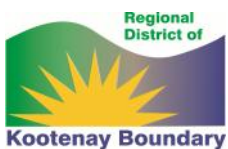


KETTLE RIVER WATERSHED MANAGEMENT PLAN

DRAFT SEPTEMBER 16, 2014

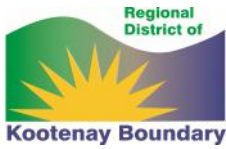


We envision a healthy, resilient and sustainable Kettle River Watershed, which functions to meet the needs and values of its communities, who in turn act as stewards of the watershed.



Kettle River Watershed Management Plan

The Kettle River Starts Here

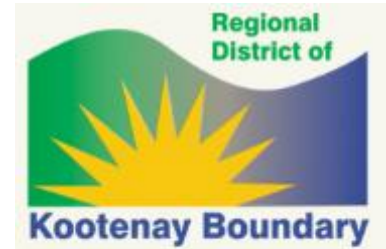


Kettle River Watershed Management Plan

The Kettle River Starts Here

Suggested citation

The KRWMP Stakeholder Advisory Group. 2014. *Kettle River Watershed Management Plan (Draft, September 2014)*. Grand Forks, B.C., Regional District of Kootenay Boundary. Available at <http://kettleriver.ca/what-we-are-planning/>.



Electoral Areas of Christina Lake, Rural Grand Forks and West Boundary

Acknowledgements

Thank you to the Regional District of Kootenay Boundary (Electoral Areas of Christina Lake, Rural Grand Forks, and West Boundary), Southern Interior Beetle Action Coalition, the Real Estate Foundation of BC, the Phoenix Foundation of the Boundary Communities and the City of Grand Forks for their financial support of this planning process.

Thank you to the Stakeholder Advisory Group, Technical Advisory Committee and other participants for your ideas, networking and support in developing this work.

Cover Photo: “Facing upstream” – Roly Russell



Contacts:

Graham Watt
Coordinator, Kettle River Watershed Management Plan
250.442.4111
plan@kettleriver.ca
<http://kettleriver.ca>

Bill Baird
Kettle River Steering Committee Chair;
Director for Electoral Area ‘E’ Director
250.445.6578

Roly Russell
Advisory Group Chair;
Director for Electoral Area ‘D’ Director
250.584.4677

Donna Dean
RDKB Manager of Planning and Development
1.800.355.7352
ddean@rdkb.com

EXECUTIVE SUMMARY

The Regional District of Kootenay Boundary (RDKB) has undertaken the development of a watershed management plan for the Kettle River in British Columbia. The Kettle River Watershed Management Plan is a collaborative initiative supported by a Stakeholder Advisory Group with participation from local and provincial governments and representatives from multiple sectors and organizations from across the Boundary region. Over the last three years, the RDKB and the Advisory Group have developed a shared understanding of watershed issues, created a vision, goals and strategies to take care of the Kettle River watershed into the future, shared information widely, and learned from a broad network of interested stakeholders.

This draft plan presents a vision for the Kettle River watershed that is drawn from this common understanding: *“We envision a healthy, resilient and sustainable Kettle River Watershed, which functions to meet the needs and values of its communities, who in turn act as stewards of the watershed.”* The vision forms the foundation for nine goals affirming healthy aquatic ecosystems, safe and secure water supplies, and a reliable water system supporting a sustainable economy and local food system.

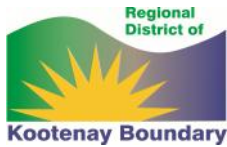
A number of challenges exist to achieving these goals, including high water use and broad, interacting ‘cumulative impacts’ from resource development, urban and rural development, industry, agriculture, and recreation activities. These impacts together further impact low river flows, surface and ground water quality, and habitat for fish and aquatic ecosystems. Underlying these challenges are constraints on understanding by both the public and decision makers, conflicting priorities and gaps in regulations and policy support, and a lack of resources and capacity in resource management agencies, local governments, and stewardship organizations.

This draft plan answers these challenges by presenting four broad strategies containing twenty directions for management and over fifty actions to be undertaken by stakeholders in collaboration over the coming years. The draft builds on the analysis and discussions in the Phase 1 Technical Report¹ and five issue-specific papers developed and shared over the last year.²

The first overall strategy, and the highest priority, is to increase community understanding, support and capacity for stewardship of the Kettle River watershed. This includes developing a governance and

¹ The Phase 1 Technical Report is available at <http://kettleriver.ca/state-of-watershed/>

² Discussion papers are all available at <http://kettleriver.ca/what-we-are-planning/>



Kettle River Watershed Management Plan

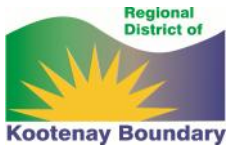
The Kettle River Starts Here

funding structure to implement the plan, growing understanding and awareness through a broad education and research strategy, and building skills and capacity to undertake the work.

The second strategy is to improve the quality, reliability and security of water supplies through the sustainable management of water supply and water quality, using applied research, monitoring, policies and technologies. The third strategy is to improve the health and function of the ecosystems that support the Kettle River and its communities, through supporting shoreline and riparian restoration, conservation planning, and beneficial practices in agriculture and resource management. The fourth strategy is to enhance the recreational, cultural and amenity values of the watershed, bringing people together to celebrate the stewardship of the watershed and the connections we all have to water.

The key to success of a watershed plan is the dedication and ability to carry out the actions. The RDKB has committed to funding coordination and leading the next three years of implementation, with an implementation team that is drawn from the Advisory Group and key organizations.

This draft Kettle River Watershed Management Plan is presented for consideration by all interested parties before it is finalized and presented to the RDKB Board of Directors. Feedback on the draft plan is requested by **Tuesday, October 14** and can be sent to the Project Coordinator at plan@kettleriver.ca / Box 1965, 2140 Central Avenue, Grand Forks BC V0H 1H0. A response form is available on the website at (<http://kettleriver.ca/what-we-are-planning/>) if you are interested in providing detailed responses or if you or your organization will be involved in some aspect of implementing the plan.



