

## **Watershed Management Actions to Advance Sustainability**

Discussion Paper  
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## A. Advancing Watershed Sustainability in BC

The BC Wildlife Federation (BCWF), in conjunction with funding from the Gordon & Betty Moore Foundation is undertaking a project to advance watershed conservation and sustainability throughout BC. BCWF is delivering the project in partnership with the Fraser Basin Council (FBC). In addition, many other organizations and individuals, representing a diversity of perspectives, experiences and expertise, were engaged in various ways throughout year-one (Fall 2013 – Spring 2014) of this three-year project.

This initiative arose from a concern, shared by many, that watershed ecosystems in BC are losing their resilience and sustainability. The long-term health of watersheds is key to ensure the sustainability of the ecosystems, communities and economies that depend upon them. However, over the years, land and water use decisions and actions have resulted in the gradual loss of ecological function in watersheds including degradation of habitat, declining water quality, inadequate flows for environmental values, and conflict among different sectors that depend upon water. Though there are many diverse organizations and jurisdictions working on the stewardship, management, planning and governance of watersheds and water resources, there is still a need for enhanced coordination and collaboration among these efforts.

The goal of this project is to educate British Columbians on the importance of watershed sustainability and protecting BC's diverse and unique aquatic resources. It also aims to help strengthen capacity in BC to achieve healthy watersheds by considering watershed health and sustainability through several different lenses, or sub-projects. The focus of the sub-projects facilitated by the Fraser Basin Council include the following:

1. Vision of Watershed Sustainability – Develop a unifying vision of sustainability for watersheds and landscapes through a collaborative process that engages First Nations organizations and non-governmental conservation organizations.
2. **Watershed Management Actions – Conduct research on the roles, responsibilities and actions required to effectively manage the health and sustainability of BC's watersheds, including an assessment of capacity, challenges and opportunities.**
3. Funding and Delivery Models – Conduct research and develop recommendations on funding and delivery models needed to advance watershed health and sustainability at local and regional scales throughout BC.
4. Capacity and Accountability for Shared Decision-Making = Conduct research and develop recommendations regarding capacity requirements and accountability mechanisms for shared decision-making at local, regional and watershed scales.
5. Natural Resource Practices Board – Conduct research and develop recommendations regarding a Natural Resource Practices Board to provide advice on effective, science-based management of natural resources including independent performance audits and reporting.

6. Indicators of Watershed Health – Conduct research and develop a set of indicators to measure the health of watershed and estuarine ecosystems throughout BC.
7. Workshop for Advisors and Practitioners – Plan, deliver and co-host a workshop to present key findings to date and facilitate dialogue and feedback.

Each of the projects outlined above are intended to focus on a particular aspect of watershed management. (e.g. vision, management, governance, capacity, oversight, funding, etc.). However, these different aspects can also be seen as distinct pieces of a more complex and interconnected puzzle. The following is intended to illustrate how the different pieces fit together.

1. **Vision** – What are our needs, aspirations and goals for our watersheds?

- Project - Vision of Watershed Sustainability

2. **Implementation** – What actions do we take to achieve our vision?

- **Project – Watershed Management Actions**
- Project – Capacity and Accountability for Shared Decision-Making

3. **Resources** – What human and financial resources do we allocate – and how – to most efficiently and effectively manage watersheds and achieve our vision?

- Project – Funding and Delivery Models

4. **Evaluation and Performance Management** – How can we best assess progress towards achieving our vision of healthy watersheds and what auditing and reporting mechanisms can assist?

- Project – Indicators of Watershed Health
- Project – Natural Resources Practices Board

Note: the highlighted project above indicates the focus of this particular discussion paper.

***Acknowledgements***

The project – Advancing Watershed Sustainability in BC – would not be possible without generous contributions from the BC Wildlife Federation and the Gordon and Betty Moore Foundation. Special thanks also to the various advisors, reviewers, and information sources that enabled the project team to advance this work. Thank you all for your generous support.

## Introduction to Watershed Management Actions

One of the components of this larger project includes research on watershed management action to advance sustainability in BC.

Based on research to date, the following have been identified as primary areas of management actions required for effective management of watersheds for sustainability. Each of these broad-based areas of management activity includes several sub-actions, which are outlined in the following sections of the discussion paper.

