Forest Practices Board

Forest Practices and Water

Opportunities for Action

SPECIAL REPORT

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Contents

Executive Summary

Properly functioning watersheds support values that are important to the public and Indigenous Peoples throughout British Columbia, and can be more resilient to the effects of a changing climate.

Water is a recurring theme in the work of the Forest Practices Board (the Board) because forest and range practices have the potential to affect water quality, quantity, and the timing of flow, which can have negative impacts on values such as drinking water quality, aquatic ecosystems and habitat, public infrastructure and private property.

Since 2006, the Board has investigated 27 complaints, published 8 special investigations and reports that involved forest management and water under the *Forest and Range Practices Act* (FRPA), and completed three compliance audits with findings related to water.

While FRPA is the primary legislation protecting water from damage by forest and range practices, there are other related laws with the potential to influence practices under FRPA. The Board believes that BC needs to clarify and improve how existing laws can work together to protect water and downstream values.

Forest licensees in BC generally demonstrate a high degree of compliance with FRPA's legal requirements relating to water, and some licensees voluntarily go beyond the legal requirements; however issues still arise. Too often, practices focus on a single activity at the stand level while many impacts on water involve the combined effects of all activities over time and need to be managed at a watershed level.

The Board prepared this special report as advice to government relevant to three current initiatives—the creation of a Watershed Security Strategy and Fund, modernization of BC's forestry legislation, and development of a Climate Preparedness and Adaptation Strategy.

Through our work, we have identified four significant issues with the management of forest practices and their effects on water:

1. The public does not have adequate opportunity for meaningful involvement in how forest practices occur in relation to water and risk to values.
2. There are no legal requirements to assess or consider cumulative effects of forest practices in most watersheds in BC.
3. Current forest practices contribute sediment into streams.
4. Historical forest practices continue to negatively affect water.

The Board is of the view that BC could address these issues by acting on the following four opportunities:

1. Improve public involvement by making water a core value in forest planning, including forest landscape planning.
2. Manage cumulative effects of forest practices on water as a legal requirement in all watersheds.
3. Improve regulation of forest practices that contribute sediment to streams.
4. Reduce the impact of historical practices on water through a renewed program of watershed restoration.

Introduction

Water has been a recurring theme in the work of the Forest Practices Board (the Board) since it was established in 1995. At least a third of the public complaints we have received involved the potential for forestry and range practices to affect water and downstream values including drinking water; the integrity of aquatic ecosystems and habitat; public infrastructure; and private property.[1] While Board audits and investigations usually find compliance with the *Forest and Range Practices Act*'s (FRPA) legal requirements, with some licensees going beyond legal requirements, in some cases forest and range practices contribute to a risk of landslides, cause soil erosion or have other negative effects on water. Gaps in FRPA's legal requirements for the protection of water mean that forestry and range practices can contribute to negative impacts on water. Over the years, the Board has produced numerous reports and recommendations regarding improvements to forest and range practices, in an attempt to close some of the gaps.

In 2020, the BC government announced its intention to create a Watershed Security Strategy and Fund, and to modernize forestry legislation. It is also developing a Climate Preparedness and Adaptation Strategy. The Board reviewed its work related to forestry and range practices and their impact on water and prepared this report to inform these three initiatives. The Board conducted this work throughout British Columbia, and we respectfully acknowledge the territories of the many Indigenous Peoples who have lived on these lands since time immemorial.

Background

Water is the lifeblood of all ecological communities; it links and maintains all ecosystems on the planet.[i]

Watersheds provide water for drinking and domestic use, for irrigation and agricultural supply, and stream flow that supports aquatic habitats while moderating the effects of climate variability and change on the hydrologic cycle in a watershed. The water we rely on originates in thousands of watersheds across the province. Most are subject to integrated resource management, which permits multiple land uses including forestry, grazing, mining and recreation. The BC government regulates forestry and range use on public land primarily through FRPA, which has requirements that directly or indirectly protect water.

[1] For simplicity, this report will refer to effects of forestry on water. This includes the effects on other public values such as infrastructure, habitat, or drinking water, as a result of changes to water (such as changes in the hydrograph).

Water is a sacred resource to Indigenous Peoples who rely on it for health and well-being; culture, customs and traditions; sustenance; and economic opportunities. Indigenous Peoples have been stewards of water and aquatic habitat for generations, a role that continues today.[ii]

Human disturbance of forests, such as timber harvesting and roads, or natural disturbances, such as fire, insects or disease, can result in hydrologic and geomorphic effects within a watershed. Depending on site conditions and the practices used, the removal of trees is known to alter the amount of snow accumulation, the infiltration of rainfall, and the rate of snowmelt. Forest roads can concentrate and redirect water, and high rates of disturbance can result in channel erosion, debris flows, and floods. These changes can cause negative effects on values.

The Board has a mandate to audit forest licensees and to investigate public complaints involving forest practices under FRPA and the *Wildfire Act*. It may also carry out special investigations to determine compliance of forest practices with FRPA or produce special reports on a matter relating generally to its duties or to a particular case it has investigated.

Legal Framework

Five primary statutes related to water have implications for forest management in BC. Figure 1 illustrates elements of these five statutes that govern forest practices and the conservation, management, and use of water in BC: FRPA, the *Water Sustainability Act* (WSA), the *Drinking Water Protection Act* (DWPA), the *Fisheries Act* and the *Land Act*. In addition, the *Environmental Management Act* pertains to the regulated discharge of pollutants into water.

FIGURE 1. LEGAL FRAMEWORK TABLE

	FOREST AND RANGE PRACTICES ACT (BC)	DRINKING WATER PROTECTION ACT (BC)	FISHERIES ACT (CANADA)	LAND ACT (BC)	WATER SUSTAINABILITY ACT (BC)
GOAL RELATED TO WATER	Protect water sources and fish streams from damage by forest practices on public land	Protect drinking water from health hazards	Protect fish and fish habitat	Protect the use and management of public land and Crown resources	Regulate the diversion and use of water resources
RESPONSIBILITY	FLNRORD	Ministry of Health through health authorities	Ministry of Fisheries and Oceans, and Environment and Climate Change (Federal)	FLNRORD	FLNRORD and Ministry of Environment and Climate Change Strategy
LINK TO FOREST MANAGEMENT	FRPA is the primary statute that governs forest activities on public lands	Drinking Water Protection Plans can direct forest activities	Provisions of the *Fisheries Act* protect fish/fish habitat from activities, including forest practices	Objectives established under the *Land Act* apply to operational plans developed under FRPA and can be used to address water values	Objectives and plans established under the WSA could require FRPA decision-makers and forest licensees to consider objectives in their decisions and operational plans
APPLIES TO	Public land, or on private land, subject to a tree farm licence, community forest agreement or woodlot licence	Public land and private land	Public land, or on private land, subject to a tree farm licence, community forest agreement or woodlot licence	Public land, or on private land, subject to a tree farm licence, community forest agreement or woodlot licence	Water on public land and private land

While a number of statutes have tools to help manage water, many have not been widely applied to date. There is little guidance describing how the different tools work together and across resource sectors, or who is responsible for their coordinated use.

Forest and Range Practices Act

FRPA and its associated regulations are the primary legislation protecting water from damage by forest and range practices. It governs forest and range activities on public lands in BC during forest planning, road building, timber harvesting, reforestation, and livestock grazing. It also applies to private land associated with woodlot licences and tree farm licences. Although FRPA includes specific requirements for range practices related to protection of water, this special report focuses on forest practices, because those are the most common and widespread issues the Board encounters.

