment. 2014. “Conserve, Restore and Connect with Nature.” May 15. https://www.canada.ca/en/campaign/ncp/index.html.

Douglas, Erika. 2015. “Fecal Coliform Monitoring in Whatcom County.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/08_Bertrand06-15.pdf.

Fisheries and Oceans Canada. 2013. “A Synthesis of the Outcomes from the Strait of Georgia Ecosystem Research Initiative, and Development of an Ecosystem Approach to Management.” Science Advisory Report 2012/072. Canadian Science Advisory Secretariat.

Fraser Basin Council. 2015. “Collaborative Watershed Governance – Keys to Success and Current Examples.” http://www.fraserbasin.bc.ca/_Library/Water_BCWF/Collaborative_Watershed_Governance_Keys_to_Success_and_Case_Studies-May1-2015.pdf.

Freelan, Stefan. 2009. The Salish Sea and Surrounding Basin. https://huxley.wwu.edu/sites/huxley.wwu.edu/files/Freelan_SalishSea_125.jpg.

Freimund, Jeremy. 2014. “Overview of the Lummi Nation, Tribal Water Rights, Drainage/Flood Control, and Water Quality Issues.” presented at the Farm Water Meeting, Mt. Baker Rotary Building, Lynden Fairgrounds, January 20. http://lnnr.lummi-nsn.gov/LummiWebsite/userfiles/90_FarmWaterMeeting01202014FINAL.pdf.

Gage, Andrew. 2013. “Privatizing Salmon Protection: The Failure of the Riparian Areas Regulation | West Coast Environmental Law.” March 23. http://wcel.org/resources/environmental-law-alert/privatizing-salmon-protection-failure-riparian-areas-regulation#attachments.

Government of Canada, Environment and Climate Change Canada. 2003. “Environment and Climate Change Canada - Nature - Habitat Stewardship Program (HSP) for Species at Risk.” September 16. https://www.ec.gc.ca/hsp-pih/.

———. 2007. “Environment and Climate Change Canada - Funding - EcoAction Community Funding Program.” January 9. http://www.ec.gc.ca/ecoaction/.

Government of Canada, Office of the Auditor General of Canada. 2004. “Protection of Fish Habitat in Riparian and Streamside Areas in British Columbia.” September 7. http://www.oag-bvg.gc.ca/internet/English/pet_127_e_28854.html.

Haddock, Mark. 2015. “Professional Reliance and Environmental Regulation in British Columbia.” Victoria, BC: Environmental Law Centre, University of Victoria. http://www.elc.uvic.ca/wordpress/wp-content/uploads/2015/02/Professional-Reliance-and-Environmental-Regulation-in-BC_2015Feb9.pdf.

Healy, Robert G., Debora VanNijnatten, and Marcela López-Vallejo. 2014. Environmental Policy in North America: Approaches, Capacity, and the Management of Transboundary Issues. University of Toronto Press.

Holley, Cameron, Neil Gunningham, and Clifford Shearing. 2013. The New Environmental Governance. New York: Routledge. https://books.google.com/books/about/The_New_Environmental_Governance.html?id=eZsMOVMnukYC.

Hood, Steve. 2002. “Nooksack River Watershed Bacteria Total Maximum Daily Load: Detailed Implementation Plan.” Washington Department of Ecology Water Quality Program. https://fortress.wa.gov/ecy/publications/publications/0110060.pdf.

Howard, Sandy. 2016. “ECOconnect: Lots of Thoughtful Feedback Received as We Update the CAFO Permit.” Accessed March 1. http://ecologywa.blogspot.com/2015/10/lots-of-thoughtful-feedback-received-as.html.

Hutchings, Dr Jeffrey. 2014. “Potential Consequences of a Perceived Relaxation of the Habitat Protection Provisions of the Fisheries Act.” August 27. http://www.oag-bvg.gc.ca/internet/English/pet_361_e_39680.html.

Isensee, Michael. 2015. “Pathogen Monitoring and Regulatory Efforts in Jackman Ditch.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/10_DNMP-BertrandWatershedConference_2015-06-24.pdf.

Kerr Wood Leidal. 2009. “Bertrand Creek ISMP.” Township of Langley: Township of Langley. http://www.tol.ca/Portals/0/township%20of%20langley/engineering/integrated%20stormwater%20management%20plans/bertrand%20creek%20ismp/Bertrand%20ISMP%20REPORT%20Final%202009-10-01.pdf?timestamp=1449171004854.

Lampman, Jonathan W., and David W. Thomas. 2014. “So Near and Yet So Far: Washington and British Columbia in the New Century.” In Canada and the United States: Differences That Count, 4th ed. Toronto, Canada: University of Toronto Press. https://books.google.com/books/about/Canada_and_the_United_States.html?id=yQqnAwAAQBAJ.

Langley Sustainable Agricultural Foundation. 2016. “Ecological Services Initiative | Langley Sustainable Agriculture Foundation.” Accessed February 18. http://www.langleysaf.ca/projects/esi/.

Laschever, Eric S. 2016. “The Endangered Species Act and Its Role in Land Use Planning.” Accessed February 9. http://www.sjel.org/vol1/endangered-species-act-and-land-use-planning.html.

Lee, Philip, Cheryl Smyth, and Stan Boutin. 2004. “Quantitative Review of Riparian Buffer Width Guidelines from Canada and the United States.” Journal of Environmental Management 70 (2): 165–80. doi:10.1016/j.jenvman.2003.11.009.

Lucchetti, G., J. Burkey, C. Gregersen, L. Fore, C. Knutson, J. Latterell, P. McCombs, R. Timm, J. Vanderhoof, and J. Wilhelm. 2013. “Assessing Land Use Effects and Regulatory Effectiveness on Streams in Rural Watersheds of King County, Washington. Prepared by Water and Land Resources Division. Seattle, Washington.” Note about This Edition This Report Was Originally Published and Submitted to US EPA in December. http://www.researchgate.net/profile/Raymond_Timm/publication/262486238_Assessing_Land_Use_Effects_and_Regulatory_Effectiveness_on_Streams_in_Rural_Watersheds_of_King_County_Washington/links/0c960537cd5ff24f22000000.pdf.