1. Collecting and Analyzing Data and Technical Information
  - For example, collecting monitoring data on water quality and quantity
2. Developing and Implementing Policies, Plans and Governance
  - For example, facilitating shared decision-making processes on land and resource use;
3. Administering Operational Permits, Licenses and Regulatory Requirements
  - For example, issuing water licenses and other natural resource tenures;
4. Implementing Watershed Protection, Conservation and Restoration
  - For example, designing and constructing habitat restoration projects
5. Delivering Education, Outreach and Capacity Development
  - For example, education programs for private landowners and the broad public

## B. Summary of Watershed Management Actions

### 1. Collecting and Analyzing Data and Technical Information

#### a. Baseline / Inventory Data

- Vegetation or wildlife species inventory
- Watershed characterization
- Etc.

#### b. Monitoring / Trend Data

- Water quality data
- Water quantity / streamflow data
- Groundwater level data
- Weather and climate data
- Sediment transport data
- Etc.

#### c. Mapping / Spatial Data

- Watershed mapping
- Land use / land cover mapping
- Aquifer mapping
- Etc.

#### d. Research / Analysis / Assessment

- Assessment of fish and wildlife populations
- Source assessment (for source water protection)
- Environmental assessment
- Watershed assessment
- Cumulative effects assessment
- Specific research projects as needed for particular sites, watersheds and/or communities
- Independent performance audits
- Etc.

## 2. Developing and Implementing Policies, Plans and Governance

### a. Developing and Adopting Policies, Legislation, and Regulations

- Water Act / Water Sustainability Act
- Fisheries Act
- Numerous other federal and provincial acts, regulations and statutory requirements
- Riparian Area Regulations
- Setting policy objectives, standards and guidelines
- Etc.

### b. Planning Procedures and Protocols

- Referral processes associated with various planning and decision-making processes
- Consultation and accommodation of First Nations title, rights and interests
- Stakeholder consultation
- Etc.

### c. Developing and Implementing Plans

- Land Use Plans / Land and Resource Management Plans
- Species at Risk Recovery Plans
- Water Conservation Plans, Drought Management Plans, Water Allocation Plans, Water Use Plans
- Well/Aquifer Protection Plans, Source Assessment Response Plans, Drinking Water/Source Protection Plans
- Water Management Plans / Water Sustainability Plans
- Watershed Management Plans
- Integrated Stormwater Management Plans
- Flood Hazard Management Plans
- Etc.

### d. Facilitating Multi-Interest Advisory and Decision-Making Processes

- Establish process objectives, deliverables, vision, roles and responsibilities, timeline and priority issues of the watershed organization
- If applicable, formalize a Committee, Roundtable, Board, Council, etc.
- Establish Terms of Reference, formal agreements, Memoranda of Understanding
- Etc.

### 3. Administering Operational Permits, Licenses and Regulatory Requirements

#### a. Permitting and Licensing Actions<sup>1</sup>

- Provincial: e.g. water licenses, instream works permits, waste discharge permits, resource extraction permits, etc.
- Federal: e.g. DFO – Regional Operational Statements for BC and the Yukon<sup>2</sup> such as stream crossing by roads and lines, shoreline activities, etc.
- Local: e.g. zoning bylaws, development permits, riparian area regulations, etc.
- Etc.

#### b. Monitoring Compliance and Enforcement

- Monitoring compliance with the terms and requirements of permits and licenses
- Monitoring compliance with other regulatory requirements and standards
- Issuing penalties in cases of non-compliance
- Etc.

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<sup>1</sup> Permits for activities that relate to water (provincial): aquaculture, change an existing surface water license, generate power, use of provincial Crown land, use of surface or subsurface water, discharge waste, and making changes in lakes, rivers, streams, gulches, swamps, creeks, etc. (Source: Front Counter BC)

<sup>2</sup> Operational Statements outline conditions and measures for avoiding harmful alteration, disruption and destruction (HADD) of fish habitat and applying them will ensure the project complies with subsection 35(1) of the Fisheries Act.

