Water Policy in BC: Directions and Possibilities for the BC Real Estate Association

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Prepared for the BC Real Estate Association
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Objective and Mandate

The BC Real Estate Association (BCREA) has identified water as an emerging concern for its members. It is becoming apparent to many that the impacts of climate change will increase the scarcity of water and the likelihood of extreme events such as droughts and floods. This adds risk to the interests of property owners and is of significant concern to the Association – and to British Columbians generally.

The BCREA has commissioned this water policy overview paper as part of its broader interest in engaging the government to develop durable solutions to the emerging challenges related to water management in BC. This overview paper will provide the Association with background information to increase its understanding around water issues generally and the current water management approach in BC. The review will also be the foundation of a 4-page policy briefing note that will be used to directly involve elected leaders and provincial government representatives in the task of identifying water management priorities.

Complemented by the policy briefing note, this document provides a firm platform to engage the Province on water management issues. It also emphasizes the BCREA's intention not only to find solutions, but also to assist with implementation to ensure sustainable management of water resources in British Columbia.

The authors are aware that the government is currently drafting a ***Water Action Plan*** for public release in the spring. It is understood that this plan will cover some of the issues explored by the authors and that the BCREA will be in a strong position to partner with the Province on some aspects of the Action Plan once it has been released.

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Overview

This paper, organized in 6 sections, provides an overview of current (and emerging) water issues and outlines selected policy issues in priority areas supported by the BCREA – both immediate opportunities and areas for longer-term analysis.

The introductory section outlines the rational for the BCREA's engagement by placing its organizational principles as articulated by their Quality of Life Indicators in the context of emerging water challenges. It is important to understand that water is one element that impacts on quality of life and that the policy analysis contained in this document will need to be integrated with other policy areas. This initial section concludes by listing the primary water related issues and trends emerging in the Province.

Section II introduces the increasing risks associated with water management in the current reality of a changing climate and a growing economy and points out that current approaches to water management are continuing to degrade our natural capital. This section also offers solutions by highlighting the importance of protecting ecosystems – as the foundation to healthy communities and vibrant local economies – and the potential of water demand management to reduce risks and impacts on aquatic ecosystems.

An overview of the current legislative, institutional and policy environment governing water in BC is provided in Section III.

Section IV delves into the three priority areas identified by BCREA for consideration in 2007: drinking water and source protection; groundwater management; and, flood protection. Included with these reviews are a number of action items and proposed targets to monitor government uptake of the proposed recommendations.

Longer-term priorities and areas requiring more extensive reform are explored in Section V. These more fundamental priorities emphasize the need to modernize water allocations, reform water pricing and commit to water conservation as the foundation of watershed management across the province. These are issues that the BCREA can engage with the province in a more meaningful manner once the *Water Action Plan* has been released.

The final section provides the path forward by emphasizing the need for a serious commitment to "good" water governance and concludes by summarizing the focus on action presented throughout this paper.

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SECTION I – Introduction

Core messages:

- Water related risks will increase and will impact on the interests of property owners.
- Water management today and in the future requires more resources from both the public and private sector. Doing nothing will have much higher costs in the future than appropriate action undertaken in the immediate future.
- Currently, the government is under-resourced to manage for increased water-related risk.

In British Columbia, as in much of Canada and the world, management of freshwater resources is in a period of rapid change. Climate change is but one of many factors that drive this changing reality. The current era, premised on a belief in virtually unlimited water supply, is ending. Water supply issues and concern about management capacity are mounting.

To address many of the current water management challenges in British Columbia the typical response has been to focus on supply-side approaches. This primarily involves the provision of large-scale built infrastructure – pumps, pipes, reservoirs, dams and water and waste treatment plants. This supply-side approach generally underestimates the full economic costs and long-term impacts on the health of ecosystems that support the water resource.

A number of other Canadian provinces have already undertaken comprehensive policy reviews of water management to deal with the emerging challenges facing water resources across the nation. For example, Alberta's *Water for Life Strategy* provides an excellent framework and sets out clear provincial leadership in three aspects of water management: safe, secure drinking water; healthy aquatic ecosystems; and, conservation. Manitoba has created Canada's first (and only) Ministry of Water Stewardship to signal the importance of water and Quebec is leading with a strong commitment to an integrated watershed-based approach. The BC Government is also committed to reviewing its water policies in a new *Water Action Plan* to be released later this spring.

The BC Government has already recognized that a change in approach is required if water resources are to be managed sustainably. For example, in the Ministry of Environment *Service Plan* for 2006-2009 more emphasis is placed on demand-side management and the need to prepare watershed management plans to protect these crucial eco-systems. Although the BCREA is encouraged by some of these new directions, significant additional attention is needed to ensure the protection of water resources in the province. Once this new provincial water strategy is released, the BCREA, with the assistance of this background document, will be well positioned to engage the Province in a process of establishing priority areas and successful implementation toward creating a more sustainable water management regime.

Linking water priority areas with BCREA's Quality of Life Indicators

The BCREA has published a set of Quality of Life Indicators that combine economic and environmental principles with the interests of property owners. In the box below, these principles are put in a water management context by relating how increasing risks maybe undermining these principles.

Ensuring economic vitality
- Economic growth (and prosperity) is constrained in some regions due to concerns about water quality and availability.

Preserving our Environment
- Declining water quality and intensification of water use undermine aquatic ecosystem health and ecological resilience.

Protecting property owners
- Increased risk of floods and droughts and lack of effective groundwater management directly impact private property (and reduce value).

Building better communities
- Poor drinking water source protection, high water use and lack of groundwater management increase water supply (and treatment) costs and jeopardize residential water access and security.

Providing housing opportunities
- Linking new housing with water conservation is of fundamental importance in an increasingly uncertain water future.

Many linkages exist between water and other factors affecting quality of life as set out in the BCREA principles. Water conservation saves energy by reducing pumping and treatment. Better land use and watershed management increases carbon sinks and contributes to meeting the Province's greenhouse gas targets. Wise water use will add to property values and reduce water inputs, such as chemicals, and will also reduce the need for waste management thus protecting environmental quality. Therefore we urge the BCREA to consider the integration of good water stewardship among the many other Quality of Life Indicators it promotes.

Primary water issues and trends in British Columbia

An informal review of the state of water resource in British Columbia revealed numerous water issues and emerging trends:

- climate change impacts on water resource availability and intensity
- escalating variability and occurrences of extremes – droughts and floods
- mounting infrastructure costs associated with rapid growth, urbanization and historical under-capitalization for maintaining water infrastructure
- current approaches to water management and governance that undermine ecosystem health
- water conservation as the next best "source" of water for many communities

- lack of accountability and oversight in protecting sources of drinking water that leads to decreased citizen confidence
- lack of controls on the use of groundwater that lead to conflicts
- potential privatization of water supply delivery (including privatization of waste water)
- oil and gas development impacts on water resources
- Aboriginal title and interests in water
- increasing community demands for water security

The range and potential implications of these issues and trends demonstrate the public good nature of water and the need for active management by the Province to effectively steward and protect our freshwater resources. Additional details, including regional breakdowns and a summary table are in Appendix A.