Under FRPA, there are two approaches that govern the forest practices of licensees. The first is through objectives that set out the desired outcomes for forest and range management, and can apply at a provincial, landscape, watershed, or stand level. Once an objective is established, forest stewardship plans and woodlot licence plans must be consistent with it, and undergo a public review and comment process, before a statutory decision-maker approves them. All forest practices must follow the approved operational plans under FRPA.

The second approach is through practice requirements that are set out in FRPA and its regulations to protect water from specific damage or events. Practice requirements set out actions licensees must avoid and practices they must implement in all their activities. Figure 2 describes the practice requirements that protect water.

Section 149 of FRPA specifies water as a subject for which government is authorized to established objectives. Objectives set by government for water have been established under the *Forest Planning and Practices Regulation* (FPPR), the *Government Actions Regulation,* the *Haida Gwaii Reconciliation Act* and the *Land Act,* and some have been carried over from the *Forest Practices Code of British Columbia Act*. Although objectives established under the WSA and DWPA could require FRPA decision-makers and forest licensees to consider them in their decisions and operational plans, government has not established any to date.

FIGURE 2. FORESTRY AND WATER PRACTICE REQUIREMENTS: FOREST PLANNING AND PRACTICES REGULATION

APPLIES EVERYWHERE	Protect the environment [FRPA s.46], Damage to the environment [FPPR s.3]
	Ensure that forest practices do not cause landslides that materially affect water and other values [s.37]
	Maintain natural surface drainage [FRPA s.39]
	Revegetate exposed soil if it would cause sediment to enter a stream or have a material adverse effect on water, fish and other subjects [s.40]
	Restrictions related to work in riparian areas adjacent to streams, lakes and wetlands [ss.47-52]
	Protect and mitigate disturbance to stream channels and stream banks when building a stream crossing [s.55]
	Protect fish passage [s.56], fish and fish habitat [s.57], use of livestock in riparian areas [s.58], protect drinking water quality for licensed users [s.59], protect waterworks licenced for human consumption [s.60]
	Size culverts and bridges to pass peak flows [s. 74(1)]
	Requirements for road maintenance and deactivation [ss.79(6), 81, 82(1)]
IN COASTAL REGIONS ONLY	Avoid destabilization of alluvial or colluvial fans [s.54]
WITHIN COMMUNITY WATERSHEDS ONLY	Increased protection for riparian areas on non-fish steams [ss.47, 50-52]
	Ensure sediment from excavated or bladed trails does not affect water diverted for human consumption by a licenced waterworks [s.61]
	Avoid building a road within 100m of a spring [s.62(2)]
	Avoid fertilizer use near streams and licenced waterworks [s.63(1)]
	Increased culvert sizes to pass peak flows [s.74(1)]
ON DESIGNATED TEMPERATURE SENSITIVE STREAMS ONLY (none designated)	Maintain adequate stream shade to prevent water temperatures from increasing to the extent that they have a material adverse impact on fish [s.53]
FOR DESIGNATED FISHERIES SENSITIVE FEATURES ONLY (none designated)	Ensure primary forest activities do not damage or render ineffective a wildlife habitat feature [s.70]

The objective described in section 8 of the FPPR, which applies across provincial public land, is "without unduly reducing the supply of timber from British Columbia's forests, to conserve, at the landscape level, the water quality, fish habitat, wildlife habitat and biodiversity associated with those riparian areas" (riparian area objective). This objective, which applies to all streams, lakes and wetlands within a watershed, is by definition a landscape-level objective. While it has the potential to facilitate a watershed-level approach to minimizing impacts of forestry activities on water, licensees typically address the objective by proposing a stand-level result or strategy, such as retaining a default-width forested buffer (riparian management area) along certain classes of streams.

Licensees generally demonstrate a high degree of compliance with legal requirements of FRPA that relate to water, including results related to the riparian area objective. While stand-level practices are important, many impacts occur through cumulative effects of all activities in the watershed over time. Watershed-level objectives aim to prevent these types of combined impacts from having a material adverse effect on values.

Designated watersheds

This report uses the term 'designated watersheds' for areas where government has established watershed-level objectives for water. Currently, nine percent of the province (see Figure 3) is in a designated watershed, which include community watersheds, fisheries sensitive watersheds and specific watersheds subject to objectives enabled by FRPA.[2]

This report focuses on water management under FRPA. However, the Province has applied watershed-level consideration of impacts to water for other natural resource industries. For example, the *Environmental Protection and Management Regulation* (EPMR) under the *Oil and Gas Activities Act* (OGAA), gives the Minister of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) the authority to establish watersheds, including community watersheds, as designated watersheds for the purposes of EPMR. FLNRORD designated 467 watersheds under the OGAA in August 2011. The EPMR establishes that an oil and gas operating area should only be located within a designated watershed if it will not have a material adverse effect on the quantity and quality of water and the natural timing of water flow. The Oil and Gas Commission must consider this and other environmental objectives when issuing a permit for oil and gas activities.

[2] Currently includes objectives under the *Land Act* and the *Haida Gwaii Reconciliation Act*.