Luerkens, Chris, and Jessica Kirkpatrick. 2015. “DOE Efforts Working with Livestock Owners in Bertrand.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/09_BertrandJune_DOE.pdf.

MacKay, Heather. 2013. “A Natural Resources Marketplace: What Is It? Is It a Viable Solution Locally? What Is Needed to Move It Forward?” presented at the Whatcom County Water Supply Symposium, May 30. http://wria1project.whatcomcounty.org/uploads/PDF/water%20symposium/Symposium%20Presentation%20MacKay_061713.pdf.

Marples, Nichole. 2015. “Bertrand Creek North of the 49th Parallel.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/06_BertrandCreekNorthOf49thParallel.pdf.

McLain, Kelly. 2015. “Pesticides and Water Quality in Bertrand Creek.” presented at the Bertrand Watershed Conference, Berthusen Park, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/07_2015BertrandWorkshop6_2015.pdf

McClure, Robert. 2012. “Agriculture Is Nation’s Biggest Water Polluter but Usually Goes Unpunished.” InvestigateWest. August 16. http://invw.org/2012/08/16/farm-pollution-draws-scru-1293/.

McManus, Elizabeth, K. Jenni, M. Clancy, K. Ghalambor, Jesse Langdon, S Redman, B. Labiosa, et al. 2014. “THE 2014 PUGET SOUND PRESSURES ASSESSMENT.” Puget Sound Partnership Technical Report 2014-04. Puget Sound Partnership. http://wdfw.wa.gov/grants/ps_marine_nearshore/files/2014_puget_sound_pressures_assessment.pdf.

Ministry of Agriculture. 2015a. “Guide for Bylaw Development in Farming Areas.” http://www.alc.gov.bc.ca/assets/alc/assets/library/land-use-planning/guide_for_bylaw_development_in_farming_areas_2015.pdf.

———. 2015b. “British Columbia Application Risk Management (BC ARM) Pilot Project : Questions and Answers.” http://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/agriculture-and-seafood/agricultural-land-and-environment/waste-management/manure-management/380700-3_bc_application_risk_mgmt_bc__arm_q_and_a.pdf.

Ministry of Agriculture. 2015c. “FACTSHEET: What the B.C. Government Is Doing to Support Wild Salmon | BC Gov News.” July 31. https://news.gov.bc.ca/factsheets/what-the-bc-government-is-doing-to-support-wild-salmon.

Ministry of Environment. 2014. “Develop With Care 2014: Fact Sheet #14 -Northern Red-Legged Frog.” http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/Fact-Sheet-14-redlegged.pdf.

———. 2015. “Agricultural Waste Control Regulation Review.” http://www2.gov.bc.ca/assets/gov/environment/waste-management/industrial-waste/industrial-waste/agriculture/awcr-review-2nd-policy-paper_july-2-2015.pdf.

———. 2016a. “Develop with Care 2014.” Accessed February 18. http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/index.html#Main.

———. 2016b. “Agriculture - Province of British Columbia.” Accessed January 19. http://www2.gov.bc.ca/gov/content/environment/waste-management/industrial-waste/agriculture.

Ministry of Forests, Lands and Natural Resource Operations. 2015. “Review of Local Government Implementation of the Riparian Areas Regulations.” Province of British Columbia. http://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/fish-fish-habitat/riparian-areas-regulations/lg_rar_implementation_compliance_report_september_14_2015_r.pdf.

———. 2016. “Riparian Area Regulation (RAR) Effectively Evaluation Framework.” Accessed February 19. http://www.bcbid.ca/open.dll/showDisplayDocument?sessionID=502019204&disID=31375360&docType=Tender&dis_version_nos=2&doc_search_by=Tend&fromEmail=yes.

———. n.d. “Riparian Areas Regulation Assessment Methods Version 3.3.” http://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/fish-fish-habitat/riparian-areas-regulations/rar_assessment_methods.pdf.

Municipal Research and Services Center. 2016. “Overview of the National Flood Insurance Lawsuit and the Biological Opinion.” January 8. http://mrsc.org/Home/Explore-Topics/Public-Safety/Emergency-Services/Flood-Hazard-Management-Planning-(1)/The-National-Flood-Insurance-Program-and-the-Impac/Overview-of-the-National-Flood-Insurance-Lawsuit-a.aspx.

NOAA Fisheries. 2011. “5 - Year Review: Summary & Evaluation of Puget Sound Chinook Hood Canal Summer Chum Puget Sound Steelhead.” Portland, OR: National Marine Fisheries Service. http://www.westcoast.fisheries.noaa.gov/publications/status_reviews/salmon_steelhead/multiple_species/5-yr-ps.pdf.

Norman, Emma. 2012. “Cultural Politics and Transboundary Resource Governance in the Salish Sea.” Water Alternatives 5 (1): 138–60.

———. 2015. Governing Transboundary Waters: Canada, the United States, and Indigenous Communities. London and New York: Routledge. https://www.routledge.com/products/9780415838597.

Norman, Emma, and Karen Bakker. 2005. “DRIVERS AND BARRIERS OF COOPERATION IN TRANSBOUNDARY WATER GOVERNANCE: A Case STUDY OF WESTERN CANADA AND THE UNITED STATES.” Report to the Walter and Duncan Gordon Foundation. ftp://ftp.cs.ru.nl/pub/toinesmits/PDF_files_supporting_literature_24%2625-11-2009/2005BakkerDRIVERS%20AND%20BARRIERS%20OF%20COOPERATION.pdf.

Norman, Emma S., and Jean O. Melious. 2004. “Transboundary Environmental Management: A Study of the Abbotsford-Sumas Aquifer in British Columbia and Western Washington.” Journal of Borderlands Studies 19 (2): 101–19.