CONTENTS

Executive Summary.....	ii
Contents.....	iv
1 Introduction	1
1.1 Watersheds and planning.....	3
2 A vision for the Kettle River watershed	4
2.1 Watershed Management Goals.....	5
2.2 Sense of Place: Cultural, spiritual, amenity and recreational values	6
2.3 Watershed Challenges	7
3 Strategies, directions and actions.....	11
Strategy 1. Increase community understanding, support and capacity for stewardship of the Kettle River Watershed.....	12
Strategy 2. Improve the quality, reliability and security of water supplies through sustainable management of water resources.....	15
Strategy 3. Improve watershed health and function in the Kettle River Watershed	19
Strategy 4. Maintain or enhance recreational, cultural and amenity values	21
4 Towards Plan Implementation.....	23
4.1 Overview of Phase 3 (Fall 2014- Summer 2017).....	23
References	25
Appendices.....	28
A. Planning Team.....	28

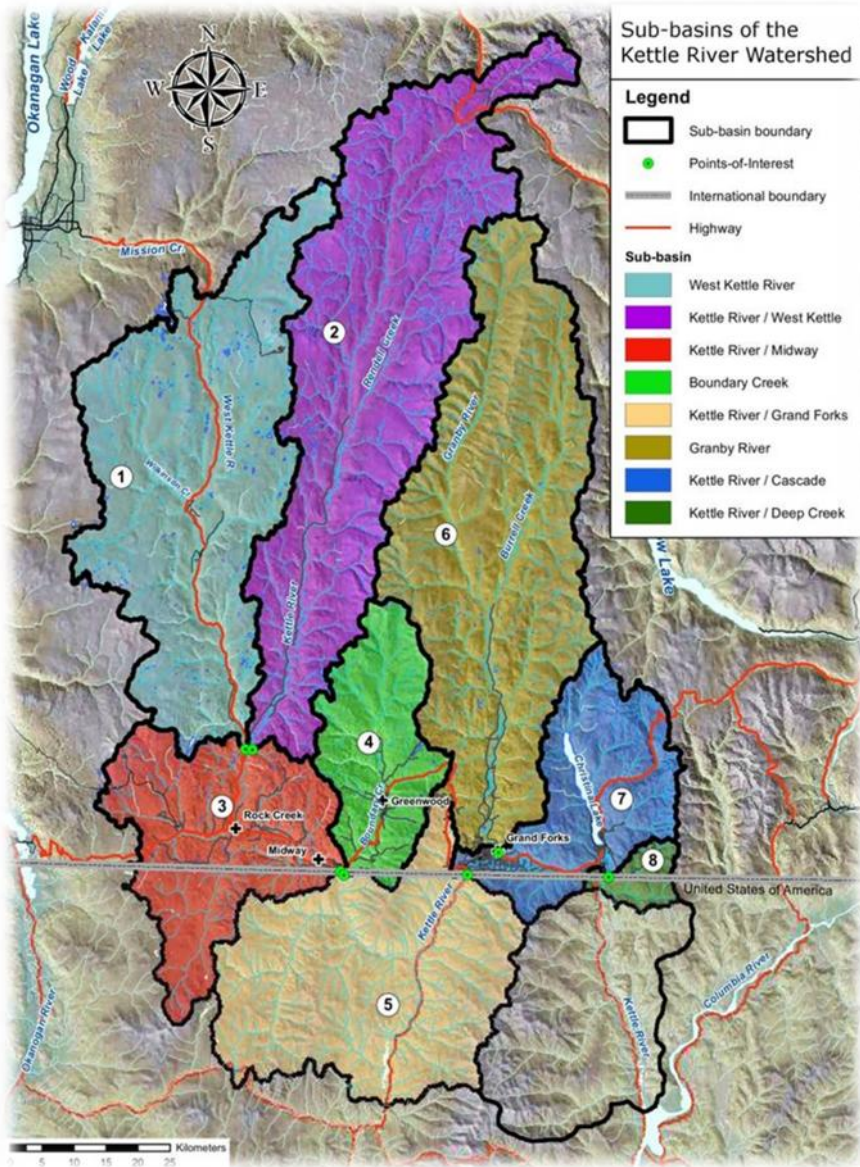
1 INTRODUCTION

The Regional District of Kootenay Boundary (RDKB) has undertaken the development of a watershed management plan for the Kettle River in British Columbia. The Kettle River Watershed Management Plan (Plan) considers issues and develops strategies and actions related to water quantity, water quality, and aquatic ecosystems, across the Kettle River watershed.

The Phase 1 Technical Report provided a comprehensive technical review of current watershed conditions and a foundational analysis of water supply and demand [16], building on several decades of monitoring and management planning principally concerned with water supply, aquifer quality and fisheries management.³

Phase 2 of the Plan is intended to provide guidance to decision-makers, resource managers, and users and residents regarding land and water resources in the watershed. Based on the Terms of Reference [12], the Plan is intended to provide actions to be undertaken by the RDKB and other stakeholders which:

- Balance water supply and use today and in the future;
- Protect water quality and the ecological function of



³ Recent key documents at <http://kettleriver.ca/state-of-watershed/>

the system;

- Increase the understanding of the Kettle River Watershed and the issues associated with it;
- Promote an ethic of water conservation throughout the watershed; and
- Build support for watershed management initiatives through thorough public engagement.

This draft plan presents a vision for the Kettle River watershed that addresses the challenges identified in the planning process through a strategic, action-oriented approach that looks forward to the next three years of implementation and beyond. It also emphasises the ‘sense of place’ in the cultural, spiritual, and amenity values that connect people to the watershed.