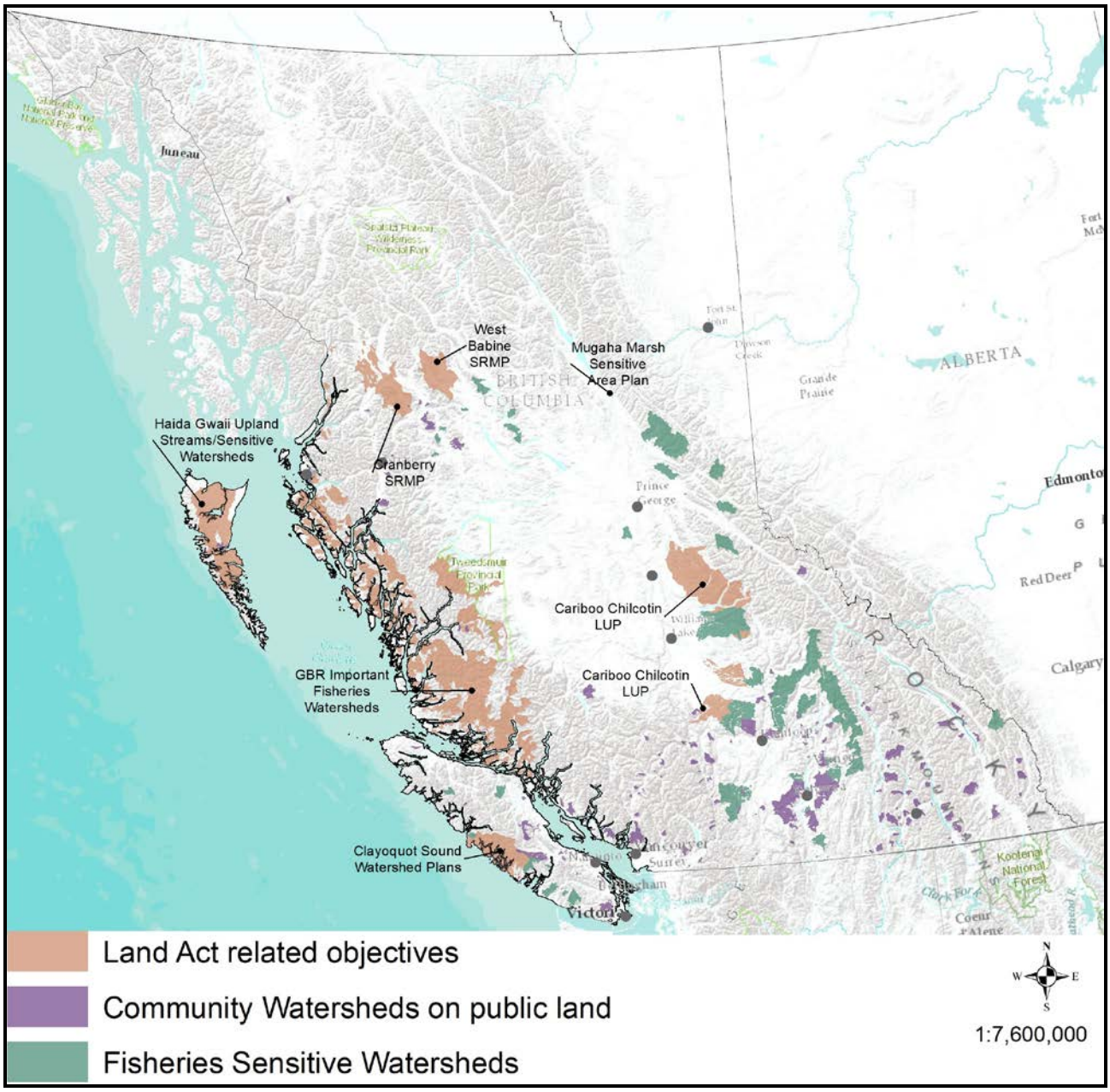

FIGURE 3. MAP OF DESIGNATED WATERSHED AREAS IN BC

Climate Change

Any discussion of water management must look at both current land uses and expected impacts resulting from the changing climate. More extreme weather events such as heat waves and intense rainfall pose a threat to water due to the effects on the active geomorphology and hydrology in a watershed (see Table 1).

In areas where wildfire burns at high or moderate severity, changes in soil infiltration increase surface runoff and erosion rates by one or more orders of magnitude.[iii] More upslope surface runoff contributes to soil erosion and collects onto roads. Roads can concentrate the runoff and sediment at points where they cross a stream and this can affect water quality, fish habitat and drainage structures that were not designed to handle the increased volumes of water.

Increased precipitation, altered timing of spring snowmelt and extreme weather events will affect the quantity and timing of water flows, increasing the risk of erosion of stream channels and leading to negative effects to fish habitat, damage to road infrastructure, and flooding.[iv] This is especially important in snowmelt-dominated watersheds where measurable changes in magnitude, frequency, and water flow timing already occur, or where forest cover has been removed and the area has not yet hydrologically recovered.[v]

While FLNRORD is integrating climate adaptation approaches into programs such as species selection and climate-based seed transfers, and is advancing procedures for climate adaptation for resource roads,[3] more work is required for climate adaptation of forest practices that impact water.

Climate Variables	Examples of Primary Effects	Examples of Secondary Effects
Sustained rainfall or rapid snowmelt	Increase in active hydro-geomorphology (flooding, landslides, peak flow frequency)	Increased surface erosion with negative effects on stream habitat
		Decrease in water quality for human consumption (increased turbidity)
		Risk to public safety, damage to infrastructure
Low rainfall periods and increased warm days	Changes in stream flows and water budgets Increase in stream temperatures	Negative effects on fish habitat
		Decrease in quantity available for human use (e.g., domestic use, irrigation)

TABLE 1. EXAMPLES OF CAUSE AND EFFECTS OF CLIMATE CHANGE ON WATER

Discussion of the Issues Affecting Water

Since 2006, the Board has investigated 27 complaints, published 8 special investigations and reports that involved forest management and water under FRPA, and completed 3 compliance audits with findings related to the effects of forestry on water.[4]

In preparing this report, Board staff reviewed this body of work to identify the most significant forest management issues involving water it has encountered over the last 15 years. We then met with subject matter experts from the provincial and federal governments, water users, professional foresters and consulting hydrologists to assess what action had been taken or is underway to address these issues. This special report describes the four

[3] https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resource-roads/climate-adaptation
[4] These reports are listed in Appendix 1 and are available on the Board's website at www.bcfpb.ca.

most significant issues, examines whether government is addressing them, and suggests opportunities for improvement.

To date, no Board reports have dealt with Indigenous interests in water or the cultural/traditional use of water. The Board recognizes the important relationship Indigenous Peoples have to the waters in their territories, and that the perspectives of individual nations need to be addressed in changes to water stewardship in BC. We believe that the opportunities presented in this report will contribute to addressing the water-related interests of Indigenous Peoples.

Issue 1: The public does not have adequate opportunity for meaningful involvement in how forest practices occur in relation to water and risk to values.

The Board's work shows that British Columbians are concerned about their ability to provide input on the potential of forest practices to impact water—17 of the 38 reports we reviewed involved this issue. The Board's view is that the public must have appropriate opportunities to provide meaningful input to forest practices that may affect water.

What has the Board heard or said on this issue?

The Board commonly hears concerns from people who rely on water from public land for domestic use and irrigation, who believe that forest developments will impact the quality or quantity of water available. They want to have influence on forest management, but opportunities for meaningful and timely input are limited under the current forest planning system. In its 2013 bulletin on public involvement,[vi] the Board outlined how the public should be able to provide input at all forest planning levels: strategic, landscape and operational. They do not necessarily have to agree with the decision, but they should have a reasonable opportunity to comment and their input should be considered.

Government has made strategic land use decisions that allow forest development in most watersheds on public land as long as it is not within a park or protected area. Few land use plans have a legal objective for watersheds, which is a tool available to government to set out desired outcomes.

On public land with no watershed-level objectives, licensees are not required to incorporate content about watershed-level management of water into operational plans. This means that when that operational plan undergoes a public review and comment period, there is nothing for the public to comment on and, therefore, no opportunity for meaningful involvement.

Where government has not established specific watershed-level objectives for water, licensees decide whether to manage for water at a watershed level, determine the acceptable level of risk, and create strategies to manage those risks. Under these circumstances, no public input is required. A 2014 Board bulletin on balancing risk describes how non-timber resource users are generally less tolerant of risks than forest licensees, as they must live and deal with the downstream consequences.[vii]

The Board's *Laird Creek Landslide* complaint report shows how water users bear the consequences of a forest licensee's risk assessment decisions. Despite their concerns, the licensee developed cutblocks and roads after determining that the level of risk was acceptable. A post-harvest landslide triggered a debris flow that deposited approximately 2000 cubic metres of debris into Laird Creek, the drinking water source for more than 100 homes. The landslide affected licensed waterworks, plugging water intakes and introducing suspended sediment to the water system.

[1] Forest Practices Board. 2013. Laird Creek Landslide. FPB/IRC/186. Available at https://www.bcfpb.ca/wp-content/uploads/2016/04/IRC186-Laird-Creek-WEB.pdf

FOREST LANDSCAPE PLANNING*

Forest landscape plans (FLPs) will be developed by management unit (for example a timber supply area or TSA) and once established, will replace forest stewardship plans within that area. Direction for the FLP will be collaboratively developed by the Province and partner Indigenous Nations, providing greater opportunity for those nations to influence forest and range development. Forest and range licensees, stakeholders and local communities will also have the opportunity to engage in the development of FLPs.