North Lynden Watershed Improvement District. 2009. “Final Report Prepared for: North Lynden Watershed Improvement District Board of Directors Management Plan for Drainage, Flooding , Irrigation and Fish Issues.” Lynden, WA: North Lynden Watershed Improvement District.

http://emergency.rice.edu/external/content/document/2012/296175/1/NLWID%20Watershed%20Plan_FINAL_07.09.09.pdf.

Northwest Indian Fisheries Commission. 2015a. “Treaty Rights at Risk.” Accessed October 1. http://treatyrightsatrisk.org/.

Northwest Indian Fisheries Commission. 2015b. “Tribe Urges Better Regulation for Dairy Farms.” Western Environmental Law Center. April 14. http://www.westernlaw.org/article/tribe-urges-better-regulation-dairy-farms-nwifc-news-41415.

Northwest Treaty Tribes. 2015. “Dairy Farm Pollution Costs Lummi Nation.” Northwest Treaty Tribes. January 16. http://nwtreatytribes.org/dairy-farm-pollution-costs-lummi-nation/.

Pearson, M. P, Canada, Department of Fisheries and Oceans, British Columbia, and Ministry of Environment. 2007. Recovery Strategy for the Nooksack Dace (Rhinichthys Cataractae) in Canada. Vancouver: Fisheries and Oceans Canada. http://epe.lac-bac.gc.ca/100/200/301/dfo-mpo/species_risk_act_recovery_strategy_series-e/nooksack_dace/En3-4-19-2007E.pdf.

Puget Sound Partnership. 2014. “The 2014/2015 Action Agenda for Puget Sound.” http://www.psp.wa.gov/downloads/2014_action_agenda/Final%202014%20action%20agenda%20update/2014-2015_Action_Agenda_for_Puget_Sound.pdf.

———. 2015. “REPORT ON THE PUGET SOUND VITAL SIGNS.” Puget Sound Partnership. https://pspwa.app.box.com/2015-SOS-vitalsigns-report.

———. 2016. “Action Agenda Report Card.” Accessed March 8. http://gismanager.rco.wa.gov/ntaportal.

Pynn, Larry. 2014a. “Bertrand Creek Is Prime Fish Habitat - and under Attack.” Www.vancouversun.com, June 5. http://www.vancouversun.com/technology/bertrand+creek+prime+fish+habitat+under+attack/9916224/story.html.

———. 2014b. “Minding The Farm: Agriculture Practices Clash with Protection of Streams and Fish Habitat.” Www.vancouversun.com, June 5. http://www.vancouversun.com/technology/minding+farm+agriculture+practices+clash+with+protection+streams+fish+habitat/9916232/story.html.

———. 2014c. “Fish and Farm: The Problem with Manure.” The Vancouver Sun, June 9. http://salmonriver.org/wp-content/uploads/2014/06/Vancouver-Sun-ePaper-The-Vancouver-Sun-9-Jun-2014-FISH-FARM.pdf.pdf.

———. 2014d. “Probe Prompts Some Farmland Owners to Improve Fish Habitat.” The Vancouver Sun, December 29. http://salmonriver.org/wp-content/uploads/2014/06/Van-Sun-Farm-probe-Dec.-29-2014-.pdf.

“Special meeting of Township Council”. 2006. Fraser River Presentation Theatre, BC. March 20.

Solano, Maria Gabriela. 2006. “Land Use Impacts on Ground and Surface Water Quality in the Bertrand Creek Watershed (Township of Langley, BC).” Vancouver BC: University of British Columbia. https://open.library.ubc.ca/cIRcle/collections/ubctheses/831/items/1.0092582.

Steensma, Karen M.M. 2015. “History and Current Overview of the Bertrand Watershed.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/03_BertrandCreekStateOfTheWatershed2015.pdf.

Storer, Paul, David Davidson, and Laurie Trautman. 2015. “Washington State’s Economy in Relation to Canada and the Border.” Special Report. Bellingham, WA: Border Policy Research Institute. http://www.wwu.edu/bpri/files/2015_Special_Report_Washington_Economy.pdf.

Sweeney, Aneka. 2015. “Community Solutions to Clean Water.” presented at the Bertrand Watershed Conference, Lynden, WA, June 24. http://www.whatcomcd.org/sites/default/files/watersheds/bertrand/2015-conference/11_Bertrand_Sweeney.pdf.

Thomas, David Martin, and David N. Biette. 2014. Canada and the United States: Differences That Count, Fourth Edition. University of Toronto Press.

Township of Langley. 2006a. “LANGLEY OFFICIAL COMMUNITY PLAN BYLAW 1979 NO. 1842 AMENDMENT (STREAMSIDE PROTECTION) BYLAW 2006 NO. 4485.” http://www.tol.ca/Portals/0/township%20of%20langley/mayor%20and%20council/bylaws/Bylaw%204485%20-%20Streamside%20Protection.pdf?timestamp=1451413942133.

———. 2006b. “Report to Mayor and Council: Streamside Protection and Enhancement Amendment Bylaw 4529.” https://langley.civicweb.net/document/7666.

———. 2013. “Agricultural Viability Strategy.” Township of Langley. http://www.tol.ca/Portals/0/township%20of%20langley/community%20development/current%20projects/agricultural%20viability%20strategy/Agricultural%20Viability%20Strategy%20Phase%203.pdf.

Tuttle, George. 2014. “Surface Water Monitoring Program for Pesticides in Salmonid - Bearing Streams, 2013 Data Summary.” Olympia, WA: Washington State Departments of Agriculture and Ecology. http://agr.wa.gov/FP/Pubs/docs/411-SWM2013Report.pdf.

U.S. Environmental Protection Agency Office of Wetlands, Oceans, & Watersheds. 2011. “A National Evaluation of the Clean Water Act Section 319 Program.” U.S. Environmental Protection Agency Office of Wetlands, Oceans, & Watersheds.

U.S. Environmental Protection Agency, REG 10 (US EPA Region 10). 2015. “Health of the Salish Sea Ecosystem Report.” Collections and Lists. Accessed September 8. http://www2.epa.gov/salish-sea.