SECTION II – Increasing Risk, New Opportunities and the Water Management Challenges in BC

Core messages:

- Climate change will have permanent and lasting impacts on water resources in BC.
- BC continues to degrade its water-based natural capital.
- Ecosystem health is disconnected from current water management approaches.
- The "new" water reality requires emphasis on demand management and integration at the watershed scale.
- The Province has devolved important water-related responsibilities to local government – such as drinking water management, groundwater protection, conservation promotion or flood and dike maintenance – but has not provided these governments with the tools or resources to meet their commitments in an increasingly risky environment.
- Although new forms of water governance and partnerships with local governments, stewardship groups and professional associations are important, ***strong provincial leadership*** is urgently required to properly protect our freshwater resources.

Water management is becoming more complex due to:

- continued increase in water consumption for residential, agricultural and industrial expansion;
- growing awareness that water is an essential element for watershed health; and,
- changing water supply regime brought about by climate change.

Evidence of these challenges and changes can be seen around the province. For example, in the droughts of 2003 that affected parts of the Okanagan and Vancouver Island, the more recent incident in Tofino where the town almost ran out of water at the height of the tourist season, flooding in the Chilliwack valley and North Vancouver during the past winter rains, and loss of ecological function in many urban watersheds, such as the unprecedented recent winter storm in Vancouver that resulted in the largest boil water advisory in Canadian history. Also, initiatives such as the Federal Government's recent release of its Wild Salmon Policy, which calls for more water to be retained in streams during critical low-flow periods, further underline the increasing importance of water to British Columbians.

A changing climate = increasing risk

There is general consensus among the scientific community that the advent of climate change due to the release of greenhouse gases will exacerbate these problems. Climate change cannot be reversed by the mitigation policies such as the current target of a 33% reduction by 2020 set by the Province. Climate change can only be slowed. The world will be a permanently different place in 20 years as the average temperature increases. It

will result in more precipitation falling as rain, accelerated retreat of glaciers and the snowpack, increasingly common severe droughts in the Interior, longer drier summers throughout the province and more winter storms causing additional flooding and erosion.

The traditional response to these risks in the past has been to build more dikes, more reservoirs to store water, bigger and better water filtration plants and waste treatment plants. This supply-side approach erodes our aquatic natural capital and is no longer a sufficient response either economically or ecologically.

Protecting our Natural Capital

Rivers, lakes, aquifers and wetlands provide numerous benefits to the economy – including water for drinking, irrigation, and manufacturing; critical habitat for fish, waterfowl and other aquatic species; and a variety of non-extractive (conservation) benefits, including recreation, transportation, flood control, bird and wildlife habitat, and dilution of pollution. Such conservation values are difficult to measure, and accordingly have been undervalued in making management decisions, but nonetheless are critical for basic life support and quality of life. (See Appendix B for a more detailed list of the services provided by freshwater ecosystems).

Evidence of declining water quality, loss of riparian habitat, reduction in water flows (that directly impact fish and other aquatic species), flood runoff events that undermine broader ecosystem values, cumulative effects of resource development and urban growth in watersheds that impact ecosystem health are all increasingly apparent in British Columbia. Together these impacts lower ecosystem health, undermine watershed resilience, increase costs of water management, and lower economic (and social) vitality. British Columbians are liquidating their water-based natural capital at an increasing pace with potentially dire consequences.

The emerging opportunities of demand management and integrating at the watershed scale

There is increasing awareness in government that the supply side approach is fiscally and ecologically unsustainable. The alternative is to shift to demand-side management with an emphasis on water conservation and on maintaining ecosystem integrity such that Nature will provide services such as cleaning water and supporting living ecosystems at no additional cost. This approach is beginning to appear in such documents as the Ministry of Environment's *Service Plan* and is likely to be a core principle in their *Water Action Plan*.

The fragmented and complex nature of water management in British Columbia suggests that the watershed must be the starting point for effective water management. At the watershed scale, all government actors – federal, provincial, municipal, and aboriginal – have important responsibilities. But the provincial government must take the lead and ensure that sufficient capacity and resources are available.

Ensuring a government focus at the watershed or basin scale recognizes that balancing conflicting values, interests and priorities about water management requires that water governance progress beyond fragmented sectoral approaches. It also requires an active and engaged citizenry. Thus the government must support the work of local watershed/basin organizations with broad citizen representation (early examples of success includes the Okanagan Basin Water Board), with resources for data collection, "state of the watershed" reporting, water sustainability pilot projects and local conservation education initiatives. Governments must also enable community input on water allocations and land use decisions that address water budgets and priority areas in the broader context of the public trust.

What is demand-side management?

Demand-side management – also referred to as demand management – fundamentally differs from supply-side management in that it considers that new water supplies may be too costly, and that consumer demand is subject to influence on a more cost-effective basis. Generally, demand-side management is defined as "reducing the demand for a service or resource, rather than automatically supplying more of that service or resource being sought," and is increasing viewed as a tool for promoting sustainability in sectors such as transportation and energy (Brandes and Ferguson 2003: 37).

…A parallel with energy

The government's recently released Energy Plan places increased emphasis on demand side management for electricity. It sets out an explicit target that half of the new sources of energy required by 2016 will come form energy conservation. This is an ambitious target and indicates that the government is beginning to embrace demand-side management as viable approach. The BCREA should support a similar approach with water. Indeed reductions in water use will also directly contribute to the energy conservation target by reducing the need to pump new water supplies into existing and new pipes and reservoirs, and reduce the transport and treatment of wastewater outflows.

Current water management approaches and concerns in BC

The current government favours partnership with community groups and devolution of responsibilities to local government and to registered professionals – engineers, biologists, agrologists and planners. It has reduced the resources for water management in government by approximately one third over the past five years. Evidence of this distributed approach is demonstrated with the creation of the *Living Rivers Trust* of $21 million to enable stewardship groups (not government) to restore fish habitats and the shifting of responsibility for flood plain management, drinking water quality and source protection and riparian area regulation to local government. Other examples include implementation of the conservation strategy led by the BCWWA, water efficiency regulation left to voluntary commitments by individual communities and groundwater management triggered only after concerted efforts by the local community.

Although this leadership by non-government entities has some advantages, such as engaging a broader range of actors, creating creative solutions and ensuring efficiency of

public funds, it also has numerous detrimental impacts. Some of the disadvantages include the creation of patchwork solutions, lack of province-wide consistency, and devolution of responsibility to entities with insufficient resources, capacity, mandate or accountability. Overall this approach creates an environment where community and stakeholder confidence is eroded and may ultimately increase costs, as programs are not fully (or properly) implemented. Gaps in information and action also create problems that might easily (and cost effectively) be avoided.

Emphasizing an approach that places excessive reliance on non-government actors may be appropriate for some types of initiatives, such as social programs, but may not be appropriate for a resource as critically important as water, especially when there is increasing uncertainty about supply due to climate change.