FLPs will address the following five objectives:

1) Supporting the production and supply of timber.
2) Supporting the protection and conservation of the environment.
3) Managing the values placed on forest ecosystems by Indigenous Peoples.
4) Managing the values placed on forest ecosystems by local communities.
5) Preventing, mitigating and adapting to impacts caused by significant disturbances to forests.

The FLP will specify how forest and range resource values will be managed within the management unit, and where and how forest harvesting can occur for the life of the FLP. Examples include measures for managing cumulative effects to watersheds; strategies for managing wildlife habitat; and direction on harvesting within sensitive ecosystems. FLPs will include spatialized information and clearly defined measures for success. Once the FLP is established, all forest development will be legally required to be consistent with the FLP direction. FLPs will have a lifespan of 10 years, and will be supported by rigorous monitoring and adaptive management.

* Written by Resource Practices Branch, FLNRORD

In a 2011 special report on the Board's experience with water users, the Board concluded that there is no conflict resolution mechanism to address disagreements between the public and forest licensees about risk related to forest activities.[viii] Currently, government decision-makers have no authority under FRPA to resolve conflict in stand-level decisions. In a 2015 special report, the Board found that if district managers had conditional discretion over issuing cutting permits and road permits, this would strengthen their role in safeguarding the public interest and likely enhance public confidence. [ix]

Is government addressing the public's desire to have greater influence on forest practices?

Government has a number of initiatives underway that could improve public involvement related to forest practices and water. In November 2021, the legislature enacted the *Forest Statutes Amendment Act* (Bill 23), which introduces forest landscape planning (see inset) as part of the FRPA regime, and is intended to increase transparency and improve public involvement in forest planning at the landscape level. Forest landscape plans (FLP), prepared by the provincial chief forester, and forest operations plans (FOP), prepared by licensees and approved by the Minister, will replace FSPs over time. FLPs will address five objectives, including management of the values placed on forest ecosystems by local communities. There will be a public review and comment period required for both FLPs and FOPs. Four forest landscape planning pilot projects are in early stages and the values to be addressed have not yet been identified.

Although some licensees undertake public engagement on site-level plans, FRPA currently does not require this. This makes it difficult for someone with a concern about logging in a specific watershed to know to engage with a

licensee. In 2019, the Province passed the *Forest and Range Practices Amendment Act* (Bill 21), which will improve this situation by requiring public review and comment on planned blocks and roads. At the time of writing, this provision of the legislation is not in force.

The BC government, in partnership with Indigenous governments, is testing the development of water sustainability plans (WSP) and water objectives under the WSA in two new provincial land use planning projects, the Nicola Watershed Governance Project with five Nicola Indigenous Nations, and the Wet'zin'kwa Water Sustainability Project with the Office of the Wet'suwet'en. A third WSA project, Xwulqw'selu-Koksilah, a partnership with the Province and Cowichan Tribes, is exploring a water sustainability plan, with a significant focus on private managed forest lands. These WSA tools have the potential to influence forest practices under FRPA and other natural resource activities, and to create new opportunities for the public to influence the management of water.[5]

The Board understands that, over the long term, modernized land use planning combined with use of WSA tools could result in new objectives in selected watersheds in BC.

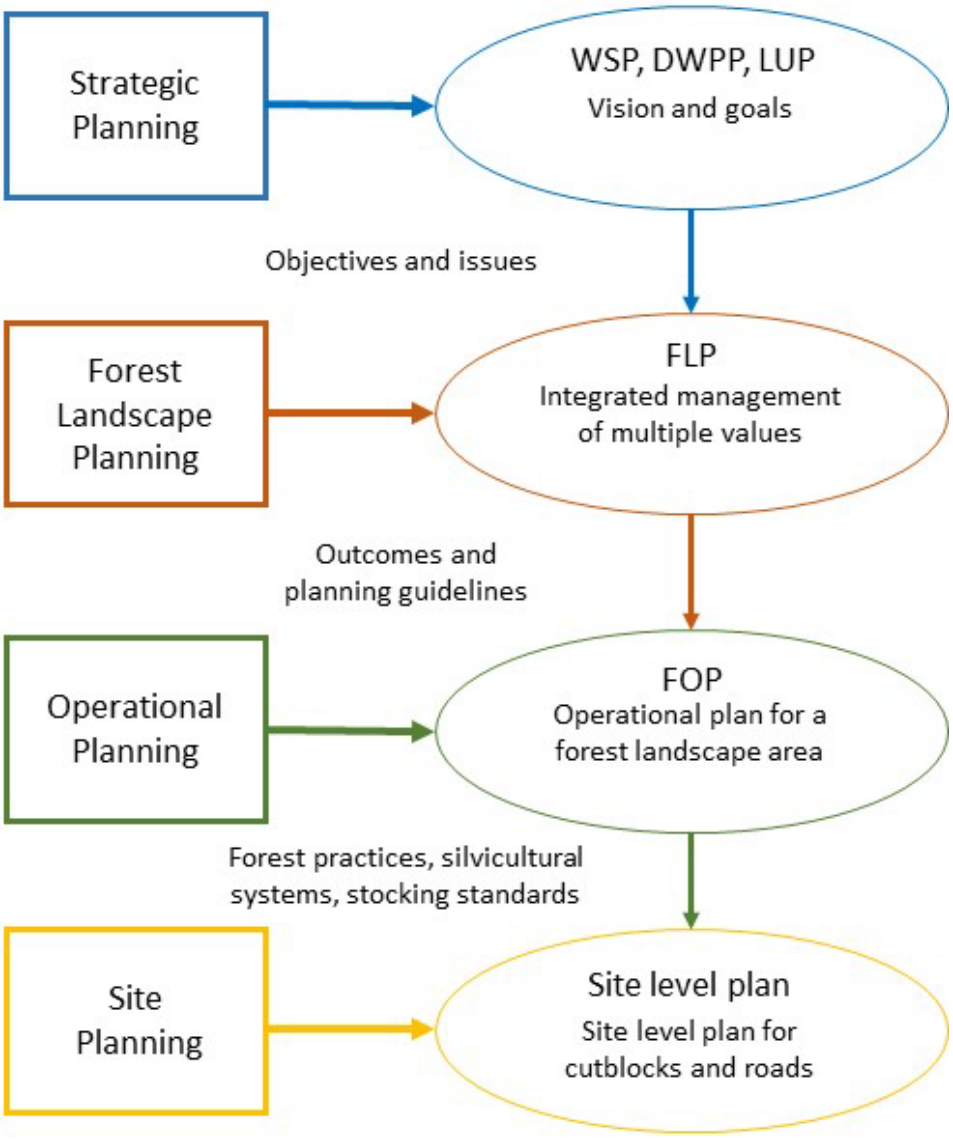

FIGURE 4. PROPOSED NEW FOREST PLANNING STRUCTURE IN BC

[5] A 2020 direction paper, *Towards Watershed Security*, offers a more detailed description of how land use planning and water planning have evolved in BC along with a discussion of some opportunities for improvement.

Opportunity 1: Improve public involvement by making water a core value in forest planning, including forest landscape planning.