US EPA. 2015a. “EPA Acts to Protect Puget Sound Shellfish Beds from Manure Runoff, Fines Lynden Dairy.” Verity View. March 26. https://yosemite.epa.gov/opa/admpress.nsf/a883dc3da7094f97852572a00065d7d8/67f99440176a6b7d85257e14006bf773!OpenDocument.

US EPA. 2015b. “Lynden, Washington Landowner to Restore Wetlands to Settle Clean Water Act Violation.” News Releases by Date. October 7. https://yosemite.epa.gov/opa/admpress.nsf/0/C35366E10EF4617E85257ED7005DFE45.

US Geological Survey (USGS), 2009. Salish Sea: Board on Geographic Names Decisions. Available at http://geonames.usgs.gov . Accessed September 22, 2015

Washington Environmental Council. 2004. Habitat Protection Tool Kit. June. http://sanjuanco.com/cdp/docs/CAO/HabitatProtectionToolkit(Gorsline%202004).pdf.

Washington State Conservation Commission. 2016. “Voluntary Stewardship Program.” Accessed January 19. http://scc.wa.gov/voluntary-stewardship-program/.

Washington State Department of Agriculture. 2015. “Endangered Species Program.” Endangered Species Program. March 20. http://agr.wa.gov/pestfert/natresources/endangspecies.aspx.

Washington State Department of Community, Trade and Economic Development. 2007. “Critical Areas Assistance Handbook: Protecting Critical Areas Within the Framework of the Washington Growth Management Act.” Washington State Department of Community, Trade and Economic Development. http://www.commerce.wa.gov/Documents/GMS-Critical-Areas-Assist-Handbook.pdf.

———. n.d. “Water Quality Assessments (303[d]) | Water Quality Assessments & TMDLs | Water Quality Program | Washington State Department of Ecology.” http://www.ecy.wa.gov/programs/Wq/303d/index.html.

Washington State Department of Ecology. 2008a. “Exploring Wetlands Stewardship A Guide for Washington Landowners and Communities.” 96-120. Olympia, WA: Washington State Department of Ecology. https://fortress.wa.gov/ecy/publications/documents/96120.pdf.

———. 2008b. “Making Mitigation Work The Report of the Mitigation That Works Forum.” 08‐06‐018. Olympia, WA: Washington Department of Ecology. https://fortress.wa.gov/ecy/publications/documents/0806018.pdf.

———. 2014. “Assessment of Nonpoint Pollution in Washington State.” Washington State Department of Ecology. http://whatsupstream.com/assets/Nonpoint%20Pollution%20Assesment%20-%2057.pdf.

———. 2015a. “Whatcom Clean Water Program | Focus on the Lower Nooksack Watershed.” July. http://www.ecy.wa.gov/water/whatcomcleanwater/LwrNooksackwtrshed.html.

———. 2015b. “CAFO Permit Development Listening Session.” presented at the CAFO Permit Development Listening Session, Bellingham, WA, April 23. http://www.ecy.wa.gov/programs/wq/permits/cafo/docs/generalListeningSessionPresentation2015.pdf .

———. 2016a. “Calculating Credits and Debits for Compensatory Mitigation in Wetlands | The Credit/Debit Method | Washington State Department of Ecology.” Accessed March 1. http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/creditdebit/index.html.

———. 2016b. “Interagency Wetland Mitigation Guidance | Washington State Department of Ecology.” Accessed March 1. http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/guidance/.

———. 2016c. “Nonpoint Source Pollution - Sources: Agriculture-Other Efforts to Protect Clean Water | WA State Department of Ecology.” Accessed February 24. http://www.ecy.wa.gov/programs/wq/nonpoint/Agriculture/effortsprotclnwtr.html.

———. 2016d. “Watershed Characterization and Land Use Planning | Mitigation That Works | Washington State Department of Ecology.” Accessed March 1. http://www.ecy.wa.gov/mitigation/landscapeplan.html.

———. 2016e. “Puget Sound Watershed Characterization Project.” Accessed March 1. http://www.ecy.wa.gov/services/gis/data/inlandWaters/pugetsound/characterization.htm.

———. 2016f. “Wetland Change Analysis | Ecology’s Wetland Status and Trends Inventory | Washington State Department of Ecology.” Accessed March 1. http://www.ecy.wa.gov/programs/sea/wetlands/StatusAndTrends.html.

———. 2016g. “Wetland Mitigation Banking | Home | Washington State Department of Ecology.” Accessed March 1. http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/index.html.

———. 2016h. “Whatcom Clean Water Program.” Accessed March 15. http://www.ecy.wa.gov/water/whatcomcleanwater/index.html.

Watershed Characterization Technical Assistance Team. 2015. “WRIA 1 Analysis Maps for Water Quality in the Nooksack Watershed.” Olympia, WA: Washington State Department of Ecology. ftp://www.ecy.wa.gov/gis_a/inlandWaters/ps_project/Maps/WRIA1_WQ_Maps.pdf.

Washington State Dept. of Health. n.d. “EPA Grant: Pollution Identification and Correction.” http://www.doh.wa.gov/CommunityandEnvironment/Shellfish/EPAGrants/PathogensGrant/PIC.

Washington State House Committee on Agriculture and Natural Resources. 2003. “House Bill Report ESSB 5889.” House Bill Report ESSB 5889. http://apps.leg.wa.gov/documents/billdocs/2003-04/Htm/Bill%20Reports/House%20Historical/5889-S%20BRH%20AGNR.htm.

Watershed Characterization Technical Assistance Team. 2015. “WRIA 1 Analysis Maps for Water Quality in the Nooksack Watershed.” Olympia, WA: Washington State Department of Ecology. ftp://www.ecy.wa.gov/gis_a/inlandWaters/ps_project/Maps/WRIA1_WQ_Maps.pdf.

West Coast Environmental Law. 2005. “Riparian Areas Regulation: Deregulation Backgrounder.” http://wcel.org/sites/default/files/publications/Deregulation%20Backgrounder%20-%20Riparian%20Areas%20Regulation.pdf.