The Plan is supported by a Stakeholder Advisory Group (Advisory Group; Appendix A) representing a broad range of interests from across the Boundary region and beyond. Over the past year, the Advisory Group and other stakeholders have developed and reviewed a series of five discussion papers focusing on watershed management challenges, strategies and opportunities, organized around the broad strategies outlined in Section 3 of this document. The papers are complementary and form valuable background to this draft Plan:

- Discussion Paper 1 – Towards the Kettle River Watershed Management Plan: A Vision for the Kettle River Watershed [17] - <http://kettleriver.ca/discussion-paper1>
- Discussion Paper 2 – Working together: Growing our capacity for watershed stewardship in the Kettle River Watershed [19] - <http://kettleriver.ca/what-we-are-planning/discussion-paper-2-working-together-growing-our-capacity/>
- Discussion Paper 3 – Sustaining the flow: managing water supply and demand to support ecosystem health and community needs [7] - <http://kettleriver.ca/what-we-are-planning/discussion-paper-3/>
- Discussion Paper 4 - Water Quality and Source Water Protection: Issues and Strategies in the Kettle River Watershed [20] - <http://kettleriver.ca/what-we-are-planning/discussion-paper-4/>
- Discussion Paper 5 – Stepping Back From the Water: Managing Wetlands, Riparian Areas and Floodplains in the Kettle River Watershed [21] - <http://kettleriver.ca/what-we-are-planning/discussion-paper-5-stepping-back-from-the-water/>

In addition to the discussion papers, the Advisory Group utilized several approaches to learn from and share with stakeholders about issues, priorities, and solutions.

- Mail survey of households across the Boundary [18];
- Regular Stakeholder Advisory Group meetings and four special meetings and open houses;
- Over 20 presentations to community groups, municipal councils, and conferences / professional meetings;

- Attendance and information tables at Rock Creek Fall Fair, farmers markets, and various community events; and
- Regular columns in local newspapers and an active website and social media presence to keep the watershed plan in the public view [13].

The issues, strategies and actions presented in this draft Plan have been reviewed in depth by the Advisory Group and are the basis for further review by the community before finalizing the Watershed Management Plan and preparing for implementation this fall.

The Advisory Group recognizes that there are statutory requirements and responsibilities which guide the actions of the various agencies involved in the management of resources within the watershed. The Plan will not commit agencies to actions which conflict with their area of jurisdiction, instead will invite them to collaborate in new ways and achieve more than could be done alone. All stakeholder groups and government agencies will be asked to endorse the Plan upon completion and to participate in or support its implementation.

1.1 Watersheds and planning

A watershed is all of the land, lakes, wetlands, streams and rivers that drain to a common water body or water source (Figure 1). It is an ecosystem with complex interacting natural components including upland plant communities, wetlands, riparian areas, and aquifers. Human alteration of watersheds by water use, land management, and changes to landscapes and watercourses directly and indirectly influences many aspects of surface and groundwater on which people and ecosystems depend.

A management plan is simply a proposed course of action – a statement of intentions – that is based on the best available information and assumptions about the future.

A watershed management plan has a more comprehensive scope than a water management plan or water use plan. Instead of one or two agencies determining strategies for conserving or managing water in consultation with water suppliers and consumers, watershed management planning involves multiple institutions, regulatory frameworks, and jurisdictions in cooperation. Watershed management plans also consider the interaction and



Figure 1. The water cycle (courtesy Conservation Ontario)

mutual influence of upland land and water use, riparian and wetland ecosystems, and in-stream and groundwater conditions.

Watershed management plans succeed when they:

- build support for watershed management with the public and other organizations;
- develop scientific understanding of the watershed and share that knowledge with stakeholders, while also learning from the public about their values, interests and understanding about the watershed; and
- lay the foundation for action by building capacity to make and carry out decisions about watershed management (also known as governance) (Figure 2).

The need to jointly build support, understanding, and capacity has never been more critical. As Brandes and O’Riordan [2] note, there is a grassroots momentum among communities to have a greater role in watershed governance at the same time that all levels of government have a diminished capacity to fulfill their responsibilities to protect and sustain watersheds. Indeed, a key factor of success for watershed management is how much influence local watershed organizations and partnerships have over water and related resources that affect their communities. Moving towards greater shared decision-making in watershed management is a priority, such that local and regional authorities have increased influence on water issues.

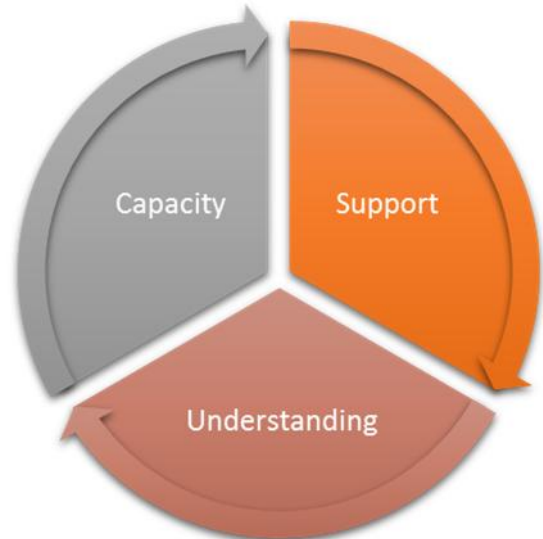


Figure 2. Key ingredients for success in watershed management

2 A VISION FOR THE KETTLE RIVER WATERSHED

The vision statement and goals are foundational principles and high-level aspirations about the long-term results of the watershed plan. Based on a thorough review of watershed issues and input provided by the public, the Advisory Group has adopted the following vision for the Kettle River watershed:










Reliable, quality water and healthy aquatic ecosystems are vital to the well-being of our communities, for quality of life and economic sustainability. Residents and visitors in the Kettle River Watershed have expressed their sense of stewardship of the Kettle River and its tributaries, and clearly wish to maintain and enhance the functions and values of a healthy watershed.