In the Board's view, forest planning must consider water at a watershed scale across all of BC with meaningful public involvement to understand and address the risks posed to water from forestry. In addition, long-term planning at a landscape level is required to assess the implications of climate change on water and to develop adaptation strategies.

Forest planning occurs at the strategic, landscape, operational, and site level (see Figure 4 on page 12). Strategic-level planning processes are likely to focus on specific watersheds where values are at greatest risk and on the most complex management issues. In other areas, forest planning can consider water through forest landscape planning.

Forest landscape planning should explicitly consider and plan for potential impacts of climate change on water, and determine how forest practices can support appropriate climate adaptation strategies. If water is a value that is considered in all FLPs, the Province would need to develop the appropriate policies, procedures and planning tools to make this level of planning effective.

The Bill 23 amendments to FRPA require FLPs to address five objectives, including *protection and conservation of the environment* and *management of the values placed on forest ecosystems by local communities*. Forest landscape planning is designed to advance shared or joint decision making with Indigenous Nations, creating a new opportunity to address Indigenous interests in water. If the Province makes water a core value in all FLPs, this will ensure consideration of water at the landscape level across BC with a legal requirement for public input.

In the Board's view, good plans with clear objectives and meaningful public involvement improve forest practice outcomes, and forest planning that addresses water could yield similar benefits.

Issue 2: There are no legal requirements to assess or consider cumulative effects of forest practices in most watersheds in BC.

The combined impacts of all human activities and natural disturbances on a value, such as water, are called cumulative effects. These occur where multiple pressures overlap spatially and temporally and a system does not have adequate time to recover.[x] In most watersheds, there is no legal requirement to assess, consider, or take action to mitigate the cumulative effects of forest practices on water. Of the Board's 38 reports related to water, 20 involved cumulative effects.

What has the Board heard or said on this issue?

Forest practices contribute to adverse cumulative effects in many watersheds in BC. When the Province establishes watershed level objectives, it is identifying what values are important to the public and establishing its expectations to manage potential risks in those watersheds.

The nine percent of watersheds with legal objectives can offer practical examples of how to regulate cumulative effects that can be applied across the province. A requirement to manage for cumulative effects is more effective if the objective clearly defines what government desires, such as identifying how much risk to values is acceptable or desired outcomes. In all designated watersheds, the management of cumulative effects by forest licensees is typically accomplished by undertaking a detailed watershed assessment that, most commonly, provides recommendations to a forest licensee that assists it in avoiding unacceptable consequences from its forest management practices.

A 2020 special investigation published by the Board, *Conserving Fish Habitat under the Forest and Range Practices Act – Part 2,* identifies that cumulative effects are happening in all five case study watersheds, including those that are designated watersheds under FRPA. [1] It concluded that priority actions such as watershed-scale planning and monitoring are necessary.

[1]Forest Practices Board. 2020. Conserving Fish Habitat under the Forest and Range Practices Act – Part 2: An Evaluation of Forest and Range Practices on the Ground. FPB/SIR/52. Available at: www.bcfpb.ca/wp-content/uploads/2020/05/SIR52-Fish-Habitat-Conservation-Part2.pdf

Where there are no watershed level objectives under FRPA, licensees have discretion on whether to consider the cumulative effects of forest management on water or whether any mitigation measures are necessary to prevent risk to values from increasing. The Board has published 20 complaint investigation reports involving activities outside of designated watersheds, and in 5 of these, licensees voluntarily conducted watershed assessments.

In many parts of the province, multiple licensees with different risk tolerances operate on the same area of public forest land. Without clearly established objectives, a decision made by one licensee to mitigate risk could be undone by another.

In a 2016 complaint investigation, the Board found that only one out of three licensees operating in the Bonneau Creek watershed considered the potential risks of harvesting on watershed hydrology and streamflows.

Forest Practices Board. 2016. Forest Harvesting and Streamflows in the Bonneau Creek Watershed. FPB/IRC/201. Available at www.bcfpb.ca/wp-content/uploads/2016/03/IRC201-Bonneau-Creek-Watershed.pdf

The Board acknowledges that cumulative effects management relates to more than the impact of forest practices on water. In a 2011 special report on cumulative effects, we concluded that the combined adverse effects of all natural resource development were largely unknown and unmanaged in BC. The Board found there was no requirement to assess the effects of all natural resource development, and if an assessment was needed, there was no government decision-maker to consider the results.[xi] The report considered the overall framework required to manage for cumulative effects of all activities on all values.

In 2015, the BC Auditor General concluded that the Province was not effectively managing for cumulative effects and made nine recommendations. In July 2021, a Supreme Court of BC ruling (Yahey vs. British Columbia) [xii] affirmed these findings, and found that government decision-makers lack sufficient authority under FRPA to link the results of the cumulative effects assessments to their decision-making. These findings support the Board's earlier conclusions that the current system does not adequately manage cumulative effects.

In the Peachland and Trepanier Creek community watersheds, the Board found that the watersheds are actively used for many different activities and by different industries, which creates the potential for unmanaged or undetected cumulative effects. Forest licensees are carrying out watershed assessments to understand and manage the cumulative effects of forestry developments but no one is responsible for managing the cumulative impacts of all activities in designated watersheds.

Forest Practices Board. 2019. Forestry Activities in the Peachland and Trepanier Creek Community Watersheds. FPB/IRC/224. Available at www.bcfpb.ca/wp-content/uploads/2019/09/IRC224-Peachland.pdf

What is being done to address the cumulative effects on water?

The Province has three WSA projects underway looking at the development of water sustainability plans and water objectives. These plans provide an opportunity to address cumulative effects of forest practices on water but it is too early to assess how this will work.

Assessment and monitoring processes have evolved in the past decade, delivering science-based information designed to inform the management of cumulative effects on water. They include GIS-based risk analysis, effectiveness monitoring and watershed assessment. It is not clear how decision-makers will consider this new information under the current FRPA legal framework.

GIS-Based Risk Analysis

In January 2017, the Province approved the *Interim Assessment Protocol for Aquatic Ecosystems in British Columbia* (AE protocol). It provides a strategic-level, GIS-based risk assessment for a defined geographic area based on a set of core indicators (see inset on the provincial cumulative effects framework for a link to the protocol and published reports). Although intended to inform government decision-making, there is no explicit link between these assessments and decision-making under FRPA.

The Skeena Sustainability Assessment Forum (SSAF) is one of four regional environmental stewardship projects that make up the Environmental Stewardship Initiative, a new form of collaboration between BC and Indigenous Nations. The SSAF is undertaking GIS-based assessments, including water, and fish and fish habitat, which could serve as a source of information to support decision-making on resource development activities.

Effectiveness Monitoring

In 2009, the Forest and Range Evaluation Program (FREP) developed the Water Quality Effectiveness Evaluation (WQEE) protocol to determine whether forest and range practices are effective in protecting water quality. It helps identify implementation issues regarding forest policies, practices, legislation, and FSP results and strategies. The WQEE field procedures quantify the effect of forest- and range-related disturbances on water quality, and how they might be mitigated.

FREP is in the process of refining protocols for assessing the condition of a watershed.[6] The condition assessments provide results-based field data that is used to monitor and evaluate the actual condition of the watershed on the ground. The results of effectiveness monitoring are intended to inform forest planning and practices. The Board is aware that some FSPs have been adjusted to reflect results of FREP assessments, however there is no explicit link between the monitoring results and decision-making under FRPA.