Wetland Program. 2015. “Washington State Wetland Program Plan.” Publication No. 14 - 06 - 005. Olympia, WA: Washington State Department of Ecology.

Whatcom Clean Water Program. n.d. “Whatcom Clean Water Program Quarterly Progress Report January - March 2014.” http://www.ecy.wa.gov/water/whatcomcleanwater/FINAL-1stQtr2014.pdf.

Whatcom County. 2005. Critical Areas. Whatcom County Code. Vol. Chapter 16.16. http://www.codepublishing.com/WA/WhatcomCounty/html/WhatcomCounty16/WhatcomCounty1616.html#16.16.

———. 2016a. “Critical Areas Update | Whatcom County, WA - Official Website.” Critical Areas Update. http://wa-whatcomcounty.civicplus.com/1153/Critical-Areas-Update.

———. 2016b. “Water Quality Monitoring Results.” Water Quality Monitoring Results. Accessed March 15. http://www.whatcomcounty.us/2170/Water-Quality-Monitoring-Results.

———. 2016c. “Sources of Bacterial Pollution | Whatcom County, WA - Official Website.” Accessed March 3. http://www.whatcomcounty.us/2169/Sources-of-Bacterial-Pollution.

Whatcom County Ag-Watershed Pilot Project. n.d. “Whatcom County Ag-Watershed Pilot Project.” https://sites.google.com/site/wcwatershedag/home/.

Whatcom County Ag-Watershed Project. 2013. “Agriculture - Watershed Characterization and Mapping Report.” https://sites.google.com/site/wcwatershedag/documents/06-ag-ws-mapping-characteriz-combined-20130425.pdf?attredirects=0&d=1.

Whatcom Family Farmers. 2016. “Water Quality.” Whatcom Family Farmers. Accessed March 15. http://www.whatcomfamilyfarmers.org/water-quality.html.

Wong, Cecilia, and Michael S. Rylko. 2014. “Health of the Salish Sea as Measured Using Transboundary Ecosystem Indicators.” Aquatic Ecosystem Health & Management 17 (4): 463–71.

APPENDIX A: LIST OF PARTICIPATING ORGANIZATIONS

I would like to recognize the work of the many professionals engaged in riparian and wetland management in the Salish Sea, a few of which I was able to talk directly with as part of this study. These individuals have dedicated themselves to preservation and restoration of these vital natural and cultural features, and work tirelessly to ensure that these common resources are maintained for future generations.

I must take time to recognize those who I was not able to contact. As with any study, there were time constraints that prevented me from talking to more individuals working in this field. There are many other individuals involved in this work, and their experiences and perspectives undoubtedly would provide a deeper understanding than I have been able to present.

Moreover, I must recognize those individuals who gave graciously of their time and experience to help me prepare this study. Representatives from the following organizations participated in this study:

Organization
Township of Langley
BC Ministry of Forests, Lands and Natural Resource Operations
Whatcom County
City of Lynden
Washington State Department of Ecology
U.S. Army Corps of Engineers
Nooksack Tribe
Lummi Nation
BC Ministry of Agriculture
Langley Environmental Partners Society
Whatcom Conservation District
BC Ministry of Environment
U.S. Environmental Protection Agency, Region 10

APPENDIX B: DETAILED OVERVIEW OF KEY LAWS AND REGULATIONS ADDRESSING PROTECTION OF RIPARIAN AND WETLAND AREAS IN BC

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
		Federal	
Canada Fisheries Act	Provide for the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries.	Habitat: No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery. If there are potential impacts to fish or fish habitat that are part of or support a commercial, recreational or Aboriginal fishery; the impacts cannot be avoided or mitigated; and the impacts will result in serious harm to fish, the activity must be reviewed to determine if the project will be authorized. "Serious harm to fish" is the *death of fish or any permanent alteration to, or destruction of, fish habitat*. Pollution: No person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water, unless authorized by regulations under the Fisheries Act or other federal legislation. (Note: New regulations were issued under this Section of the Fisheries Act in February 2014 to allow deposits in three circumstances: to regulate aquaculture, aquatic pests and invasive species; to allow for aquatic research; and where such deposits are already managed by governmental regulators) (Branch 2014).	Fisheries and Oceans Canada (except for freshwater fisheries, which are delegated to Province)

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
		Note: 2013 Amendments to the Act limit the federal role. DFO has published guidelines to minimize the need for DFO review of projects, allowing proponents to self-assess compliance with the Fisheries Act (British Columbia and Office of the Ombudsperson 2014).	
Species at Risk Act	Prevent Canadian indigenous species, subspecies, and distinct populations from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species, and encourage the management of other species to prevent them from becoming at risk.	Prohibits the killing, harming, harassing, capturing or taking of species at risk, and also makes it illegal to destroy their critical habitats if 1) that habitat is on federal land, in the exclusive economic zone of Canada or on the continental shelf of Canada; 2) the listed species is an aquatic species; or 3) the listed species is a species of migratory birds protected by the Migratory Birds Convention Act. The Act allows the issuance of a permit or agreement authorizing a person to affect a listed species so long as certain conditions are first met.	Fisheries and Oceans Canada (for aquatic species)
		Provincial	
Riparian Areas Protection Act (renamed from Fish Protection Act)	To ensure sufficient water for fish; to protect and restore fish habitat; and to allow for a renewed focus on protection and enhancement of riparian areas (British Columbia and Office of the Ombudsperson 2014).	Section 12 gives the authority to create, by regulation, policy directives to protect and enhance riparian areas that may be subject to residential, commercial or industrial development. The minister responsible for the Fish Protection Act must consult with the UBCM before creating policy directives under section 12.	Ministry of Forests, Lands and Natural Resource Operations