Primary Conclusion: Provincial leadership is urgently needed – the *Water Action Plan* will be an important first step, but leadership also requires the resources and the mandate for action. Relying on a community-by-community approach simply does provide sufficient leadership in this increasingly complex and challenging new era of water management. The Province must set the bar high for all communities on issues such as conservation plans, efficiency regulations, sustainable water allocations, ensuring fundamental ecosystem health, groundwater stewardship, water management plans and drinking water source protection. The Province should continue to cultivate effective partnerships, and the BCREA will be well placed to work with the Ministry following the release of the *Water Action Plan*.

SECTION III – Water Law, Institutions and Policy in BC

Core messages:

- The Province has a fundamental constitutional responsibility to effectively management water resources for current and future British Columbians.
- In general, sufficient legal tools exist for drinking water and groundwater management and flood protection, but they are highly discretionary, are not sufficiently resourced, and are not being effectively implemented.

Recent recognition of the need for increased leadership in water management has resulted in the Minister of the Environment being charged with the duty of developing a *Water Action Plan* scheduled to be released later this spring. The creation of the *Water Stewardship Division* in the Ministry is the first step to provide some consistency across government and to improve coordination in water management. The recent budget for 2007-2008 does not appear to provide additional resources for the Ministry of Environment to implement the *Water Action Plan*

Over the past 10 years the Province has incrementally amended its legislation affecting water management. This has resulted in a patchwork of legislation that does not deal comprehensively with the array of issues already mentioned. The Government of BC recognizes some of these systemic weaknesses, which represent a significant motivation for the upcoming water stewardship paper.

Overview of water legislation in BC

The ***Water Act*** deals primarily with the allocation of water between users, not the protection of water quality. It has its origins in the 19th century in an era when water supply was readily available and conflicts were few. It is now outdated. It stipulates that licenses are required for the diversion, storage and use of water and outlines conditions. It is likely that the *Water Action Plan* will call for a review of this legislation and we recommend that the BCREA participate in this review.

According to the Act approvals are required for "change in and about a stream" – diversions, streamside engineering works, etc and generally include certain conditions. These conditions can reflect some concerns for downstream impacts such as flooding, effects on the rights of other licensees, protection of fish habitats and ecosystems, as well as concerns of other agencies. However, in reality, this regime is only modestly accountable to fish and other ecosystem uses, primarily through the relatively recent *Fish Protection Act* – which provides legislative authority for water managers to consider impacts on fish and fish habitat before approving new water licenses, amendments to licences, or issuing approval for work in new streams. The Federal Fisheries legislation provides a backstop for impacts of developments on fish and fish habitat not protected through provincial legislation. Although recent amendments to the Federal *Fisheries Act*

encourages more collaboration between jurisdictions, property owners are often frustrated by delays in approvals required from both senior governments before being free to develop their properties.

The *Water Act* is based on seniority so that those with older licences have full rights to water over those with more junior rights, even in times of drought. Enforcement of licences has been criticized because some major licensees routinely use more than their allocation. Water rentals charged by the Crown are also very low, designed to cover the cost of administration, but certainly do not encourage conservation.

The *Water Act* has been recently augmented by amendments to protect drinking water and some aspects of groundwater (the *Drinking Water Protection Act*, which came into force in May, 2003 and the *Groundwater Protection Regulation* in 2004).

The ***Drinking Water Protection Act*** is the Province's recent attempt at creating a comprehensive "source to tap" framework to protect drinking water over the long term. The *DWPA* has amended a number of other statutes (with the majority of the amendments taking effect by regulation) including as the *Water Act* concerning groundwater protection**.**

The ***Water Protection Act*** confirms that the ownership of, and the right to use, surface and groundwater are vested in the Crown (except in so far as rights have been established). It is responsible for ensuring the protection of water and its sustainable use, and deals primarily with the bulk export of water, establishing a registration system to keep track of and prevent large-scale transfers out of province.

The ***Environment Management Act*** prohibits the discharge of waste into the environment from "prescribed" industries, trades, businesses, operations, and activities. This *Act* is the Province's key piece of pollution prevention legislation. It replaces the old ***Waste Management Act***. It has created a tiered approach to waste discharge authorization through the *Waste Discharge Regulation*. Many view this new legislation as an example of how environmental legislation has been relaxed to allow certain discharges to go unchecked.

Water quality objectives are tools for the effective management of water resources. They describe conditions that water managers have agreed should be met to protect the most sensitive designated uses of fresh, estuarine and coastal marine waters. They are used in conjunction with other management tools such as effluent controls and pollution prevention planning to achieve high standards of water quality. WQOs can be prepared for specific bodies of fresh, estuarine and coastal marine surface waters of British Columbia as part of the Ministry of the Environment's mandate to manage water quality. Objectives are prepared only for those water bodies and water quality characteristics that may be affected by human activity now or in the near future.

The ***Fish Protection Act*** was introduced in 1997 and provided controls on water extraction to protect conservation flows for fish in 15 designated streams. It also included

the ***Riparian Area Regulation***, which brought in controls on development along stream banks. ***Water management plans*** were enabled in amendments to the *Water Act* to provide the government with a tool for comprehensive water management. To date only one plan is underway– in the Langley area to consider the conflicts between surface and ground water use. It is scheduled t be completed in December 2007.

Who deals with water in government?

The lead ministry on water related matters is the Ministry of the Environment (MoE) with the minister also explicitly charged with Water Stewardship and Sustainable Communities (as of June 2005). MoE administers the *Water Act*; as well, the minister can order the development of water management plans.

The new MoE ***Water Sustainability Division*** is the lead department for most water related issues in BC. For example, this division issues the water licences for the province. However, the Ministry of Health (complemented by the Health Authorities (HA), who administer and enforce the legislation) also has an important role to play as the lead agency for drinking water. The MoE provides technical support to Drinking Water Officers who are appointed under the *Drinking Water Protection Act* to advise water purveyors and other agencies on source water protection issues. The Ministry of Community Services and the Ministry of Agriculture also play a role in water-related issues, although less directly, by influencing water infrastructure development and providing some support on demand management initiatives.

There is no provincial Water Council or similar entity in charge of oversight of water-related issues in the province.

SECTION IV – Immediate Priority Areas

Drinking water and source protection

Thousands of residents of North Battleford, Saskatchewan; Walkerton, Collingwood and Kitchener, Ontario; and Kelowna and Cranbrook, British Columbia became violently ill, and in a few cases died because of waterborne disease outbreaks in the past decade (Boyd 2003: 16). These incidents have focused broader Canadian attention on the critical importance of drinking water and source protection. According to the Auditor General of BC in 1999, British Columbia had the highest levels of waterborne disease in Canada, especially *Giardia*, *Cryptosporidium* and *Toxoplasmosis*, with 27 outbreaks of waterborne disease in the 18 years prior to that report.

These incidents have lead to a variety of initiatives to address drinking water issues across the nation, including Justice O'Conner's Walkerton Inquiry and, in British Columbia, the Auditor General's 1999 report, followed by a report from the Provincial Health Officer and another from the Drinking Water Review Panel.

According to these experts, an effective system to ensure safe drinking water must include:

1. protection of water at the source;
2. water treatment, including filtration and disinfection;
3. a well-designed and well-operated distribution system;
4. comprehensive testing of drinking water;
5. public notification and reporting of water quality problems; and
6. adequate resources to operate water systems and enforce the law.