Watershed Assessment

In response to Board recommendations in a 2014 report on community watersheds,[xiii] the Joint Practices Board of the Association of BC Forest Professionals and Engineers and Geoscientists BC developed guidelines for *Watershed Assessment and Management of Hydrologic and Geomorphic Risk in the Forest Sector*.[xiv] These professional guidelines establish standards of practice for professionals managing risks in forested watersheds and completing watershed assessments. The professional guidelines govern how professionals manage risk to water. They describe a framework for the management of hydrologic and geomorphic

PROVINCIAL CUMULATIVE EFFECTS FRAMEWORK*

The Province of British Columbia initiated the provincial Cumulative Effects Framework (CEF) in 2014 to measure the effects of all natural resource activities, large and small, on values that are important to the people of British Columbia.

Aquatic ecosystems is one of five provincial CEF values currently being assessed (along with grizzly bear, old growth forest, moose and forest biodiversity). The *Interim Assessment Protocol for Aquatic Ecosystems in British Columbia* (AE protocol) assesses cumulative effects related to:

1. Sustaining water quality (sedimentation);
2. Sustaining water quantity (peak flows); and
3. Sustaining hydrological and aquatic ecosystem processes (riparian function).

Pressure indicators are analyzed to estimate the potential risk to each watershed, with benchmarks to support interpretation and management. In some regions, modifications to this protocol or alternate assessment methods, with similar indicators and locally available data, have been used to generate cumulative effects assessment reports.

The results of CEF aquatic ecosystem assessments are reported by region, and as of 2021, they have been completed and published for three regions or parts of regions: Thompson-Okanagan, Kootenay-Boundary, and South Coast.

CEF reports are intended to be used by provincial government staff and decision-makers to inform decisions related to sustainable management of BC's natural resources. They may also be used by Indigenous groups, industry, other levels of government and local communities to understand the level of relative risk in an assessment unit.

For more information on the CEF, visit the Province of BC's CEF website.

* Written by Resource Planning and Assessment Branch, FLNRORD

[6] The Pour-point Routine-level Watershed Assessment (PRWA) and the Watershed Status Evaluation Protocol (WSEP) are condition assessment protocols.

WATERSHED ASSESSMENTS

Water assessments use current science and the knowledge and experience of specialists to understand the condition of a watershed, the extent of past disturbance and current recovery trends. Forest licensees use the results of a watershed assessment to guide forest management planning, prioritize restoration opportunities, and identify management strategies that promote recovery of hydrologic processes.

Joint Practices Board. 2020. Watershed Assessment and Management of Hydrologic and Geomorphic Risk in the Forest Sector, version 1.0.

risks in watersheds, and set out the responsibilities for professionals who undertake watershed assessments. The professional regulatory bodies are responsible for holding their registrants accountable to standards of practice. However, if there is no legal requirement in FRPA or other legislation to manage risk to water, doing so is discretionary for forest licensees. When combined with clear watershed level objectives, the Board considers the professional guidelines a constructive tool to guide the watershed assessment process and mitigate cumulative effects on values.

Opportunity 2: Manage cumulative effects of forest practices on water as a legal requirement in all watersheds.

BC should require the management of cumulative effects of forest practices on water as a legal requirement under FRPA throughout the province.

Over the long term, approved FLPs, together with other types of forest plans, have the potential to establish the desired outcomes and practice guidelines for managing cumulative effects on water. This would allow for government-to-government engagement, improved public involvement and adaptation options in response to climate change.

As a bridge to completed FLPs, government could enact new legal provisions that require forest licensees to manage cumulative effects of forest practices on water in all watersheds. This approach would create accountability for forest licensees to manage cumulative effects, and the professional guidelines then set out the standards for how professionals undertake watershed assessments and manage the risks.

In applying this new requirement, the Province, through policy or regulation, could apply a flexible model for managing cumulative effects to water based on risk. Where risk to values are lower, the assessment methods and management strategies could be simpler.

Issue 3: Current forest practices contribute sediment into streams.

The deposition of sediment into water can be detrimental to fish, fish habitat and water quality, and is the most common forest practice issue identified in past Board work that affects water. Fine sediment covers spawning and feeding beds, smothers incubating eggs and clogs fish gills. Coarse sediments such as gravels, cobbles and boulders lead to channel widening and bank erosion, channel infilling, diversions, and dewatering. When sediment enters a stream, the water becomes turbid, increasing the risk that pathogens from wild and domestic animals (e.g., livestock) and human sources will attach to the sediment particles, negatively affecting drinking water quality.

Of the 38 Board reports that address water, 17 relate to the introduction of sediment into streams.

What has the Board heard or said on this issue?

The Board's special report, *Access Management and Resource Roads: 2015 Update*, identified roads as the cause of the most significant environmental effects of natural resource development, including landslides, siltation of streams and alteration of natural drainage patterns.

In its 2014 report on community watersheds, the Board found that practices to minimize erosion and control sediment deposition into streams were unsound in 3 of the 12 community watersheds sampled. In 4 of the watersheds, licensees did not meet all the legal requirements to protect water quality, including prevention of landslides, road maintenance and maintenance of natural surface drainage patterns.

In a recent special investigation looking at conservation of fish habitat, the Board identified sediment deposition from roads into streams as a chronic problem, resulting in a moderate or high existing or potential risk of harm to fish habitat in 4 of 5 case study watersheds.

> Investigators found significant problems related to sediment from roads entering into streams and fish habitat. Of the 200 sites assessed on the ground, 50 were identified as a sediment source and at 37 of those 50 sites, sediment is impacting or has the potential to impact fish habitat.
>
> Forest Practices Board. 2020. Conserving Fish Habitat under the Forest and Range Practices Act – Part 2: An Evaluation of Forest and Range Practices on the Ground. FPB/SIR/52. Available at: www.bcfpb.ca/wp-content/uploads/2020/05/SIR52-Fish-Habitat-Conservation-Part2.pdf

In a 2020 report on conservation of fish habitat, FRPA manages sediment by regulating the time and manner a primary forest activity such as harvesting or road construction or maintenance is carried out, but that only applies to fish and fish habitat. FRPA does not regulate day-to-day road use and does not explicitly regulate sedimentation that results from acts of omission during road maintenance. Most sedimentation issues can be avoided by following erosion and sediment control best management practices, such as effective revegetation of exposed soil surfaces, crowning or sloping of road surfaces or properly designed water control structures.

FREP's *Water Quality Effectiveness Evaluation* for 2008-2020[xv] supports the Board's findings. The data shows that consistently, about one third of all sites monitored (n=8411), are exceeding government's target threshold for the amount of sediment deposited into a stream each year. This includes 2041 sites rated as 'moderate' (1-5 m^3 per site/per year); 396 sites rated as 'high' (5-20m^3 per site/per year) and 85 sites rated as 'very high' (greater than 20m^3 per site/per year). Monitoring between 2008 and 2020 shows that the proportion of all sites assessed as 'moderate' or higher has remained relatively unchanged between years, indicating there has been little improvement in forest practices to minimize sediment entry into streams over the 12-year period. Using the WQEE protocol, FREP found that the generation of excessive fine sediment is the primary reason for degraded water quality attributed to forestry operations. It also highlighted the importance of addressing sediment impacts through all stages of a road's life.