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
Riparian Areas Regulation	To establish directives to protect riparian areas from development so that the areas can provide natural features, functions and conditions that support fish life processes	Enacted under Section 12 of Fish Protection Act. Under the RAR, if a proposed residential, commercial or industrial development is located fully or partially within a riparian assessment area, a qualified environmental professional (QEP) must assess the property and determine the applicable streamside protection and enhancement area (SPEA) according to specified assessment methods Local governments must either implement the RAR by including in their zoning and rural land use bylaws provisions that comply with the RAR, or they must ensure that their bylaws and permits under Part 26 of the Local Government Act provide a level of riparian protection that, in the opinion of the local government, is comparable to or exceeds the RAR's requirements. Local governments must not "approve or allow" certain types of development within a riparian assessment area until they are notified that both the provincial ministry and DFO have received a copy of the QEP's assessment report.	Ministry of Forests, Lands and Natural Resource Operations
Environmental Management Act – Waste Discharge Regulation	Requires authorization for introductions of waste from "prescribed" industries, trades, businesses, operations and activities.	Prohibits introduction of waste into the environment in the course of conducting a prescribed industry, trade or business or waste produced by a prescribed activity or operation, unless otherwise approved under the Act. A person must not introduce waste into the environment is such a manner or quantity as to cause pollution, unless otherwise approved under the Act. Agricultural operations may be authorized under a code of practice; if there is not yet a code in place, then authorization may be provided by a regulation (if it exists) or by a site-specific permit or approval. Dairy products industry require a permit, approval, or registration under a regulation (because they are treated as high risk operations).	Ministry of Environment

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
Environmental Management Act - Agricultural Waste Control Regulation (Under Review)	Establishes Code of Practice for agricultural operations, describing environmentally sound practices for using, storing and managing agricultural wastes and by-products, such as manure and composted materials.	Codes of practice ("minister's regulations") are legally enforceable standards that may apply to industries, trades, businesses and other activities. These activities do not require authorization. Existing standards intended to prevent pollution from agricultural activities, including collection, storage and application of agricultural wastes (e.g. manure, compost, vegetation).	Ministry of Environment
Water Sustainability Act (Replacing Water Act, To be implemented in 2016)	Designed to meet three key outcomes: 1. Water management is sustainable, efficient and adaptive 2. Rights for water users, communities and industries are secure and transparent 3. B.C.'s water and aquatic ecosystems are healthy and protected.	Requires authorization for "changes in and about a stream" (Section 12). Under the Water Act, "changes in and about a stream" means any modification to the nature of the stream including the land, vegetation, natural environment or flow of water within the stream, or any activity or construction within the stream channel that has or may have an impact on a stream. In addition, prohibits introduction or allowance of debris, refuse, carcasses, human or animal waste, pesticides, fertilizers, contaminants or another matter or substance into a stream, a stream channel or an area adjacent to a stream in such a quantity or in such a manner as to cause a significant adverse impact to • the stream or stream channel, • the existing uses of the water from the stream, • the property of riparian owners on the stream, • an aquifer that is hydraulically connected to the stream or the existing uses of the water from that aquifer, or • the aquatic ecosystem of the stream. (Section 46, as amended under new Water Sustainability Act (Bill 18))	Ministry of Forests, Lands and Natural Resource Operations

APPENDIX C: DETAILED OVERVIEW OF KEY LAWS AND REGULATIONS ADDRESSING PROTECTION OF RIPARIAN AND WETLAND AREAS IN WA

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
		Federal	
Clean Water Act	Restore and maintain the chemical, physical, and biological integrity of the Nation's waters	• Section 301 – Makes it illegal to discharge pollutants except in compliance with the Act. This section specifically focuses on point source pollutant discharge. • Section 303 – Requires States to provide water quality standards to protection public health or welfare, enhance the quality of water and serve the purposes of the Act. Establishes a process to identify and clean up polluted waters. Every two years, all states are required to perform a *water quality assessment* of the quality of surface waters in the state. Waters whose beneficial uses – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants are placed in the polluted water category on the water quality assessment. Waters placed on the 303(d) list require the preparation of a water cleanup plan, like a total maximum daily load (TMDL) or other approved water quality improvement projects. The TMDL identifies the maximum amount of a pollutant to be allowed to be released into a water body so that the beneficial uses of the water are not impaired. The TMDL allocates that amount of the pollutant among various sources. • Section 319 - Requires states to develop Assessment Reports that described the states' non-point pollution problems, and establish Management Programs to address these problems.	Washington State Department of Ecology (Sections 301, 303, 319, 401) Washington State Department of Agriculture (for inspections associated with Concentrated Animal Feeding Operations that require NPDES permit under the CWA) Puget Sound Partnership (Section 320) Army Corps of Engineers (Section 404) Environmental Protection Agency (on federal lands)

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
		• Section 320 - National Estuary Program: Designed to encourage local communities to take responsibility for managing their own estuaries. Each NEP is made up of representatives from federal, state and local government agencies responsible for managing the estuary's resources, as well as members of the community such as citizens, business leaders, educators, and researchers. These stakeholders work together to identify problems in the estuary, develop specific actions to address those problems, and create and implement a formal management plan to restore and protect the estuary. • Section 401 - Requires an applicant for any federal permit covering an activity that may result in a "discharge" into "navigable waters" to first obtain a state certification, to ensure that the project will comply with state water quality standards. • Section 402 – Regulates discharge of pollutants from a point source into navigable waters through a National Pollutant Discharge Elimination System (NPDES) Permit • Section 404 – Requires authorization for discharging dredge and fill materials into jurisdictional waters. Under the Clean Water Act, certain "normal farming activities" are exempt from requiring a Section 404 permit.	
Endangered Species Act	Protect and recover imperiled species and the ecosystems upon which they depend.	• Section 4(d): Authorizes the Services to apply the take prohibition to threatened, rather than endangered, species through administrative rules that incorporate full Section 9 protections. • Section 7: Requires consultation with the listing agency—either the U.S. Fish and Wildlife Service or NMFS prior to engaging in an activity that may have potential impacts on a listed species.	U.S. Fish and Wildlife Service (marine wildlife such as whales and anadromous fish such as salmon) Commerce Department's National Marine Fisheries