<http://www.pac.dfo-mpo.gc.ca/habitat/os-oo/index-eng.htm>



## 4. Implementing Watershed Protection, Conservation and Restoration

### a. Implementing Best Management Practices (both within and beyond regulatory requirements)

- Required terms and conditions associated with licenses, permits, tenures, etc. from statutory decision makers by all resource sectors
- Achieving 3<sup>rd</sup> party certification or accreditation associated with best practices such as sustainable forest management certification, organic agriculture, Green Shores, Salmon Safe, Ocean Wise, etc.
- Voluntary adoption of best management practices and/or guidelines by all resource sectors
- Etc.

### b. Management of Protected Areas

- Federally Protected Areas
- BC Parks and Protected Areas
- Regional Parks
- Internationally Recognized Sites
- Etc.

### c. Restoring Habitat Features and Functions

- Habitat mitigation and compensation projects as required by statutory decision makers
- Discretionary / voluntary site-specific restoration projects based on local, regional or province-wide priorities including, but not limited to, wetlands, riparian areas, spawning habitat, stream habitat complexing, stream bank stabilization, etc.
- Etc.

## 5. Delivering Education, Outreach and Capacity Development

### a. Public Education, Outreach and Capacity Development

- Public education, outreach and engagement processes
- Education through elementary, secondary, and post-secondary institutions
- Educating and training of future water managers

### b. Training and Professional Development of Watershed Management and Stewardship Practitioners

- Professional staff
- Community volunteers

### c. Public Access to Data and Information on Water and Watersheds

- Development, maintenance and access to databases and information portals

## C. Challenges and Opportunities for Effective Watershed Management

The previous summary of watershed management actions serves to provide a general overview of management areas and actions. It is not intended to provide a fully comprehensive inventory of management actions. Nor does it provide a detailed description about how each of these management actions is connected to numerous policies, legislation, jurisdictions, local contexts, and operational realities. To further complicate matters, there are ongoing changes to policies, watershed-scale pressures and resource capacity over time. There are also regional variations with respect to priority issues, interests, and capacity. There are also different values, interests, and degrees of capacity within the public, private and civil society sectors.

A particular interest of this project is to assess the adequacy of current resources (human, financial and technical information) to support the effective delivery of the necessary management actions. Where are we doing well and where are there limitations, gaps or other deficiencies? Perhaps most importantly, where are the opportunities and what are the innovations to more effectively deliver on the range of actions necessary to manage watersheds for their long-term health and sustainability?

The question of assessing “capacity” or “adequacy” in terms of human and financial resources is highly subjective. Some would argue that the status quo is working very well; while others would argue that there are gaps, limitations and deficiencies in all or most of the management actions outlined in this discussion paper.

The following are some observations and thoughts regarding past, current and emerging capacity. Some of these observations are general and span many or all aspects of watershed management, while others are specific to particular areas of management. These are offered to provoke further thought and consideration about challenges and opportunities for effective watershed management.

- There has been a reduction of government resources (both staff levels and budgets) in relation to the environment and many natural resource sectors over the past decade or two.
- There has been a particular loss of senior government staff with extensive experience and knowledge acquired over long periods of professional employment.
- Resource management pressures are increasing in intensity in some regions of BC and the challenges and conflicts between different resource values and uses are on the rise.
- There is variation among different regions of the province with respect to urban and rural pressures on watershed health as well as variation in regional capacity for governance and natural resource management.

### **Collecting and Analyzing Data and Technical Information**

- There has been an erosion of some monitoring networks and libraries / resource centres that provide archives of data and information.

- New arrangements are emerging to maintain and perhaps expand monitoring networks through strategic partnerships and collaboration
- There have been significant gains in terms of open data and online tools to facilitate access to information.
- There are emerging opportunities for targeted, applied research undertaken in collaboration between academic institutions and community-based initiatives.
- There are growing interests in learning from traditional knowledge and citizen science.

### **Developing and Implementing Policies, Plans and Governance**

- The Water Sustainability Act represents a potentially significant opportunity in British Columbia with respect to many aspects of water and watershed management.
- There is a growing interest at local, regional and watershed scales to strengthen governance through advisory and/or shared decision-making processes on land and resource use to complement senior government roles.