*Therefore, we envision **a healthy, resilient and sustainable Kettle River Watershed, which functions to meet the needs and values of its communities, who in turn act as stewards of the watershed.***

2.1 Watershed Management Goals

A healthy, resilient, and sustainable watershed has a balance of land uses, land management practices, water conservation practices, and stewardship of water bodies that, taken together, support the achievement of watershed management goals. The Advisory Group has developed a set of goals that expresses the conditions of the watershed that the community wishes to achieve and maintain, and describes the outcomes of implementing the vision (Table 1).

Table 1. Goals for the Kettle River Watershed

Icon ⁴	#	Goal
	1	Healthy aquatic ecosystems sustain native biodiversity and aquatic life
	1a	Healthy flow regimes & water levels
	1b	Excellent water quality
	1c	Excellent quality habitat in wetlands, riparian areas and associated uplands
	2	Safe & secure water supports healthy communities
	2a	Safe and secure drinking water
	2b	Safe water-based recreation and quality leisure & recreational activities
	2c	Community enjoyment and expression of spiritual, cultural, heritage and aesthetic values
	3c	Stable shorelines and resilient floodplain land use
	3	Reliable and adequate flows of clean water support a sustainable economy and food system
	3a	Adequate water quality to support current and future uses
	3b	Reliable, secure water supplies to support current and future use within sustainable levels

⁴ Nicholas Mollet (no date). Map Icon Collection. Creative Commons 3.0 Attribution & Share Alike. <http://mapicons.nicolasmollet.com/>

2.2 Sense of Place: Cultural, spiritual, amenity and recreational values

People are drawn to the Kettle River watershed for its clean, swimmable rivers and lakes, great fishing, and quiet, scenic rural environment. As noted in the 2012 survey of watershed residents, there is a tremendous ‘love’ of the Kettle River and its lakes and tributaries, and a strong sense of stewardship and care [18].

A number of survey respondents indicated that they value a healthy watershed for its own sake – regardless of the ecosystem or economic values that it supports. Many others shared about the intangible benefits of being in or near the water, which is a large part of what draws people to live or enjoy recreation and vacations here.

Stewardship of these lands and waters goes much further back than the current settlements in the Boundary region. The Kettle River watershed is in the heart of the traditional territory of the Okanagan, or Syilx-speaking peoples of the Interior Plateau [8,9]; the eastern watershed is part of Sinixt territory [8,15]; and the eastern edge borders Ktunaxa territory.

The health of the lands and waters here continues to be of critical importance for First Nations. For instance, the Okanagan Nation Alliance is developing a water strategy incorporating Syilx principles that seeks “to improve the way water is managed within Syilx territory and ensure that clean, flowing water, the lifeblood of the land, is properly respected and available for all living things [10].” The Okanagan Nation Alliance has also been active in the conservation and restoration of Okanagan and upper Columbia River salmon populations, which has resulted in the return of the sockeye salmon fishery to the south Okanagan [14].

The importance of the recreational and amenity values can be measured, imperfectly, through the value of tourism and recreation for the larger region. While specific dollar figures have not been assembled for the Boundary, there is no doubt that tourism, recreation and water-based amenities



Figure 3. Catch and release trout fishing in the Kettle River (S. Lockhart photo)

provide numerous jobs and bring tremendous economic value to the region. In the province as a whole, tourism generated 7.5 billion dollars in 2012, more than the contributions of forestry, agriculture & fish combined and three quarters of the value of mining, oil & gas sectors [5]. In the Thompson-Okanagan, leisure travelers spent almost 730 million dollars in the region in 2010 [4]. The total economic impact of freshwater sport fishing in BC is nearly one billion dollars, and the Okanagan fisheries region provided 10% of total angling days in 2013, equivalent to approximately \$154 per angler per day contributed to the local economy [6].

A consensus of common values for water in British Columbia has been endorsed by a collaboration of non-government organizations, First Nations, local government representatives, scholars, and others:

Water is life. Water is our relation. Water bonds us across time and place to our ancestors, to our descendants, and to our land. Water nourishes, replenishes, cleanses, and refreshes. It is the source of food, sustains our salmon, supports our rich environment, and powers our economy. It is critical to our community and economic prosperity.

Water cannot be owned as it is shared by all life on Earth. It is a public trust that provides a universal link between all cultures and species, requiring us to understand each other's experiences, histories, and identities. As such, we each have a duty of stewardship and share a mutual responsibility to ensure water is protected and stewarded to provide for its availability for the health and resilience of all life.⁵

2.3 Watershed Challenges

Over the last three years, the Advisory Group has learned about many different issues that affect our community's water uses and values, and constrain our ability to meet these goals. These issues were raised by the community during initial consultation in 2010 and through surveys and public engagement from 2012 to 2014. The Phase 1 report examined available information about watershed issues [16], and the discussion papers summarized issues and provided updated information and analyses.

In the fall 2012 survey, residents of the Kettle River watershed were asked to rate how well the watershed meets a variety of general watershed objectives [18]. Respondents were least concerned about impacts to amenity and aesthetic values of the watershed, and most concerned about water quantity and wastewater and stormwater drainage impacts on surface water.

⁵ http://poliswaterproject.org/sites/default/files/watersheds2014/Watersheds2014Consensus_FINAL.pdf

When asked to consider causes and effects, respondents most often mentioned pressures relating to water use, pollution, and agricultural practices. Top issues related to loss of surface water quality, unreliable flows or water levels, and degradation of aquatic ecosystems.

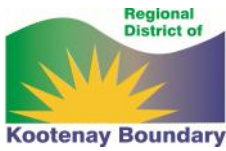
In other venues, stakeholders have identified issues including riparian damage, climate change, impacts of range management, and overall degradation of watershed function. The overall impacts affect water quality & quantity, habitat & ecosystems, and social and economic considerations.