The Province published a *Drinking Water Action Plan* in 2002 which led to the *Drinking Water Protection Act* and the associated Regulation. The Ministry of Health has primary responsibility for administering this legislation and has appointed 65 Drinking Water Protection Officers to regulate water purveyors across the Province. An Inter-Agency Memorandum of Understanding has been signed involving many provincial ministries to coordinate jurisdictional responsibilities for protecting drinking water. The Provincial Medical Health Office issued a report in 2002 (Drinking Water in British Columbia – the Public Health Perspective) with four key recommendations:

- Provide legislative authority that establishes drinking water as a priority water use.
- Establish regulations to control drinking water quality in all community-based systems regardless of size.
- Establish microbial treatment standards.
- Establish performance measures, accountabilities and reporting.

The MHO is scheduled to release a further assessment of the adequacy of the Drinking Water legislation in March 2007. The BCREA should review this document prior to finalizing its position on this policy area to discuss with the Government of BC in April.

It is generally accepted that the most important step in providing safe drinking water is protection of the sources from contamination. This requires controlling land use activities that affect community watersheds. Source water protection involves a range of activities such as developing *Drinking Water Protection Plans*, implementing land use controls, and modifying land management practices. Although these tools are contained in the legislation, no protection plans have been developed. In addition the *Forest and Range Practices Act* has reduced the level of control on forest and range activities that may ultimately affect drinking water quality. The Province has also transferred the oversight of these activities to registered professionals.

Drinking Water Action Items

- Recommend that the government develop at least one *drinking water protection plan* as set out in Part 5 of the *Drinking Water Protection Act* to add to its tools to protect drinking water quality.
- Encourage the government to publish drinking water quality assessment reports to compare water quality with drinking water quality objectives in key watersheds.

Groundwater management

Groundwater is an unseen resource, but it is critical in BC. Twenty to 25% of British Columbians rely on groundwater for drinking water and it is also important for irrigation and manufacturing processes. Yet BC remains the only Canadian province that does not regulate groundwater use (see Appendix B for a comparison of groundwater regulation across Canada). Unrestrained groundwater withdrawals place pressures on the hydrological systems resulting in falling water tables, reducing flows in streams and wetlands, interferences with wells, salt water intrusions and potential shifts in groundwater divides. In some cases, groundwater extraction is the only source of additional water as surface water rights have been fully exploited. Given the unregulated nature of groundwater, this will inevitably lead to conflicts between water users.

Recent pubic attention, especially around drinking water and source protection, has created some momentum to develop a better management regime for digging wells. The *Groundwater Protection Regulation* controls the sitting of wells near sources of pollution and requires caps to prevent contamination. However, groundwater withdrawals are still not currently licensed.

A pilot project in the Township of Langley may be the first step towards a more comprehensive groundwater licensing regime in British Columbia. Langley is the first (and only) community to begin developing an official ***water management plan*** as set out by the *Water Act* (initiated July 2006). The Minister of the Environment initiated this plan at the Township's request, due to its heavy reliance on groundwater for drinking water as well as for agricultural and industrial purposes. However the water management plan is not due to be presented toe the provincial government cabinet until December 2007 so there will be no further consideration of groundwater licensing till 2008 at the earliest. Meanwhile, conflicts between groundwater and surface water users will likely

increase as in some cases groundwater extraction directly affects existing licences and surface water flows.

Groundwater Management Action Items

- Require comprehensive groundwater regulation introduced in the Langley area by 2008 as per provincial government's stated commitment.
- Recommend that MoE identify areas in the province where surface water use is constrained and there is a potential conflict with continued development of groundwater without regulated use.
- Encourage comprehensive groundwater regulation be introduced in two additional priority areas in 2008.
- Require provincial government to provide a publicly accessible list of their identified groundwater priority areas by 2008.

Water security and flood protection

Flood events can pose significant risks to both property and lives. In BC, flooding is a common hazard that can result from heavy rainfall (flash floods), snowmelt (spring freshets), ice jams and even tsunamis (MoE, 2006a). While flooding is a natural event that replenishes ground water and deposits beneficial sediment nutrients, it can also have disastrous consequences to property if developed riparian or floodplain areas lack adequate building setbacks or protective engineering works such as dams and dikes

While emergency planning measures are important for reducing the scope of flood damage, regulation of development on floodplains is the most effective method of reducing risk. Effective regulation requires cooperation between all levels of government, developers, builders, realtors and the public. Land-use decisions initiated by local governments – especially floodplain bylaws and building covenants – are of particular importance in avoiding flood damage (MoE, 2006a).

In 2004, the Province devolved the responsibility for flood proofing developments to local government under the *Local Government Act*. Local governments are required to apply Flood Proofing Guidelines developed by the Province but there is provision for the government to bring in regulations if local governments fail to provide adequate protection.

The greatest flood impact potential in BC is in the floodplain of the lower Fraser River (FBC 2006a).[3] The Fraser River basin drains over 25% of British Columbia's land mass and is home to two-thirds of BC residents (FBC 2006c; 2006d). There has been an

[3] Engineers have projected that there is a one-in-three chance that a Fraser River flood of record will occur in the next 50 years (FBC, 2006a). The social, economic and environmental costs of "The Big One" could be very significant. A 1994 estimate put the value of development within the Fraser River floodplain at $13 billion. If major dike failures resulted from such a flood of record, there could be up to $1.8 billion in direct flood damages, and up to 300,000 people directly affected (FBC, 2006a).

enormous increase in property values and other public infrastructure in the Valley since the last flood in 1948. In addition, the risk of flooding has increased with the deposit of river gravels in the bed of the Fraser over the past years and the deterioration of the diking infrastructure due to lack of resources to adequately maintain the dykes. Thus this region is a good indicator of increased risk associated with the current flood management regime. The snow pack in the Fraser watershed on February 1 was on average 143% above normal. Depending on weather patterns over the next three months there is a possibility of a flood threat in the Fraser this spring.

Although there has not been a major Fraser River flood since 1948, there have been many close calls (FBC 2006a). Part of the concern relates to the original flood profile developed by engineers in 1969, which according to the Fraser Basin Council (FBC 2006e) was insufficiently sophisticated and resulted in many local diking systems constructed since the flood now to provide inadequate protection from a major flood event.

In many watersheds, development has encroached onto the floodplain constraining river flows in times of floods. Some jurisdictions (Washington State, California) have considered restoring watershed function by removing developments from constructed floodplains rather than continue to pay for upkeep and repair to the diking infrastructure. This approach, identified as the least-cost option in these jurisdictions, is consistent with maintaining ecological function and should be considered as a tool in future floodplain management.

A 2002 commentary on the provincial *Flood Hazard Management Program* by the BC Branch of the *Canadian Water Resources Association* indicated strong support for strengthening the provincial government's role regarding legislation, regulation, standards, knowledge base, emergency response and financial assistance. It was urged that all provincial flood hazard management responsibilities should be consolidated into one ministry to eliminate the current fragmentation of responsibilities (CWRA 2002).