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
		• Section 9: Prohibits the taking of the species. The term "take" includes injuring the endangered species as well as damage to its habitat. • Section 10: Requires the Services to adopt a recovery plan for a listed species.	Service (terrestrial and freshwater organisms)
Coastal Zone Management Act	Preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone	Established the Coastal Zone Management Program, a voluntary state-federal partnership which encourages states to adopt their own management programs in order to meet the federal goals of protection, restoration, and appropriate development of coastal zone resources. Washington's CZM program is based primarily upon the state's Shoreline Management Act. Requires applicants for federal approval to obtain Ecology concurrence that the project is consistent with the Coastal Zone Management Program. Requires state water quality agencies to develop and implement management measures to restore and protect coastal waters from adverse impacts of Non-point source pollution. States are to implement this requirement through updates to their state nonpoint and coastal zone programs.	Washington State Department of Ecology
Federal Farm Bill/Food Security Act		Offers voluntary Farm Bill conservation programs. In addition, establishes wetland conservation provisions; If participants do not comply with these provisions, then can lose USDA agricultural cost assistance benefits (e.g. loans, subsidies, crop insurance, and price support programs).	Natural Resources Conservation Service Farm Services Agency Conservation Districts work collaboratively with agriculture operators to implement these programs

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
Federal Insecticide, Fungicide and Rodenticide Act		Require compliance with pesticide label restrictions pertaining to the protection of surface and ground water quality.	Washington State Department of Agriculture
		State	
Water Pollution Control Act	Maintain the highest possible standards to insure the purity of all waters of the state…	Ecology is given the jurisdiction "to control and prevent the pollution of... waters of the state of Washington." Addresses both point and non-point sources of pollution. Makes it unlawful for any person to "cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged ... any organic or inorganic matter that shall cause or tend to cause pollution of" waters of the state. Any person who violates or creates a substantial potential to violate the provisions of Chapter 90.48 RCW is subject to an enforcement order from Ecology. Further, any "person who conducts a commercial or industrial operation of any type which results in the disposal of solid or liquid waste material into the waters of the state" must obtain a state waste discharge permit before discharging to state waters. Ecology's authority includes the ability to require a nonpoint source polluter to implement specific best management practices (BMPs). Ecology's authority can be used to prevent nonpoint pollution and require BMPs, as necessary.	Washington State Department of Ecology
Watershed Planning Act (Chapter 90.82 RCW)	Authorized local development of watershed plans for managing water resources and for protecting existing water rights, which was	Established a framework for developing local solutions to watershed issues on a watershed basis. Provides a process to allow citizens in a watershed to join together to assess the status of the water resources in their watershed and determine how best to manage them.	Watershed Resource Inventory Areas (WRIA)

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
	found by the Legislature to be vital to both state and local interests.		
Watershed Improvement Districts		Authorizes watershed improvement districts to participate in and expend revenue on cooperative watershed management actions, including watershed management partnerships under RCW 39.34.210 and other intergovernmental agreements, for purposes of water supply, water quality, and water resource and habitat protection and management.	Watershed Improvement Districts (WIDs)
Growth Management Act	Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.	Designated wetlands and fish and wildlife habitat conservation areas as 'critical areas'. Under the Act, all counties and cities are required to designate and protect critical areas functions and values. Counties and cities are required to include the best available science in developing policies and development regulations to protect the functions and values of critical areas. In addition, counties and cities are required to give special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries	Local municipalities Washington State Department of Ecology
Shoreline Management Act	Prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.	Under this Act, certain streams (greater than 20 cubic feet per second) are defined to be within the shoreline jurisdiction. Shoreline management guidelines established under the Act require local municipality shoreline master programs (SMP) to protect the functions provided by shoreline vegetation. Vegetation conservation standards, including buffers and setbacks, are required to be based on local shoreline conditions. Buffers for critical areas such as streams and wetlands that are within shoreline jurisdiction also must be protected through the SMP. Establishes requirement for no net loss of ecological functions associated with the river or stream corridors will result from development. Also requires local municipalities to develop a restoration plan to offset the expected loss of function that will	Local municipalities Washington State Department of Ecology

Legislation	Purpose	Relationship to Riparian/Wetland Area Protection	Implementing Agency/Organization
		occur from site-specific mitigation and other incremental impacts sustained over time.	
State Environmental Policy Act	Provide information to agencies, applicants, and the public to encourage the development of environmentally sound proposals	Establishes an environmental review process for actions (project and non-project actions) that are not otherwise exempt. The environmental review process involves the identification and evaluation of probable environmental impacts, and the development of mitigation measures that will reduce adverse environmental impacts. This environmental information, along with other considerations, is used by agency decision-makers to decide whether to approve a proposal, approve it with conditions, or deny the proposal. Review is required for projects occurring on lands covered by water, such as wetlands and streams.	Lead agency (with many local land use decisions, this is the local municipality) Washington State Department of Ecology
Dairy Nutrient Management Act	Establish a clear and understandable process that provides for the proper and effective management of dairy nutrients that affect the quality of surface or ground waters in the state of Washington	Requires all licensed dairies to develop and implement nutrient management plans. The Act also authorizes an inspection program.	Washington State Department of Agriculture
Hydraulic Code	Protects fish life by managing activities in state waters	Requires permit for construction or performance of work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state.	Washington State Department of Fish and Wildlife
Washington Pesticide Application Act		Authorizes the Washington State Department of Agriculture to control methods of applications and timing of applications, require permits for applications in certain areas, set maximum use rates, or prohibit the use of pesticides in geographical areas at certain times of the year.	Washington State Department of Agriculture