While tourism and amenity values are recognized as highly important for the region, there has been significant concern by stakeholders that some impacts may be far too high [18]. Backcountry damage to streams and sensitive aquatic ecosystems by off-road vehicles has been noted in the West Kettle watershed, and widespread development of lakeshore and river front properties across the region has put aquatic values at risk. Over-fishing and/or poaching of rainbow trout has also been cited as a factor in slow recovery of trout populations [23], and transport of aquatic invasive species on boats and equipment is a key concern.

The various watershed issues raised by stakeholders are presented as a set of challenges to managing land and water in the Kettle River Watershed (Table 2). These challenges do not list every issue identified by stakeholders. Instead, each identifies a set of causes and effects that together illustrate the inter-relationships of watershed issues and constraints to solving them independently.

Table 2. Watershed Management Challenges

topic	Challenge
low flows	Seasonal low river flows affect the reliability of water supplies and aquatic ecosystem health.
high water use	Water flow in the Kettle River and tributaries is naturally high in the spring and low in the late summer and fall. High water use in urban, industrial, and agricultural areas leads to lower summer and fall flows as well as less water discharging from aquifers to wetlands, streams and rivers (Discussion Paper 3 [7]). <ul style="list-style-type: none"> • There has been a small but significant decrease in the volume of low flows since water monitoring began in 1929 [7]
forest cover	Decreasing forest and permanent vegetation contributes to higher, earlier spring floods, higher overall flow and quicker streamflow response to precipitation. Loss of forest cover also exacerbates droughts and low flows (Discussion Paper 3 [7]).
climate change	Global climate change will increasingly contribute to earlier, potentially higher spring floods and longer growing seasons, therefore increasing water use and stresses on aquatic ecosystems and human uses (Discussion Paper 3 [7]). <ul style="list-style-type: none"> • Future water demand in dry years could cause extended extreme low flows or zero flow periods if comprehensive water conservation, regulations, and water storage



topic	Challenge
regulatory capacity	Regulatory oversight by provincial and federal agencies has declined in recent years for multiple aspects of land and water management. This decreased capacity limits the response to impacts on water supply, quality and watershed function (Discussion Paper 2 [19]).
funding and governance	Overall funding in resource management agencies is constrained, meaning fewer resources are available to support programs such as ecosystem monitoring, water quality testing, implementation of best management practices and ecosystem restoration. Fewer staff from federal and provincial agencies [1] means less capacity for informed decision-making at all levels of government and in watershed planning groups (Discussion Paper 2 [19]).
understanding/ commitment	<p>The public and institutional level of understanding about, and commitment to, watershed health and function limits support for improving policy, watershed stewardship, and individual actions (Discussion Paper 2 [19]).</p> <ul style="list-style-type: none"> • Of the 10 water suppliers contacted, only one had a comprehensive water conservation plan addressing leak repair, sprinkler regulations, conservation education/incentives and metering. Most focused mainly on infrastructure maintenance and sprinkling regulations.

Action 1.1.4 Integrate the KRWMP into local government decision-making through coordinated environmental planning, green bylaw development, and municipal conservation and park management planning (KRWMP Implementation Team, local governments; ongoing)

Direction 1.2. Improve understanding of watershed function, integrity, resilience, and sustainability. Fill gaps in understanding through scientific studies and ongoing monitoring.

Action 1.2.1 Build a digital map-based watershed information system to collect and share publications, information and data on water and related resources in the Kettle River Watershed and to support local government and stakeholder decision making (RDKB, Implementation Team, Project Coordinator, Technical Advisory Committee; 2015)

Action 1.2.2 Develop and implement a monitoring framework for water quality, water quantity, aquatic ecosystems, groundwater, and land use and management. Includes identification of reporting indicators and thresholds (Technical advisory committee; 2015).

Action 1.2.3 Complete a climate change resilience analysis for the Boundary that evaluates and creates an action plan for carbon reduction, community adaptive capacity, and resilience measures (Implementation Team, local government; 2017)

Action 1.2.4 Develop and implement a watershed education strategy to translate watershed science and monitoring results as well as improving overall watershed literacy (Implementation Team, Engagement & Education Working Group; 2014)

Direction 1.3. Build public and institutional support for improved watershed management, including the development, implementation, and continued support of policies and regulations that safeguard and watershed health.

Action 1.3.1 Develop a public engagement plan for regular public feedback and review, including semi-annual meetings, regular update columns, and website/social media (Implementation Team / engagement working group; fall 2014)

Action 1.3.2 Assess and improve the consistency, alignment and application of policies and regulations for protecting water quality, water quantity, and habitat in aquatic and related upland ecosystems. Address any issues with capacity for regulatory compliance and enforcement (Provincial and federal government, with monitoring by local government and non-governmental organizations; ongoing).

Direction 1.4. Improve capacity for watershed stewardship

Action 1.4.1 Enable increased funding for conservation and stewardship on private land by investigating the feasibility of, and developing, a **local conservation fund** (Leads: Implementation Team, Boundary Habitat Stewards; fall 2015)

Action 1.4.2 **Align and target stewardship and funding programs** in collaboration with stewardship and conservation groups, conservation funding sources, government agencies and landowners to address and support conservation and restoration of water conservation, stream health, riparian areas and wetlands (Implementation Team, stewardship organizations, Province; ongoing).

Action 1.4.3 **Create a water supply working group** to pool expertise and other resources and meet semi-annually to discuss source water protection and water supply management, share learning and resources, and report on links with watershed management (Implementation Team, municipalities, water purveyors; 2014)

Action 1.4.4 Consider **implementing a Climate Resilience Plan for the Boundary** to reduce reliance on fossil fuels, reduce carbon emissions, and increase adaptive capacity to climate change impacts (Implementation Team, local government, provincial government; 2017)

Strategy 2. Improve the quality, reliability and security of water supplies through sustainable management of water resources

The sound management of water resources – in terms of their allocation, conservation, use, treatment, and protection for ecosystem and human needs – is the central priority of watershed management planning. The governance frameworks and capacity-building in Strategy 1 provide the basis for the following six directions and 22 actions, which seek to develop a culture of water conservation, implement water conservation measures to protect fish and aquatic ecosystems, institute drought management and water storage development, and study and improve water quality and protection of drinking water sources.