This fragmentation remains even today. Responsibility for maintaining dikes and for flood proofing development on the flood plain rests with local government. Emergency preparedness is the responsibility of the Public Safety Ministry and local government emergency preparedness plans; and the Province is responsible for flood proofing guidelines. Given the increased risk of flooding, the need for a province-wide strategy is clear.

Flood Protection Action Items

- Identification of priority flood risk areas under various climate change scenarios.
- Review financing capacity to maintain and repair infrastructure.
- Ensure community sustainability planning to consider set back diking to retain ecosystem health.
- Establish stronger provincial flood proofing regulations to ensure that local governments apply a consistent approach to reducing the flood damage potential from new developments.

SECTION V – Long-term Priority Areas

Water supply has become a constraint to economic development and social prosperity in many regions. This will only become a greater risk as water supply is further constrained by the dual threats of climate change and increasing water demands. This supply challenge is exacerbated by a lack of commitment to effective water pricing, lack of emphasis on water conservation and efficiency, and an outdated water licensing system (under the BC *Water Act).*

Water allocations

The BC Water allocation systems is not only inefficient for the wise use of water – because some licensees get access to their full rights not matter how inefficiently they are used at the expense of junior (often more efficient and productive) licensees – it also remains mired in a philosophy that generally ignores ecosystem integrity. Despite some increasing attention at the policy level, ecological consideration generally remains an afterthought in decision making. As a result, only residual amounts of water remain *in situ* to sustain the health of freshwater ecosystems. To ensure the health of the ecosystems requires a balance of water in stream for ecological purposes and water used for economic and domestic purposes.

This ”first in time, first in right” is now out of date and may no longer be sufficient in dealing with the modern challenges of increasing demands and scarcity, especially in the context of a changing climate (Brandes et al. 2005). A recent detailed analysis outlines a number of systemic weaknesses of this system:[4]

- unclear priorities in water allocations and use;
- limited promotion of water conservation and efficiency; and
- lack of flexibility in face of uncertainty.

This water allocation system was well-developed to tackle the challenges of the day – creating a sense of certainty and promoting certain types of development such as irrigated agriculture and gold mining. But it is increasingly apparent that this system must now continue to develop if it is to address the more modern challenges associated with increasing the productivity of water use and the new priorities to protect ecological function of the aquatic system as the foundation of a healthy economy and prosperous communities.

The government appears willing to review these allocation policies in light of the changed circumstances outlined in this report. We recommend that once the *Water Action*

[4] For a more detailed discussion see Brandes, O. M., & Maas, T. 2006. “What we govern and what governs us: Developing sustainability in Canadian water management” Prepared for the Canadian Water Resources Association 59th Annual Conference: “Working from the source towards sustainable management.” Available at www.waterdsm.org.

Plan is released the BCREA propose that it become a partner with the Province in undertaking this review.

Water pricing and conservation

Other impediments to promoting the productive use of water in BC include a water pricing system that is too cheap to encourage effective conservation and efficiency.

Many tools to increase efficiency and promote conservation – from volume-based pricing systems, rainwater harvesting, reuse and recycling, social marketing to change behaviour, Xeriscaping, "soft path" planning processes, new types of infrastructure including ultra-low-flow fixtures and appliances and new technologies to improve agricultural water use – are readily available.[5] Yet, despite their increasing profile, conservation programs remain primarily ad hoc and are only implemented in a limited way. For example, water metering (especially coupled with volume-based pricing reform) has proven to be effective in promoting conservation and improving water productivity – such as in parts of the Okanagan and in Victoria. However, it is still viewed as controversial in many communities. The deficiency of real action on these opportunities is a result of an overall lack of leadership coupled with government being under-resourced and over-reliant on partners to achieve meaningful impacts and on the ground implementation.

BC Hydro, through its PowerSmart program, has been effective in conserving energy in household use. There are many similar programs for water conservation. BCREA could champion a "4 Star" conservation program based on the tools mentioned above and used to promote conservation in new homes across the province. The four stars would cover the range of potential savings with the full four stars being reserved for the application of all the readily available tools available to the household such that the household would become entirely self-sufficient. A star rating could also be a requirement as a part of future house sales and transfers, encouraging continued innovation and improvements.

Association Action Item

- BCREA to review and provide comment on the *Water Action Plan* and MHO report scheduled for March 2007;
- BCREA to correspond with the Minister of Environment on the willingness of the Association to support water conservation in the home and develop a *4-Star conservation program;*
- BCREA to develop longer-term policy analysis for water conservation, pricing, water allocation and governance following a review of the Water Action Plan, MHO and other information to be released by government in the coming months;

[5] For example many options and tools appropriate for BC are readily available on the Waterbucket website: www.waterbucket.ca. The POLIS Water Project at the University of Victoria has also produced numerous resources and recommendations to promote demand management and provides a detailed list of best practices and leading water conservation and efficiency measures – for full details see www.waterdsm.org.

SECTION VI – Accountability

Water governance is different than water management. Water governance refers to the decision-making process we follow whereas water management concerns the operation approach we adopt. Governance is specifically concerned with how we make decisions and who decides (Bakker 2006: 16). They are obviously intimately linked.

Although the Province has made an important step in creating the *Water Stewardship Division* in the Ministry or Environment to provide cross government coordination of water management, there is no overall assessment of the well being of water management in the public interest. The Medical Health Officer is scheduled to report on drinking water protection in March, and the Ministry of Environment is scheduled to release a *Water Action Plan* later this spring. All these reports are pieces of the bigger picture of how well water and watersheds are being managed in the public interest. We feel that the BCREA may wish to consider that the government provide for a more comprehensive audit of water management issues once it has had the opportunity to review these documents. One model is for the appointment of a Water (specific) Auditor who could be attached to the Auditor General's Office, or possibly increasing the Forest Practices Board's mandate to include a formal water component. Such an entity could provide independent advice to the public on the following priorities:

- *evaluating and reporting on ecological and economic impacts of water use and resources;*
- *creating innovation by informing best practices;*
- *advocating for sustainable water resource management (for example as amicus curiae to the courts and Environmental Appeal Board); and,*
- *providing "arms length" advice to government to catalyze change and inform the public policy debate on water sustainability.*

Accountability Action Item

- Increase provincial government's accountability and oversight by establishing arms length independent oversight mechanism for implementation and management of water resources in the province.

The path forward

From the recent throne speech we can see aggressive action on climate change beginning to manifest around energy conservation and efforts to reduce carbon emissions. Similar aggressive action on water is urgently needed.

The thrown speech clearly recognized that:

"The more timid our response is,
the harsher the consequences will be."

The same holds true for water in British Columbia, especially in an environment of increasing risk and uncertainty.

This overview document provides the first steps toward an effective strategy to engage the provincial government. It also provides a road map for issues that will emerge and areas that require deeper reform. It emphasizes a variety of immediate actions that represent opportunities for the BCREA and the Province, in partnership, to begin moving toward a more sustainable approach to water management. The science is clear. The urgency mounts daily, and the benefits are obvious: increased water security for individuals and healthy ecosystems which provide the foundation of a vibrant economy and prosperous communities.