### **Administering Operational Permits, Licenses and Regulatory Requirements**

- The recently formed Ministry of Forests, Lands and Natural Resource Operations provides a potential opportunity for effective, efficient process to issue licenses, permits and resource tenures through a “single land manager”.
- There needs to be improved consideration of water resources and watershed health within the regulatory process of issuing land-based resource tenures.

### **Implementing Watershed Protection, Conservation and Restoration**

- Community-based organizations offer a significant capacity the broad stewardship, conservation and restoration of watersheds in BC. This capacity has varied over the years, fluctuating with the scale of available funding.
- Although there is no single network, there are several strong regional, or task-oriented networks and broad informal connections across what could be considered a “watershed community”.

### **Delivering Education, Outreach and Capacity Development**

- Community-based organizations are very well suited to effectively and efficiently deliver education, outreach and engagement programs with landowners and the broad public
- Professional associations help maintain and enhance professional capacity, training, and accreditation.

## Collaboration and Partnerships to Strengthen Watershed Management

Collaboration and partnerships are keys to success in advancing sustainability in watersheds. In many cases collaboration includes NGOs, local governments, First Nations, the private sector and others. A diversity of partners brings with it a wide range of interests, perspectives, expertise, experience and access to resources. An important component to collaboration is the inclusion of a mechanism for local and regional organizations to connect with regulatory agencies, to improve communications and coordination. This can be particularly important to avoid duplication of efforts and to ensure that the respective efforts of various agencies and organizations are not counter productive to one another.

Successful organizations supplement their internal capacity with technical support from agencies and other organizations (e.g. government staff, academic institutions, industry staff, network of practitioners). In addition, these organizational models include a component of capacity building to strengthen stability, skills development and longer-term delivery both within their organizations and within their audiences and partners. For example, networks, coalitions, and collaborative processes enable the sharing of knowledge and lessons learned (both successes and failures) among the different participants. Initiatives that involve landowner contact or public outreach and education are more likely to be successful if they strive to build capacity within their target audiences. The following are some examples of how collaboration and partnerships can overcome challenges and strengthen the effective delivery of watershed management.

### Okanagan Groundwater Monitoring Project<sup>3</sup>

The Okanagan Groundwater Monitoring Project is an initiative to increase the monitoring of priority aquifers in the Okanagan region. It is led by the Okanagan Basin Water Board (OBWB) in partnership with local, provincial and federal orders of government. This Project arose from a need to expand the coverage of the BC Ministry of Environment's *BC Observation Well Network* to priority regions such as the Okanagan where observation well data would be needed to support water management decisions and local water services planning.

The *BC Observation Well Network* was established in 1961 and was comprised of a number of unused dug and drilled wells in the Lower Fraser Valley and the Okanagan Valley. The primary purpose of the Network is to collect, analyze and interpret groundwater hydrographs and groundwater quality data from various developed aquifers in BC. This supports management, protection and sustainability of our groundwater resources and associated ecosystems. Many of the wells are monitored in cooperation with irrigation districts, municipalities and communities utilizing groundwater supplies. In 2009, the Network was reviewed in order to

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<sup>3</sup> Okanagan Basin Water Board. (2013). Okanagan Groundwater Monitoring Project Summary. [http://www.obwb.ca/newsite/wp-content/uploads/2013/09/groundwatermonitoring\\_compiledreport.pdf](http://www.obwb.ca/newsite/wp-content/uploads/2013/09/groundwatermonitoring_compiledreport.pdf)

develop a method to recommend where observation wells needed to be located in the province to help protect, manage and sustain groundwater resources.

The partnership between the OBWB, the Province and the Government of Canada was formalized in a memorandum of understanding in 2010 that defined their roles and responsibilities and terms and conditions under which the project would be conducted. Each partner contributed the following:

#### *Okanagan Basin Water Board*

- Facilitator and funding partner;
- Coordinated with member local governments and other parties to solicit project funding;
- Entered into contracts with well drillers and other local contractors involved in the construction of wells; and,
- Contributed funds for well construction.

#### *Province of BC*

- Provided in-kind support through:
  - Hydrogeological expertise;
  - Providing access to Crown lands for well-siting;
  - Equipping observation wells; and,
  - Maintaining the ongoing remote monitoring programs.
- Became the owner of the wells after completion, and responsible for its future operation, maintenance, repair, and replacement and eventual closing.