Direction 2.1. Improve understanding of water quality and quantity in the Kettle River watershed

Action 2.1.1 Implement monitoring and central reporting of a) water use and b) flow and water levels in tributaries and aquifers connected to the Kettle River. Report regularly on meeting flow requirements or any alterations to flow regimes that could affect aquatic ecosystems or human uses (Province, Implementation Team, water suppliers and local organizations; 2015 and ongoing).

Action 2.1.2 Complete a comprehensive Environmental Flow Needs assessment⁶ of the Kettle River and major tributaries that addresses groundwater connections and establishes objectives for flow and water conservation. (Province, with support from Implementation Team; 2016).

Action 2.1.3 Design and implement a synoptic water quality assessment⁷ to characterize current conditions along the main stem of the West Kettle, Kettle, and Granby Rivers (Province; 2017).

Action 2.1.4 Design and implement a medium-term (3-5 year) water quality monitoring network to collect and update water quality data: a) downstream of Grand Forks at the former Gilpin water quality station; key tributary locations (lower Boundary Creek, lower Granby River); and in sites downstream of proposed new forest harvest, mining and road-building activities. (Province, water suppliers, Implementation Team; 2017).

⁶ Including flow objectives for fish, aquatic ecosystem, water quality, infrastructure and recreation

⁷ Synoptic water quality assessments ‘follow’ the water downstream from headwaters to outlet, sampling water quality at the confluence of major tributaries to characterize changes.

Action 2.1.5 **Continue** the sampling and reporting program for the **ambient groundwater quality network** and consider expanding sampling and reporting to other aquifer locations (i.e. Midway, Beaverdell), including additional parameters (key pesticides) (Province; ongoing).

Action 2.1.6 Develop an **accessible database** to compile and share (voluntarily) **well-testing data** from private, municipal and industrial sources and report changes in supply and quality to all stakeholders (Province, Interior Health Authority, water suppliers; 2017).

Action 2.1.7 **Establish site-specific water quality objectives** for surface and ground water purposes including drinking water and the protection of aquatic life (Province with support from Implementation Team; 2016 for sites with available long-term data, 2020 for additional sites).

Outcomes:

- Water quality is rated good or better for all water quality index parameters
- Surface and groundwater sources are drinkable with minimal source treatment for surface water and no source treatment required for groundwater
- No further impacts on drinking water sources, fish and aquatic life, or recreational enjoyment of water
- No further increase in nutrient, turbidity, or sediment loads measured at water quality monitoring sites

Direction 2.2. Improve water conservation and increase efficiency and productivity of water use in all sectors

Action 2.2.1 **Develop and implement water conservation programs** to motivate changing practices toward water conservation (Implementation Team, water suppliers; spring 2015 and ongoing)

Action 2.2.2 Identify, implement and report on **water conservation goals** and measures (infrastructure renewal, education, incentives, regulations and pricing) in water conservation plans (water suppliers, Implementation Team; 2017). Outcomes:

- All water suppliers have water conservation strategies developed and adopted 2017
- At least 50% of new water demand is met by water conservation by 2020

Action 2.2.3 **Manage the water allocation, permitting, licencing and approval process** (including groundwater) to support **environmental flow requirements** and **water quality objectives** (Province; ongoing)

Direction 2.3. Improve water security by developing and implementing drought management plans

Action 2.6.2 **Develop aquifer management or source water protection plans** for areas where risk assessment determines current or future threats to surface water or groundwater resources (Province, water suppliers, local government; 2017)

Action 2.6.3 **Design and implement an extension program for specific groups at risk of affecting or being affected by water quality issues** (well owners, septic system owners) (Interior Health Authority, Environmental Farm Plan, BCWWA, Implementation Team; 2015).

Action 2.6.4 **Prioritise the high-demand aquifers of the Kettle River watershed for groundwater licensing and regulation** in support of stream health (Province; during implementation of the Water Sustainability Act)

Action 2.6.5 **Give consideration to source water protection, water conservation and aquifer recharge protection** in local government planning documents (RDKB, municipalities, with support of Implementation Team; ongoing).

Strategy 3. Improve watershed health and function in the Kettle River Watershed

The Advisory Group understands that healthy, resilient communities depend on a functioning watershed ecosystem that provides tangible and intangible benefits and services. This strategy presents four directions and thirteen actions to improve understanding of watershed function, build support and capacity for improving watershed function, improve the extent and function of permanent vegetation, wetlands and riparian areas, protect soil and reduce erosion, and improve the resilience of land use and communities on shorelines and the floodplain.

Direction 3.1. Improve understanding of watershed health and function, including floodplain dynamics, in the Kettle River watershed

Action 3.1.1 Implement a Sensitive Ecosystem Inventory for the Kettle River Watershed, with particular emphasis on identifying wetlands and riparian areas, and that utilizes Terrestrial Ecosystem Mapping tools (Province, local government, Implementation Team; 2016).⁹

Action 3.1.2 Consider updating floodplain maps in areas at risk of flooding to address changes in hydrology related to climate change, incorporating higher resolution elevation data (i.e. Lidar) (local & Province, Implementation Team; 2017).

Action 3.1.3 Consider undertaking a planning-level Channel Migration Zone (CMZ) [11] study for settled areas of the Kettle River, Granby River and Boundary Creek to identify **land use hazards** related to channel migration and avulsion (local government and Province, Implementation Team; 2017).