Ambiguous terms in the legislation make it difficult to measure and verify impacts of sedimentation and it can be challenging for Board auditors to attribute the issue to one specific instance or licensee.

In a 2021 report on a 2019 audit of BC Timber Sales, auditors identified a number of landslides that occurred on the Oliver Creek Forest Service Road. The road continues to deposit sediment into Oliver Creek, which flows into the Adams River—one of the most important sockeye salmon breeding areas in North America. As a result of legal ambiguities in FRPA, the auditors were not able to conclude that the sedimentation contravened the Act, although they recognized fish habitat in Oliver Creek was at risk. They were unable to quantify the impacts of the sedimentation from this specific site on the fish habitat, nor could they attribute the landslides to the actions of any one specific licensee.

[1]Forest Practices Board. 2021. Forestry Audit: BC Timber Sales and Timber Sale Licence Holders, Clearwater Field Unit Portion of the Kamloops Business Area Thompson Rivers Natural Resource District. FPB/ARC/242. Available at www.bcfpb.ca/wp-content/uploads/2021/02/ARC242-BCTS-Clearwater.pdf

To reduce sediment from roads entering streams, the Board made the following recommendations in its special investigation report on conserving fish habitat:

1. Government should amend FRPA and/or its regulations to ensure that there is a clear and enforceable requirement to minimize sediment entering streams during road construction, maintenance and deactivation.
2. Government should update guidance and standards for road construction and maintenance to clearly identify practices needed to minimize sediment entering streams during road construction, deactivation, and on an ongoing basis during road maintenance.

Is government addressing the issue of sedimentation?

FLNRORD accepted the two recommendations listed above and said it would review the practice requirements related to protection of fish habitat and sediment from road maintenance, improve the criteria for monitoring impacts to aquatic ecosystems, and make improvements to its Engineering Manual related to inspection and maintenance of forest roads. The Province is also cooperating with the professional associations to update and clarify professional practice standards related to roads and sediment. The Board is encouraged to see that government is exploring a range of options to minimize sediment from entering streams.[xvi]

Opportunity 3: Improve regulation of forest practices that contribute sediment to streams.

Both government and licensees must improve sediment management on all roads, and through all stages in a road's life cycle.

The Province has committed to examine legislation and regulations related to sediment management and to look for opportunities to improve FRPA. The Board believes that government needs to make regulatory changes based on that review to minimize the amount of sediment entering streams from roads.

Issue 4: Historical forest practices continue to negatively affect water.

Historical practices refer to logging and road construction that occurred before the introduction of the Forest Practices Code in 1995 (pre-Code). The Board first identified the issue of impacts from historical practices in 1998 when four audits found significant environmental risks posed by old roads for which no one was responsible. We continue to observe impacts due to historic practices that negatively impact the functioning condition of some watersheds, including fish passage, stream channel functioning condition, and sedimentation. Of the Board's 38 reports related to water, 18 of them identified impacts from historical practices.

What has the Board heard or said on this issue?

In its special investigation of community watersheds in 2014, the Board found that the condition of the watersheds examined was primarily affected by the impacts from historic practices such as channel destabilization from pre-Code harvesting in riparian areas and ineffective road deactivation. The Board's 2009 special investigation of fish passage at stream crossings found that not all pre-Code problems with fish passage had been fixed. In particular, some older stream crossings prevent fish passage into the rest of the watershed.

In its 2020 special report on fish habitat conservation, the Board found that the cumulative impacts from historical practices contributed to existing or potential risk of harm to fish habitat in two of five case study watersheds.

> In the Ainslie watershed, factors affecting channel condition include impacts from non-status roads.
>
> In the Memekay watershed, riparian monitoring by FREP found that the functioning condition of the watershed was impaired due to extensive pre-Code streamside harvesting. Investigators suspect that the productive capacity of fish habitat will not likely improve without implementing a variety of channel restoration strategies.
>
> Forest Practices Board. 2020. Special Investigation: Conserving Fish Habitat under the Forest and Range Practices Act. Part 2: An Evaluation of Forest and Range Practices on the Ground. FPB/SIR/52. Available at www.bcfpb.ca/wp-content/uploads/2020/05/SIR52-Fish-Habitat-Conservation-Part2.pdf

The issue of historical practices shows up in complaint investigations, typically when the Board carries out a field assessment to determine the root cause of a complaint regarding water quality. Most of the time, it is impossible for the Board to attribute cause to any one event or factor and often historic practices, such as riparian area harvesting or pre-Code roads, are contributing to the issue.

> In the 2017 McClure Creek investigation, the complainant was concerned that harvesting and road construction led to increased sedimentation, resulting in a buildup of sediment at their domestic water system's dam and water intake. The Board hired a qualified professional to conduct a preliminary review of the McClure Creek watershed condition.
>
> The preliminary review found several legacy issues, including water management on non-status roads, historic selective logging access trails, an old skid trail that runs adjacent to McClure Creek and crosses the creek in several locations, and both historic and recent landslides that deposited material directly into McClure Creek.
>
> Forest Practices Board. 2017. Impacts of Harvesting and Road Construction on Water Quality in McClure Creek. FPB/IRC/211. Available at www.bcfpb.ca/wp-content/uploads/2017/10/IRC211-McClure-Creek.pdf

Is government addressing the issue of historical impacts?

There have been various watershed and stream restoration programs in BC over the last 30 years, and the Province maintains a small program to address historical fish-passage issues. While some of these programs have addressed restoration activities, most have been short term. In March 2021, the Ministry of Environment and Climate Change Strategy announced the Healthy Watersheds Initiative, dedicating $27 million to restore watersheds and wetlands throughout the province. The federal and provincial governments have jointly funded the BC Salmon Restoration and Innovation Fund, providing up to $142.85 million for five years (until March 31, 2024) for activities such as protection and restoration for priority wild fish stocks.

While these funds are supporting important work, more is needed. The BC government's commitment to developing a Watershed Security Strategy and Fund,[xvii] referred to in mandate letters to ministers, may provide an additional funding mechanism for restoration work to address some of these impacts from historical practices.

Opportunity 4: Reduce the impact of historical practices on water through a renewed program of watershed restoration.

The most cost-effective way to manage watersheds is to avoid the impacts through good planning and practices, as outlined in the first three opportunities identified in this report. However, there are many watersheds in an impaired condition due to historical practices.

Watershed restoration can address impacts from historical practices such as sediment from pre-Code roads that have not been properly deactivated, fish passage at stream crossings, stream channel morphology impacts, and riparian function. Effective implementation of restoration projects requires long-term funding and an effective program for delivery on the ground.