#### *Government of Canada (Agriculture and Agri-Food Canada (AAFC))*

- Funding partner;
- Provided technical assistance (on-site advice and assistance) for up to 15 working days/year;
- Contributed a maximum of half the eligible costs of each well (up to a maximum of \$15,000); and
- Contributed a maximum of \$35,000/year.

Over the duration of the project, 12 new observation wells were installed in the Okanagan Basin.

#### **Farmland-Riparian Interface Stewardship Program (FRISP)<sup>4</sup>**

FRISP, led by the BC Cattlemen's Association, has engaged more than 160 farmers and ranchers across the Province<sup>5</sup>. The Program is designed to help provincial agricultural producers to

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<sup>4</sup> BC Cattlemen's Association website. 'Farmland-Riparian Interface Stewardship Program.'  
<http://www.cattlemen.bc.ca/frisp.htm>

protect and enhance water quality, to protect and enhance riparian vegetation and prevent and mitigate agricultural impacts on streams and lakes. This is accomplished by achievement of the following objectives:

- Increasing understanding and cooperation between agencies responsible for resource management and the agricultural community regarding farmland development and use;
- Promoting joint planning of habitat restoration and farmland activities between landowners, resource management agencies and community groups;
- Increasing awareness of interactions between land use and habitat values; and,
- Resolving conflict that may arise between resource agencies and landowners.

Because the program manager is himself a rancher, getting those in the agricultural community onside to do riparian restoration and stewardship work has been a great success. This has helped build the capacity of landowners to adopt beneficial management practices as well as created a network of landowners who can support one another and share best practices. It has also led to the success of resolving conflict and building relationships between regulatory agencies, other interest groups, First Nations, and the agriculture sector.

## Partnerships with Universities and Research Institutes

Universities and research institutes are hubs of knowledge, information and data and conduct critical research on topics such as water quality, quantity, impacts of climate change, watershed functioning, groundwater and aquifer function, governance policy and demand management<sup>6</sup>. Experts in these areas can provide education and training, help to build the capacity of watershed organizations as well as serve as partners and conveners. Academic institutions also gain from these partnerships in being able to apply their research to benefit watershed organizations and the community as well as listen to community perspectives on issues relating to watershed health.

## Nechako Environment and Water Stewardship Society (NEWSS)<sup>7</sup>

NEWSS is a registered society that facilitates and conducts stream rehabilitation work within the sub-basins of the Nechako watershed. Its vision is to be an advisor for both landowners and government and to inspire all watershed interests to demonstrate high quality land and water stewardship in the Nechako watershed.

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<sup>5</sup> Think Salmon website. 'Project Archive.'

[http://www.thinksalmon.com/fswp\\_project/item/farmland\\_riparian\\_interface\\_stewardship\\_program\\_frisp3/](http://www.thinksalmon.com/fswp_project/item/farmland_riparian_interface_stewardship_program_frisp3/)

<sup>6</sup> Fraser Basin Council (2011). 'Rethinking Our Waterways.'

[http://www.rethinkingwater.ca/other\\_organizations.html](http://www.rethinkingwater.ca/other_organizations.html)

<sup>7</sup> Nechako Environment and Water Stewardship Society (NEWSS) website. <http://newsociety.org/>

Since its early years through the Murray Creek Rehabilitation Project, NEWSS has partnered with universities and School District 91 on many projects. It has strong relationships with the University of Northern BC (UNBC) and has worked with research professionals and students from other institutions such as Simon Fraser University (SFU) and the University of BC (UBC) on watershed health, climate change and improved agricultural land practices.

These partnerships have resulted in projects such as “Knowledge to Action” (KTA) led by Dr. Margot Parkes from UNBC that studied the relationship between healthy ecosystems and community health. In this project, Dr. Parkes brought together a collaborative team including the Northern Regional Drinking Water Team, NEWSS, Northern Health, the Fraser Basin Council and the Ministry of Environment to address the ecosystem linkages to health. Having established relationships within the region and internationally, UNBC also served as a convener bringing local politicians, medical authorities, First Nations, area leadership and international experts in examining the opportunities for water stewardship in the Nechako Valley and has created opportunities for solutions that recognize provincial legislative requirements.