APPENDIX D: COMPARISON OF RIPARIAN AND WETLAND AREA STANDARDS

Waterbody Type	Washington State		British Columbia	
	Whatcom County[49]	City of Lynden[50]	City of Abbotsford	Township of Langley[51]
Standard Stream Buffer				
Class 1 – Fish Bearing, Highest functions	150 feet[1] (46 meters)	150 feet[2] (46 meters)	98 feet (30 meters) [4] OR 32 feet (10 meters) [7]	98 feet (30 meters) OR 24 feet (7.5 meters) for roadside ditches
Class 2 – Fish Bearing	100 feet (30.5 meters)	100 feet[3] (30.5 meters)	49 feet (15 meters) [5,6] OR 32 feet (10 meters) [7]	98 feet (30 meters) OR 24 feet (7.5 meters) for roadside ditches
Class 3 – Non-Fish Bearing	50 feet (15 meters)	50 feet (15 meters)	98 feet (30 meters) [3,10] OR 49 feet (15 meters) [5,10] OR 49 feet (15 meters) [4,11] OR 16 feet (5 meters) to 49 feet (15 meters)[8]	65 feet (20 meters)[9,12] OR 49 feet (15 meters)[13] OR 19 feet (6 meters) for roadside ditches
Standard Wetland Buffer				
Category I	50-300 feet, depending on level of intensity of development	200 feet (61 meters)	Same as above	Same as above
Category II	50-275 feet, depending on level of intensity of development	100 feet (30.5 meters)		

[49] Shoreline Master Program refers to buffers established under CAO
[50] Shoreline Master Program also establishes buffers, but these are less restrictive than the CAO ordinance, which is noted above.
[51] Only applies to lands located outside of Agricultural Land Reserve.

Waterbody Type	Washington State		British Columbia	
	Whatcom County[49]	City of Lynden[50]	City of Abbotsford	Township of Langley[51]
Category III	50-150 feet, depending on level of intensity of development	50 feet (15 meters)		
Category IV	25-50 feet, depending on level of intensity of development and wetland habitat function	25 feet (8 meters)		
General Standards				
	• Signage • Notice on title and/or protective easement • Protective fencing • Erosion BMPs • Security deposit (if mitigation and monitoring)	• Signage • Notice on title and/or protective easement • Protective fencing • Erosion BMPs • Security deposit (if mitigation and monitoring)	• Protection fencing and signage • Tree protection • Erosion BMPs • Security deposit (if mitigation and monitoring)	• Security deposit • Fencing • Drainage plan/sediment control plan • Erosion BMPs
Potential Modifications				
Exemption	CAO lists several activities allowed within the buffer, including: Surface water discharge, utility lines, Public roads, bridges, and trails, Access to private development sites, Construction of a structure that is associated with an agricultural use, stormwater facilities, etc., subject to conditions	CAO lists several activities allowed within the buffer, including: Emergency activities, ongoing activities, normal and routine maintenance or repair of certain types of structures, modification of existing structures that do not increase encroachment, outdoor activities, crop harvest, lawful operation and maintenance of public and	Bylaws lists several activities allowed within the buffer, including: Stormwater conveyance and outfall systems and trails, subject to conditions.	Bylaws lists several activities allowed within the buffer, including: Municipal works and services including utilities, watercourse crossings, walkways, trails and other municipal works and services, subject to standards.

Waterbody Type	Washington State		British Columbia	
	Whatcom County[49]	City of Lynden[50]	City of Abbotsford	Township of Langley[51]
		private diking and drainage systems, etc.		
Buffer Reduction	Buffer measurement may be either reduced or averaged; provided that mitigation sequencing is followed; buffer reduction or averaging does not reduce the functions or values; and that, at no point shall buffer reduction or averaging result in the buffer width being less: • 75 percent or 50 feet for Category I or II wetlands (whichever is greater); or • 50 percent or 25 feet for Category III or IV wetlands (whichever is greater); If buffer reduction is proposed, a number of best management practices and buffer planting would be required.	Buffer measurement may be averaged to allow a more efficient use of land; provided, however, that at no point shall buffer averaging result in the buffer width being less than 50 percent of the standard buffer width.	If modification is needed, a variance is required. Mitigation sequencing is required, and Council may consider range of factors when reviewing applications, including proposed mitigation	Permitted in cases where 1) site is constrained, or 2) infill development and neighboring lots (within 500 meters) are developed (90%) and have buffer less than minimum. Maximum reduction 16 feet (5 meters), and must maintain overall buffer area. 2:1 replacement mitigation ratio
Additional Buffer or Wetland Alteration	Additional buffer encroachment or wetland alteration may be considered, provided that mitigation sequencing is followed; and	Additional buffer encroachment or wetland alteration may be considered, provided that mitigation		If additional modification is needed, a variance is required.

Waterbody Type	Washington State		British Columbia	
	Whatcom County[49]	City of Lynden[50]	City of Abbotsford	Township of Langley[51]
	mitigation occurs so that there is no net loss in functions: 1. Compensation for wetland buffer impacts shall occur at a minimum 1:1 ratio. 2. Compensatory mitigation for wetland alterations shall be based on the wetland category and the type of mitigation activity proposed, as follows: • Category I: No wetland alteration permitted • Category II: 3:1 wetland creation or reestablishment; 6:1 wetland rehabilitation; 12:1 enhancement only • Category III: 2:1 wetland creation or reestablishment; 4:1 wetland rehabilitation; 8:1 enhancement only • Category IV: 1.5:1 wetland creation or reestablishment; 3:1	occurs so that there is no net loss in functions: 1. Stream Compensatory Mitigation: Based on best available science sufficient to completely offset the impacts that will result from the proposed actions. 2. Wetland Compensatory mitigation: • Category I: 4:1 wetland creation; 8:1 wetland enhancement • Category II: 3:1 wetland creation and 6:1 wetland enhancement for forested wetlands; 2:1 wetland creation and 4:1 wetland enhancement for scrub/shrub or emergent wetlands • Category III: 1.25:1 wetland creation; 2.5:1 wetland enhancement		

Waterbody Type	Washington State		British Columbia	
	Whatcom County[49]	City of Lynden[50]	City of Abbotsford	Township of Langley[51]
	wetland rehabilitation; 6:1 enhancement only • Replacement ratio for preservation shall be 10 times the ratio for reestablishment or creation.			