Appendix 1 – List of Board Reports

Special Reports

2011 Cumulative Effects: From Assessment Towards Management
2014 A Decade in Review: Observations on Regulation of Forest and Range Practices in British Columbia
2015 Access Management and Resource Roads: 2015 Update
2018 Conserving Fish Habitats under the Forest and Range Practices Act - *Part 1: A Review of the BC Government Approach*

Special Investigation Reports

2007 The Effect of Mountain Pine Beetle Attack and Salvage Harvesting on Streamflows
2009 Fish Passage at Stream Crossings
2014 Community Watersheds: From Objectives to Results of the Ground
2020 Conserving Fish Habitat under the Forest and Range Practices Act – *Part 2: An Evaluation of Forest and Range Practices on the Ground*

Audits

2012 Audit of Forest and Range Planning and Practices Affecting Water Quality in Oyama and Vernon Creek Community Watersheds: Okanagan-Shuswap District
2017 Audit of Range Planning and Practices Thompson Rivers Natural Resource District: Range Agreements for Grazing RAN077495 and RAN077496
2021 Forestry Audit: BC Timber Sales and Timber Sale Licence Holders – Clearwater Field Unit Portion of the Kamloops Business Area, Thompson Rivers Natural Resource District

Complaints

2007 Domestic Water Concerns with Harvesting and Road Construction near Elmer Creek
2007 Cutblocks and Roads near Furlong Creek
2007 Eagle Creek Pine Salvage
2008 Forest Practices in the Leet Creek Watershed, near Kaslo, BC
2009 Salvage Logging after a Wildfire at Sitkum Creek
2009 Road Construction and Harvesting in a Woodlot near Carter Creek
2010 BCTS blocks in Slocan Park
2010 Road Construction in the Mounce Creek Domestic Watershed
2010 Pine Beetle Salvage Logging and Water Flows near Williams Lake, BC
2011 Logging in the Deroche Creek Community Watershed
2011 Logging and Winter Streamflow in Twinflower Creek
2012 Gilpin Creek Debris Slide
2012 Salvage Logging and Water Flows at Cooper Creek
2013 Laird Creek Landslide
2014 Harvest Planning and Practices in the Hunaker Creek watershed
2014 Timber Harvesting and Potential Impacts to the Duhamel Creek Alluvial Fan
2014 Harvesting Upslope of Cabins Along East Shuswap Lake
2016 Timber Harvesting Impacts on Water Flows near Clearwater
2016 Forest Harvesting and Streamflows in the Bonneau Creek Watershed

2017 Impacts of Harvesting and Road Construction to Malakwa Creek
2017 Impacts of Harvesting and Road Construction on Water Quality in McCLure Creek
2019 Harvest Planning for Ecosystem Based Management on Haida Gwaii
2019 Forestry Activities in the Peachland and Trepanier Creek Community Watersheds
2019 Yates Creek Flooding (closing letter)
2020 Watershed Assessment in the Glade Community Watershed
2020 Road Maintenance and Landslides at Bernard Creek, on Kootenay Lake
2022 Impacts of Wildfire and Harvesting Near Silver Hills

ENDNOTES

[i] Brenner, Laurie. "Role of Water in the Ecosystem" *sciencing.com*, https://sciencing.com/role-water-ecosystem-5444202.html. 14 December 2021.

[ii] First Nations Fisheries Council of British Columbia. May 2019. *Towards a Water Sustainability Act First Nations Engagement Framework. Working Group Recommendations for Collaborative Development of Regulations and Policies.* Available at www.fnfisheriescouncil.ca/wp-content/uploads/2019/11/Letter-FNFC-to-BC_July-2019.pdf

[iii] Winkler, R.D., R.D. Moore, T.E. Redding, D.L. Spittlehouse, B.D. Smerdon, and D.E. Carlyle-Moses. 2010b. *The effects of forest disturbance on hydrologic processes and watershed response*. In: *Compendium of forest hydrology and geomorphology in British Columbia*. R.G. Pike, T.E. Redding, R.D. Moore, R.D. Winkler, and K.D. Bladon (editors). B.C. Min. For. Range, Res. Br., Victoria, B.C., and FORREX Forum Res. Exten. Nat. Resourc., Kamloops, B.C. Land Manag. Handb. 66., pp. 179−212. Available at www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh66/Lmh66_ch07.pdf

[iv] Pike, R.G., D.L. Spittlehouse, K.E. Bennett, V.N. Egginton, P.J. Tschaplinski, T.Q. Murdock and A.T. Werner. 2008a. *Climate change and watershed hydrology: part I—recent and projected changes in British Columbia*. Streamline 11: 1-7. Available at web.viu.ca/earle/geol-412/streamline_vol11_no2_art1.pdf

[v] Forest Practices Board. 2006. *Post-Wildfire Hazard Assessment and Risk Management*. Special Report 24. Victoria, B.C. Available at www.bcfpb.ca/wp-content/uploads/2016/04/SR24-Post-Wildfire-Hazard-Assessment.pdf

[vi] Forest Practices Board. 2013. *Public Involvement in Forest Management Planning in BC*. Board Bulletin, Volume 15. Available at www.bcfpb.ca/wp-content/uploads/2013/07/Volume-15-Public-Consultation.pdf

[vii] Forest Practices Board. 2014. *Balancing Risk Across Resource Values in Forest Operations*. Board Bulletin, Volume 16. Available at www.bcfpb.ca/wp-content/uploads/2016/04/Volume-16-Balancing-Risk-across-Resource-Values-in-Forest-Operations.pdf

[viii] Forest Practices Board. 2011. *The Forest Practices Board Experience with Forestry and Water Users.* FPB/SR/40. Available at https://www.bcfpb.ca/wp-content/uploads/2016/04/SR40-FPB-Experience-with-Forestry-and-Water-Users-WEB.pdf

[ix] Forest Practices Board. 2015. *District Managers' Authority Over Forest Operations*. FPB/SR/52. Available at www.bcfpb.ca/wp-content/uploads/2016/04/SR52-Resource-District-Managers.pdf

[x] MacRobert, E. 2018. *Cumulative Effects of Impacts to Fish Habitats Resulting from Developments along the Immediate Coastal Zone of the Island of Newfoundland. Prepared for Fisheries and Oceans Canada, Fisheries Protection Program*.

[xi] Forest Practices Board. 2011. *Cumulative Effects: From Assessment Towards Management*. FPB/SR/39. Available at www.bcfpb.ca/wp-content/uploads/2016/04/SR39-Cumulative-Effects.pdf

[xii] Yahey v British Columbia, 2021 BCSC 1287 (CanLII), <www.canlii.org/en/bc/bcsc/doc/2021/2021bcsc1287/2021bcsc1287.html>, retrieved on 2021-08-11

[xiii] Forest Practices Board. 2014. *Community Watersheds: From Objectives to Results on the Ground*. FPB/SIR/40. Accessible at www.bcfpb.ca/wp-content/uploads/2016/04/SIR40-Community-Watersheds-From-Objectives-to-Results-on-the-Ground.pdf

[xiv] Engineers & Geoscientists British Columbia and Association of BC Forest Professionals. 2020. *Watershed Assessment and Management of Hydrologic and Geomorphic Risk in the Forest Sector V 1.0*

[xv] Carson, B. and D. Maloney. 2021. B.C. Ministry of Forests, Range, Natural Resource Operations and Rural Development. *Water Quality Effectiveness Evaluation: Water Quality Data Summary for 2008-2020*. FREP Report # 42. Available at www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/frep/frep-docs/frep-water-quality-report-may2021.pdf

[xvi] Forest Practices Board. 2021. Conserving Fish Habitat under FRPA - Government Response to recommendations. Available at https://www.bcfpb.ca/wp-content/uploads/2021/05/SIR52-Response-to-Recommendations.pdf

[xvii] 2020 Mandate letter to Minister of State for Lands and Natural Resource Operations www2.gov.bc.ca/assets/gov/government/ministries-organizations/premier-cabinet-mlas/minister-letter/cullen_mandate_2020.pdf

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