### **Columbia Basin Watershed Network (CBWN) and Selkirk Geospatial Research Centre (SGRC) Mapping Program <sup>8</sup>**

The SGRC assists watershed organizations within the CBWN and other groups in the Columbia Basin by providing mapping support and training in the following areas:

- Assembling data for use in interactive mapping (e.g. The Columbia River Basin Biodiversity Atlas<sup>9</sup>, GIS/Google Earth);
- GPS surveying;
- Producing paper or digital map products and 3D visualizations;
- Providing GIS or remote sensing analyses; and,
- Conducting training on GIS.

Examples of projects:

- Sensitive Habitat Inventory Mapping (SHIM) of Lizard and Joseph Creek
- Aquatic Plant Mapping Survey of Windermere Lake
- Slocan River Streamkeepers Side Channel Mapping Project
- Biogeoclimatic Ecosystem Classification Maps
- Maps created for various watershed groups

Members of the CBWN are encouraged to explore opportunities to work collaboratively with other groups and craft applications that benefit communities in the Columbia Basin. This

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<sup>8</sup> Columbia Basin Watershed Network website. 2014 Mapping Program Call for Applications. <http://cbwn.ca/dev/2014-mapping-program-call-for-applications/>

<sup>9</sup> Columbia River Basin Biodiversity Atlas website. <http://biodiversityatlas.org/>



includes working with groups in neighbouring watersheds, creating mentorship opportunities for newer watershed organizations or collaborating with other groups with similar goals.

Organizations that have participated in the Program include<sup>10</sup>:

- Mark/Matthew Creek (Mark Creek Recovery Program)
- Joseph/Gold Creek (Joseph Creek Community Action Team)
- Salmon River (Salmon Streamkeepers Society)
- Slocan Lake (Slocan Lake Stewardship Society)
- Columbia Wetlands (Columbia Wetlands Stewardship Partners)
- Jimsmith Lake Watershed (Jimsmith Lake Community Association)
- Lake Lillian (Toby Benches Society)
- Murphy, Hanna & Topping Creeks, Rossland, BC (Rossland Water Stewardship Task Force)
- Columbia Basin Trust
- Friends of the Lardeau River
- Elk River Alliance
- Lake Windermere Ambassadors
- Mainstreams/Joseph Creek

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<sup>10</sup> Selkirk Geospatial Research Centre website. 'Columbia Basin Watershed Network.'  
[http://www.sgrc.selkirk.ca/cbt/cbwn/cbwn\\_geomatics.htm](http://www.sgrc.selkirk.ca/cbt/cbwn/cbwn_geomatics.htm)

## D. Conclusions and Recommendations

As demonstrated through this discussion paper there are numerous actions required to effectively manage for the health and sustainability of watersheds in BC. For the purposes of this discussion paper, the primary areas of management actions include:

1. Collecting and Analyzing Data and Technical Information
  - For example, collecting monitoring data on water quality and quantity
2. Developing and Implementing Policies, Plans and Governance
  - For example, facilitating shared decision-making processes on land and resource use;
3. Administering Operational Permits, Licenses and Regulatory Requirements
  - For example, issuing water licenses and other natural resource tenures;
4. Implementing Watershed Protection, Conservation and Restoration
  - For example, designing and constructing habitat restoration projects
5. Delivering Education, Outreach and Capacity Development
  - For example, education programs for private landowners and the broad public

In some cases the need for management efforts is being outpaced by the pressures that are occurring in watersheds in some regions of BC.

Many organizations at local, regional and watershed scales have contributed significantly to the protection, conservation and restoration of streams, habitat and watersheds. Many of these organizations are well situated to continue this work if adequate funds are made available. However, these community-based initiatives should not be seen as a substitute for the critical roles of provincial and federal governments, which are best suited to provide certain core functions due to their access to financial resources and technical capacity and expertise. These include setting water objectives, research and monitoring, data acquisition and storage, as well as auditing, compliance and enforcement processes. Senior governments possess the capacity and resources to provide stable, multi-year funding support to the various organizations and initiatives working to advance watershed health throughout BC. This can be done in a way that helps achieve the mandates and policy objectives of senior orders of government alongside the broader public interests and aspirations for healthy, sustainable watersheds and communities.