Action 3.1.4 Identify and characterize the source, transport and fate of sediment currently affecting fish habitat and (Province, researchers, Implementation Team; 2017)

Direction 3.2. Build support and capacity for improving watershed function

Action 3.2.1 Consider the findings of the forthcoming Riparian Threat Assessment and implement **measures to provide increased protection for areas near water at risk of erosion** due to vegetation removal and development, in *Plan* implementation, local government planning documents and provincial resource management decisions. (RDKB, municipalities, with support of Implementation Team; 2015).

⁹ A Sensitive Ecosystems Inventory (SEI) systematically identifies and maps at risk and ecologically fragile ecosystems in a given area as part of a comprehensive ecosystem mapping framework such as Terrestrial Ecosystem Mapping [2].

Action 3.2.2 Update and implement, as appropriate and through municipal and electoral area planning processes, the **Riparian Area Development Permit Guidelines** previously drafted for Electoral Area of Christina Lake (RDKB and municipalities, Implementation Team; 2017)

Action 3.2.3 Work with local conservation groups to establish a formal ‘Streamkeepers’ group or similar organization for ongoing water quality monitoring, wetland/riparian restoration and other stewardship activities (Implementation Team, stewardship groups, fish and wildlife groups, Boundary Habitat Stewards; 2015)

Action 3.2.4 Develop and publish a ‘Riparian Buffer Guide’ booklet specific to shorelines within the RDKB that summarizes applicable regulations, articulates ‘Riparian Buffer Area Requirements’ and highlights options for conservation, restoration and beneficial management practices for landowners (Implementation Team, Boundary Habitat Stewards; spring 2015)

Direction 3.3. Maintain or increase the extent and function of riparian areas, wetlands, and permanent vegetation, including forests, in uplands, stream corridors and on floodplains

Action 3.3.1 Implement or extend local policies and incentives for retaining or increasing native tree, shrub and grassland cover (Province, Implementation Team, local government; ongoing). Outcomes:

- Increase cover of native trees and shrubs in riparian areas and floodplains
- Achieve regional zero net deforestation and zero net increase in roads

Action 3.3.2 Consider the implementation of ecosystem-based conservation planning for forest resource management to increase protection and improvement of biodiversity and ecosystem services (Province, forestry companies, BC Timber Sales, woodlot owners, and Implementation Team; ongoing).

Action 3.3.3 Develop a Watershed Restoration Program to strategically design, fund and implement conservation and restoration projects for wetlands, riparian areas, and in-stream habitat (Implementation Team, Province, stewardship groups; 2015).

Action 3.3.4 Work with landowners and resource managers and utilize the results of Channel Migration Zone studies to identify areas at risk of severe erosion and support bank protection and erosion control measures that protect aquatic and riparian habitat (Implementation Team, Province; ongoing)

Direction 3.4. Protect soil and improve soil health to improve water retention and decrease erosion

Action 3.4.1 Implement and align agricultural and forestry stewardship incentives for grazing, nutrient management, water conservation, crop management & soil conservation (Province, Implementation Team; ongoing)

Strategy 4. Maintain or enhance recreational, cultural and amenity values

As noted in Section 2.2, the cultural and spiritual connection to water and the importance of people's enjoyment of the rivers and aquatic ecosystems in the Kettle River watershed underpins our communities' support for the stewardship of healthy aquatic ecosystems and other watershed values. This strategy presents four directions and eleven actions to improve understanding, maintain fisheries, improve land and water conservation and recognize and celebrate cultural connection to water and the watershed.

Direction 4.1. Improve understanding of recreational, cultural and amenity values

Action 4.1.1 Undertake a creel survey to characterize angler behaviour, catches, and response to regulation changes (fish and wildlife groups, Province; 2015)

Action 4.1.2 Consider undertaking a **traditional place-name study** to map and share information on places of aboriginal significance in the watershed (Implementation Team, Okanagan Nation Alliance; 2016)

Direction 4.2. Maintain a healthy fishery through habitat protection and restoration, continued stocking of recreational lakes and the protection of native fish populations in tributaries and rivers

Action 4.2.1 Consider changes to fisheries regulations (catch and release, summer closures) to protect fish during warm, low-flow periods and make regulations simpler and easier to use by anglers (Province, fish and wildlife groups; 2015).

Action 4.2.2 Consider designating the Kettle River as an Environmentally Sensitive Watershed under the Fish Protection Act (Province, with support from Implementation Team; 2016).

Direction 4.3. Improve support for protected areas and increase responsible recreation

Action 4.3.1 Collaborate with **recreation and trail user groups** to share information on **stream and riparian protection**, develop sign and brochure content and support trail, camping and staging area stewardship programs (Implementation Team, Trail Agreement groups; ongoing)

Action 4.3.2 Actively **promote use of the RAPP (Report All Poachers and Polluters) line** for all natural resource, wildlife and fisheries violations (local government, Province, Implementation Team; ongoing)

Action 4.3.3 Implement regulations or other measures to prevent accidents and protect ecosystem attributes from motorized boat recreation on the Kettle and Granby rivers (Federal government, local governments, implementation team; 2015)

Action 4.3.4 Develop and implement integrated road and recreational access plans to improve access management and staging in recreation settings (including backcountry,

4 TOWARDS PLAN IMPLEMENTATION

The final Watershed Management Plan will be accompanied by an implementation strategy prepared for the RDKB and Implementation Team, which will lay out the prioritization, funding sources, phasing and responsibilities for the recommended strategies and actions in the plan.

A key aspect of the implementation strategy is governance and funding of Plan implementation. There are several options for coordinating implementation, depending on the governance structure and nature of the lead organization. Options for further study include developing an informal network, a formal partnership, a non-profit society, or some form of watershed authority [3,19].

Recognizing the critical importance of developing the capacity and governance structure to support Plan implementation (Direction 1.1), and with the expectation that the RDKB in a leading role, there will be an immediate need to build capacity in the RDKB and partners for coordination, information management, special projects, and other implementation needs.