Appendix A: Overview of BC Water Issues[6]

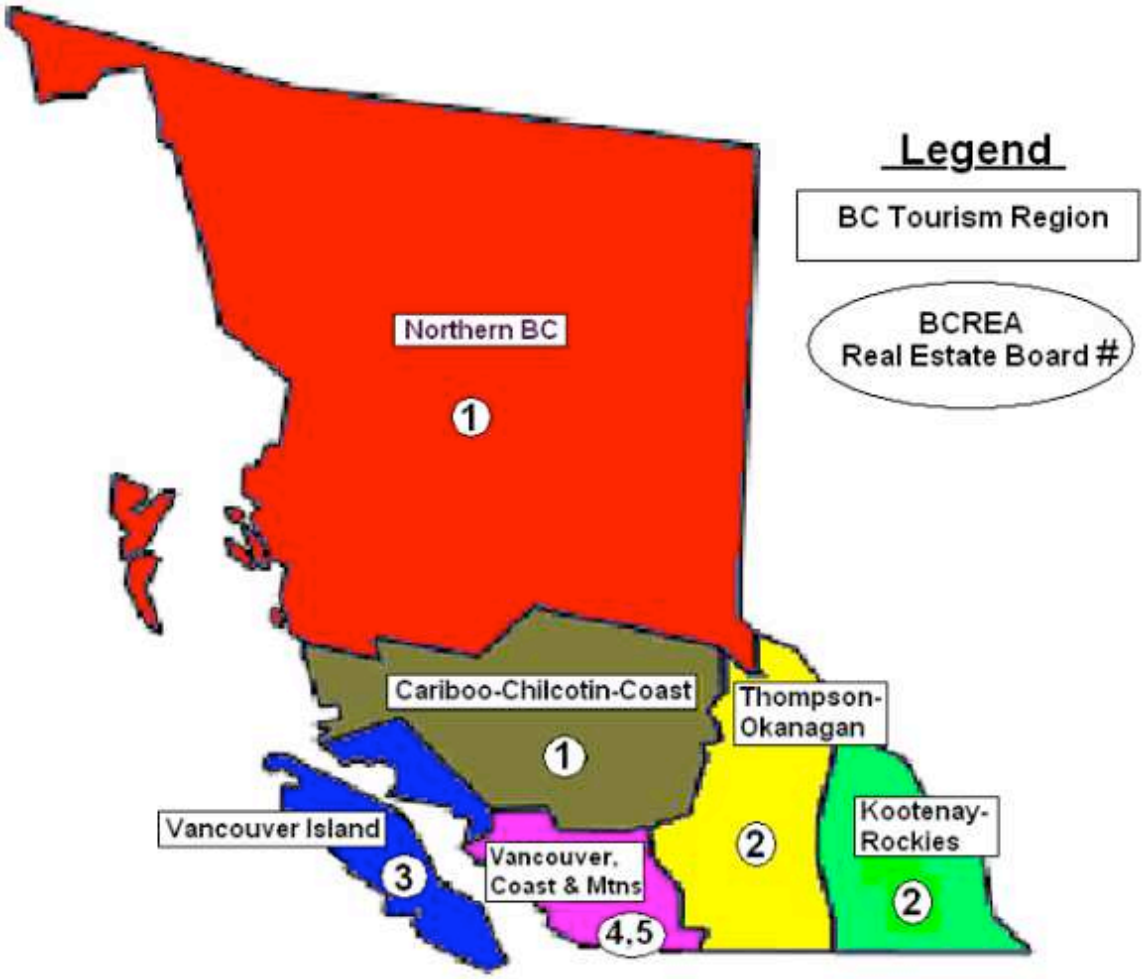
British Columbia is a diverse province made up of numerous major watersheds and communities in all regions. Its mountainous topography and generally abundant rainfall have resulted in the vast majority (75-80%) of the population receiving its drinking water from surface water sources. According to the Drinking Water Review Panel (2002: 3) BC also holds the distinction of having both the highest rate of waterborne disease outbreaks and the second oldest water system infrastructure in Canada.

Priority water issues in British Columbia that span the entire province including source protection, water quality standards, aging water infrastructure system and increasing scarcity as water limits are reached.

Beyond these province-wide issues of concern regarding water, a wide variety of regionally specific water issues exist. The following discussion provides a brief overview of some of these identified water issues. The commentary is arranged by regions – a combination of Tourism BC regions and the BC Real Estate Association's Real Estate Board regions (as illustrated in Fig. 1) – and falls under the following topics: *primary concerns*, *institutions and capacity*, *immediate opportunities*, and *emerging issues*. This overview is summarized in the table, with the more detailed discussion of each region provided below.

[6] This informal survey of issues is intended as an initial resource for the BCREA to engage its member in a more detailed review of priorities and emerging issues. It was conducted over relatively short period of time by Adam Mjolsness, a research assistant at the POLIS Project, with oversight by Oliver Brandes. It was done primarily using web-based materials; thus it should be expected to provide only a general overview.

Fig. 1. British Columbia regions and populations



BC Regional Populations (& Proportions):

Vancouver-Coast-Mtns	2,302,890	(59%)
Vancouver Island	664,355	(17%)
Thompson-Okanagan	465,042	(12%)
Northern BC	260,858	(7%)
Kootenay-Rockies	145,153	(4%)
Cariboo-Chilcotin-Coast	69,440	(2%)

(Source: 2001 Census, Statistics Canada)

Table 1. BC regional water issues summary chart

BC Region	Primary Concerns	Priority Areas	Immediate Opportunities	Emerging Issues
Vancouver, Coast & Mountains	•flood management •health of Fraser River estuary •declining salmon runs •erosion (mudslides) •agricultural runoff •turbid drinking water •Britannia Mine pollution	•floods •erosion •drinking water quality •metering and conservation programs	•source protection flexibility due to Vancouver's watershed ownership •Green building trend and increased awareness associated ensuring sustainable 2010 Olympic Games	•Sumas aquifer health and condition •Pilot water management plan in Langley
Vancouver Island	•drinking water reservoir levels (drought and longer-dryer summers) •sewage treatment (CRD) •stream flows for returning salmon •groundwater overdraft and contamination	•drinking water supply •implementing conservation programs •aquifer protection	•source protection flexibility (CRD watershed ownership) •extend CRD's acceptance of DSM and Soft Path initiatives to rest of region	•privitisation of water services in Sooke and Port Hardy
Thompson-Okanagan	•increasing drought frequency (agriculture and tourism consequences) •lake water quality over-allocation of water licenses •inconsistent application of conservation programs	•drought management •increasing conflict between water users	•spread metering through Kelowna's model success •spread water reuse/recycling through Vernon's model success •application of *Groundwater Protection Reg.*	•new policies through insights of Okanagan Basin. Supply & Demand Analysis
Northern BC	•general lack of awareness of water issues •declining fisheries (tourism) •environmental health re: oil/gas/mining development	• water sustainability education	•improve and extend Prince George's metering initiative	•mining, oil and gas projects' impacts on watersheds
Kootenay-Rockies	•drinking water quality (logging runoff, mining and pulp mill effluent) •ranching/drought interactive effects •aging (leaky) water infrastructure	•drinking water quality	•implement metering, based on Invermere's success •initiate basin-wide strategies through CBT framework	•Columbia Basin Treaty re-negotiation
Cariboo-Chilcotin	•general lack of awareness of water issues •ranching/drought interactive effects •pine beetle logging effects on run-off	• run-off water quality and volume	•extend range of FBC education programs	•downstream flood hazards (pine beetle logging run-off effects)

Vancouver, Coast and Mountains

This region includes the Lower Mainland, Sunshine Coast and Whistler areas, and contains approximately 59% of the BC population (and 86% of that is within the Greater Vancouver Regional District [GVRD]) and 56% of the province's private dwellings

(Statistics Canada 2001). Significant population growth and development is occurring within this region, accentuated by the preparation for the 2010 Winter Olympics in Whistler (Tourism BC 2006). The GVRD is BC's centre of finances, education, trade, tourism, manufacturing and services. In outlying areas, forestry, agriculture and tourism are important to the economy (Statistics BC 2001).

This region has the highest rate of total municipal water use in the Fraser Basin. The Fraser Valley increased its total municipal water use by 67% and its per capita water use by 21% between 1991 and 2001 (FBC 2006, p. 14). Residential use accounts for 63% of water consumption in the Fraser Basin (FBC 2006, p. 25).

Primary concerns include: flood and erosion management, safe drinking water, declining fisheries, agricultural run-off, Fraser River estuary health for wildlife/migrating birds, and cleaning up the contaminated Britannia Mine site.

Institutions and capacity include: the Fraser Basin Council, the GVRD Sustainable Region Initiative, Chilliwack River Watersheds Strategy, Wild Salmon Policy, Environmental Farm Plans, Forest Practices Board, City of Vancouver Sustainability Planning Office, and Smart Growth on the Ground initiatives in the Districts of Squamish and Maple Ridge.

Immediate opportunities include ensuring a sustainable 2010 Olympics, implementing model source protection given the 999-year lease Vancouver has on its own watersheds, and following up on the flood management recommendations made by the Lower Fraser River Hydraulic Model report (FBC 2006b).

Emerging issues include groundwater management, especially at the Sumas Aquifer. The pilot Water Management Plan of the Township of Langley may provide an example for other BC municipalities to follow.

Vancouver Island

This region, including Vancouver Island, the Gulf Islands and the mid-coast, contains 17% of the provincial population (and 50% of that is in Victoria). The region is experiencing high population growth (Statistics Canada 2001). Economic drivers of the region include service, trade and tourism in the Capital Regional District (CRD), and forestry, fisheries (declining), mining and agriculture in the outlying areas (Statistics BC 2001).

Primary concerns include: water shortages in drought years (no glacier sources to fill reservoirs), adequate stream flow for fish, and sewage treatment (CRD).
Institutions and capacity include: CRD Water Services—Demand Management Division, Soft Path approach adopted by CRD, Forest Practices Board, and reported examples of functional relationships between forest companies and municipal water purveyors (e.g. Nanaimo).

Immediate opportunities include extending the Soft Path water approach from the CRD to the rest of the region, and innovation in source protection due to Victoria's ownership of its watershed lands.

Emerging issues include concerns about potential privitisation of water services.

Thompson-Okanagan

This region includes 12% of the provincial population, with 32% of that located in Kelowna. The population of this area is growing, particularly due to an increase in retirees relocating to this area (Statistics Canada 2001). Major centres in this region include Kelowna, Kamloops, Vernon, Penticton and Salmon Arm. Economic drivers are agriculture, tourism, forestry, mining and transportation (Statistic BC 2001).

The Thompson area saw the most significant reduction in total municipal water use in the Fraser Basin between 1991 and 2001, but per capita water use increased by 15% between 2000 and 2003. Fewer than 20% of households in the Thompson area have water meters installed (FBC 2005, p. 13).

Primary concerns include: longer, drier summers projected due to climate change (lack of water supply will hurt both of the main industries, agriculture and tourism), water quality reduction in regional lakes (especially Shuswap Lake), and impacts to rivers due to the transportation corridors in the area.

Institutions and capacity include: the Okanagan Basin Water Board's Water Stewardship Council, Provincial Drought Management Action Plan, Fraser Basin Council, Forest Practices Board, Okanagan Basin Supply and Demand Analysis project, Environment Canada's Water Use Analysis Model, Salmon River Roundtable, and the Town of Oliver's Smarth Growth on the Ground initiative.

Immediate Opportunities include: transferring water sustainability successes (seen regarding metering in Kelowna and greywater recycling in Vernon) to the rest of the region, reducing chloride pollution along transportation corridors, e.g. through Sierra Legal Defence Fund's "Low-Salt Diet" (Ontario) program, applying the *Groundwater Protection Regulation* in the Okanagan to help protect vulnerable aquifers, and applying the Ministry of Environment's "Water Supply Plan" and "Water Conservation Plan" to the region's water purveyors.

Emerging issues include using the Okanagan Basin Supply and Demand Analysis program (when completed) as an opportunity to showcase watershed management leadership.

Northern BC

This region covers 62% of the provincial land area, but contains only seven percent of the BC population (with 28% of that located in Prince George) (Statistics Canada 2001). As of 2001, the population in this region was declining—but more updated figures are very likely to indicate an increasing population now, due to the boom in the oil and gas industry in the north. Economic drivers in the region include forestry (especially due to salvage logging from the pine beetle epidemic), commercial fisheries (on the coast), mining, oil and gas, manufacturing, and some agriculture (Statistics BC 2001).
Primary concerns include: environmental impacts and water use from the oil and gas industry, declining fisheries health on the north coast, watercourse health due to increased run-off from pine beetle-infested areas. Another significant concern is the lack of information available on water issues, due to the lack of regional environmental advocacy groups, i.e. heavy community reliance on resource-extraction industries for locals' livelihoods.

Institutions and capacity include: City of Prince George Water Conservation Plan, Fisheries and Oceans Canada's Wild Salmon Policy, Forest Practices Board, and the implementation of an industrial-commercial-institutional water metering program in the Town of Fort Nelson and the Northern Rockies Regional District.

Immediate opportunities include increasing Prince George's "volunteer" metering program to a mandatory level, and increasing water conservation education (potentially through programs by the Fraser Basin Council (the upper Fraser River area falls within the Northern BC region).

Emerging issues currently revolve primarily around the booming oil, gas and mining sector. If the moratorium on offshore oil and gas development is lifted, there will be significant issues to consider regarding ecological health of marine waters. Vast coal mine deposits in the northeastern foothills of the province may soon be developed (with an associated reliance on huge water inputs). The Northern BC region contains 57% of the province's major mining, oil and gas extraction development projects undergoing development or awaiting favourable stock prices before proceeding (Ministry of Economic Development 2006).

Kootenay-Rockies

This region contains four percent of the provincial population, with major centres in Cranbrook, Nelson, Revelstoke and Castlegar. The region had a slightly declining population in 2001 (Statistics Canada 2001). Economic drivers include mining, forestry and tourism (the four National Parks of the Rocky Mountains are included in this region) (Statistics BC 2001).

In the Columbia Basin, 67% of municipalities exceed the provincial and national water use averages (CBT 2005, p. 2). There is a widespread lack of water metering, with the exception of the District of Invermere, where a residential metering program has reduced per capita water consumption by 36% (CBT 2005, p. 15). The Columbia River Basin (Canadian side) provides BC with 50% of its total hydroelectric power (CBT 2003, p. 3).

Primary concerns include: high municipal water use in towns with mines, smelters and pulp mills; leaky water infrastructure; pollution of riparian zones by cattle in dry regions (e.g. Columbia trench) during times of drought (FPB 2002, p. iii), logging impacts of water quality in domestic watersheds, mining effluent pollution, and lack of metering.
Institutions and capacity include: Columbia Basin Trust (especially Water Initiatives Strategy and educational programs), Forest Practices Board guidelines on raching in riparian areas.

Immediate opportunities include: instituting universal water metering, water conservation strategy could be facilitated by CBT framework, source protection from ranching through Forest Practices Board recommendations, replacing leaky water infrastructure.
Emerging issues include: local versus basin-wide decision-making process, and preparing to re-negotiate the Columbia River Treaty with the U.S.A. in 2025.

Cariboo-Chilcotin-Coast

This region contains two percent of the provincial population (16% of this is in Williams Lake). As of 2001, population in this region was slightly decreasing (Statistics Canada

2001). Economic drivers include forestry (especially with pine beetle salvage logging), agriculture, mining, tourism and ranching (declining) (Statistics BC 2001).

Primary concerns include: education about water conservation, drought management in dry ranching country (impact on riparian zones), river health regarding mining operations and increased sawmill/pulp mill activity with the pine beetle epidemic.

Institutions and capacity include: Fraser Basin Council programs, Forest Practices Board guidelines on ranching in riparian areas, and the commercial water metering program in Williams Lake.

Immediate opportunities include: water conservation education (e.g. through FBC programs), source protection from logging impacts, consideration of the provincial Drought Management Action Plan.

Emerging issues include evaluating the impacts of pine beetle salvage logging on watercourse turbidity and volume, especially considering that any run-off in this region will make its way down the Fraser River to the Lower Mainland, where flood management is of great importance.

Appendix B: Services Provided by Aquatic Ecosystems

Box 1: Services provided by freshwater ecosystems

Service	Benefits
Provision of water supplies	Greater than 99% of industrial, irrigation and residential water supplies worldwide come from natural freshwater systems
Regulation of ecosystem function	Ensures essential ecological processes and fundamental life support systems continue
Flood mitigation	Functionally intact freshwater systems buffer stormwater flows, reducing flood damage
Drought mitigation	Functionally intact freshwater systems absorb rainwater, slow runoff and help recharge groundwater
Maintenance of coastal zones	Freshwater flows maintain the salinity gradients that are critical to the biological diversity and productivity of deltas and coastal marine environments
Recreational opportunities	Freshwater ecosystems are sites for swimming, fishing, hunting, boating, wildlife viewing, and so on
Hydropower generation	Flowing freshwater ecosystems provide opportunities for both conventional hydropower generation and more environmentally sensitive micro-hydro options
Provision of habitat	Rivers, streams, floodplains and wetlands provide habitat and breeding sites for numerous aquatic, avian and terrestrial species
Biodiversity conservation	Freshwater and riparian ecosystems harbour diverse assemblages of species that support many of the services in this table and also conserve genetic diversity for future generations
Provision of food	Fish, shellfish and waterfowl are important food sources for people and wildlife
Sink services	Healthy freshwater systems possess an ability to absorb and neutralize pollution. For example, micro-organisms play a critical role in groundwater purification breaking down organic wastes, including petroleum hydrocarbons and synthetic halogenated organic compounds
Water purification	Wetlands filter and break down pollutants, enhancing water quality
Nutrient delivery	Freshwater systems store and transport nutrients within the watershed
Soil fertility maintenance	Functional river-floodplain systems constantly renew the fertility of surrounding soils
Land subsidence prevention	Groundwater stored in aquifers prevents land subsidence and reduces erosion through absorption of runoff
Aesthetic, cultural and spiritual values	Natural freshwater systems are sources of inspiration and deep cultural and spiritual values

Source: Brandes et al. 2005: 3

Appendix C: Overview of groundwater permitting processes across jurisdictions

Jurisdiction and primary regulator	Number of wells	Number of GW permits •total, and •# issued annually	Groundwater licensing law	Date licensing applied	Regulation
BC: Ministry of Environment	100,000+ estimated; submission of well records is not currently mandatory	•N/A; in BC licensing does not currently apply to groundwater •N/A	Water Act could be extended for licensing groundwater; the necessary regulations do not currently exist	No requirement permit	Ground Water Protection Regulation, 2004, focuses on well construction standards and GW quality protection
AB: Alberta Environment	500,000 total wells; approx. 5,000 new wells drilled each year	•N/A; numbers kept by regional offices •N/A	Water Act	1962	Water (Ministerial) Regulation
SK: Saskatchewan Environment	N/A	•approx. 3,600 •approx. 300	Ground Water Conservation Act	1959	Ground Water Regulations
MB: Department of Water Stewardship	N/A	•533 as of Aug. 2004 •varies	Water Rights Act	1972	Water Rights Regulation
ON: Ministry of the Environment	approx. 500,000	•2,800	Water Resources Act	1961	Water Transfer and Taking Regulation
QC: Ministière du Développement durable, de l'Environnement et des Parcs	N/A	•more than 600 catchments > 75 m^3/day •Ministry of Environment gets approx. 6,000 well reports/yr.	Environmental Quality Act	2004	Groundwater Catchment Regulation
NB: Ministry of Environment and Local Government	approx. 3,000 new wells each year	•approval (not permit) required to construct and operate wells above threshold •N/A	Clean Water Act; Clean Environment Act	N/A	Environmental Impact Assessment Regulation; Water Quality Regulation
NL: Department of Environment and Conservation	17,000+	•N/A •approx. 10	Water Resources Act	Water use authorization: May 1988 to May 2002. Water use licence: May 2002 to present	Water Resources Act
NS: Department of Environment and Labour	N/A	•approx. 100 •fewer than 10	Environment Act	1973	Activities Designation Regulations
PE: Ministry of Environment, Energy and Forestry	approx. 21,000	•500-800 •approx. 30	Environmental Protection Act	N/A	Water Well Regulations
YT: Environment Yukon	N/A	•approx. five •variable	Waters Act	N/A	Waters Regulation
NT: Ministry of Environment and Natural Resources	N/A	•N/A •N/A	Northwest Territories Water Act; Mackenzie Valley Resource Management Act	N/A	Northwest Territories Waters Regulations
NU: Department of Environment	N/A	•N/A •N/A	Nunavut Waters and Nunavut Surface Rights Tribunal Act	N/A	Nunavut Water Board By-Laws

Source: Adapted from Nowlan 2005.

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