Funding for coordinating implementation could come from a combination of sources available to the RDKB, municipalities, and project partners, including: gas tax funds; climate mitigation and adaptation funds; outside granting organizations; and taxation, if required, where activities fall under existing or future municipal and/or electoral area services such as parks or environmental services. The present task of the Steering Committee is to establish a flexible framework for funding and coordinating implementation that can adapt to various available funding sources, including core funding for project coordination.

This draft Kettle River Watershed Management Plan is presented for consideration by all interested parties before it is finalized and presented to the RDKB Board of Directors. Feedback on the draft plan is requested by **Tuesday, October 14** and can be sent to the Project Coordinator at plan@kettleriver.ca / Box 1965, 2140 Central Avenue, Grand Forks BC V0H 1H0. A response form is available on the website at (<http://kettleriver.ca/what-we-are-planning/>) if you are interested in providing detailed responses or if you or your organization will be involved in some aspect of implementing the plan.

4.1 Overview of Phase 3 (Fall 2014- Summer 2017)

The following is a suggested course of action for the first three years of implementation.

1. Upon completion of the Plan, the RDKB Board of Directors will be asked to 'endorse' the Watershed Management Plan. This has three implications: a) the Board accepts the Plan as information to be considered in relevant discussions and decisions; b) the Board commits to implementing the strategies and actions, as appropriate through local government planning documents (i.e. official

community plans, zoning bylaws) and through partnerships and collaborations; and c) the Board will accept a role promoting Plan implementation through lobbying the Province and endorsing it for other local and regional organizations and stakeholders. The endorsed Plan will then be presented to other stakeholders, agencies and affected interests for their endorsement.

2. RDKB commits to continuing support for project coordination through three years of implementation. The roles, scope, timeline and funding for this coordination will be developed by the Steering Committee. The Project Coordinator will coordinate the Implementation Team and support each of the working groups, and act as a liaison between different stakeholder organizations, government agencies, and the Steering Committee. The Project Coordinator will also provide project management and delivery, as needed, for special projects undertaken during implementation.
3. The Steering Committee will create a Plan “Implementation Team” on the completion of the KRWMP that is composed of the chair & vice-chair of the Stakeholder Advisory Group, chair of the Steering Committee, and key representatives of the Advisory Group and each of the project working groups struck by the Steering Committee.
4. The Implementation Team will create a set of working groups (Governance & funding, science & monitoring, stewardship, water conservation, etc.) to coordinate and report on implementation of the strategies and actions as determined in the KRWMP and Implementation Strategy. The Governance & Funding work would be carried out by the Steering Committee with additional representatives of the Advisory Group.
5. The Implementation Team will continue with the existing governance structure for at least three years, or until the new partnership or entity is established. If the major stakeholders do not wish to create a new formal partnership or organization during that period, then the Plan implementation will continue as an informal network with RDKB as lead.
6. The Stakeholder Advisory Group will continue to meet at semi-annual or regular meetings to review progress, learn from project findings, and provide input on Plan implementation. At the transition from Plan completion to implementation, all members of the Advisory Group would be invited to continue in an advisory role for implementation, and other members of the public and stakeholder organizations would be asked to apply by the Steering Committee. This function could evolve into a watershed ‘round table’.
7. The Watershed Management Plan is intended to be a ‘living document’ that continues to inform and adapt to watershed management issues. Progress reports on key findings, strategies and actions will be provided annually, and the Plan will be reviewed and updated every three years.

REFERENCES

- [1] Ralph Archibald, Don Eastman, Rick Ellis, Brian Nyberg, *Trends in Renewable Resource Management in British Columbia*, J. Ecosyst. Manag. 14 (2014) 1–10. Available: <http://www.jem-online.org/index.php/jem/article/viewFile/556/498>.
- [2] BC Ministry of Environment, *Sensitive Ecosystems Inventories (SEI)*, (n.d.). Available: <http://www.env.gov.bc.ca/sei/>.
- [3] Oliver M. Brandes, Jon O’Riordan, *A Blueprint for Watershed Governance in British Columbia*, POLIS Project on Ecological Governance, Victoria, BC, 2014. Available: <http://poliswaterproject.org/blueprint>.
- [4] Destination British Columbia, *Thompson Okanagan: Regional Tourism Profile*, (2013) 1–4. Available: http://www.destinationbc.ca/getattachment/Research/Research-by-Region/Thompson-Okanagan/RegionalProfiles_Thompson-Okanagan.pdf.aspx.
- [5] Destination British Columbia, *The Value of Tourism in British Columbia: Trends from 2002 to 2012*, (2014). Available: <http://www.destinationbc.ca/cmspages/getfile.aspx?guid=bff8953c-5cf8-4d1e-b718-efa5cdb52690>.
- [6] Freshwater Fisheries Society of BC, *BC Freshwater Sport Fishing 2013 Economic Impact Report*, Science. 256 (2013). Available: http://www.gofishbc.com/docs/default-source/economic-analysis/2013_bc_freshwater_sport_fishing_economic_impact_report.pdf?sfvrsn=2.
- [7] The KRWMP Stakeholder Advisory Group, *Sustaining the flow: managing water supply and demand to support ecosystem health and community needs. Discussion Paper Three for the Kettle River Watershed Management Plan.*, Regional District of Kootenay Boundary, Grand Forks, BC, 2014. Available: <http://kettleriver.ca/what-we-are-planning/discussion-paper-3>.
- [8] Brenda LaCroix, Rebecca MacLean, *Christina Lake Management Plan*, Christina Lake Stewardship Society, Christina Lake, BC, 2005. Available: <http://lakesteward.ca/projects/watershed-Management-Plan.html>.
- [9] Okanagan Nation Alliance, *The Syilx People*, (2010). Available: <http://www.syilx.org/who-we-are/the-syilx-people/>.
- [10] Okanagan Nation Alliance, *Our Syilx Water Project*, (2014). Available: <http://www.syilx.org/operations/natural-resourcesland-use/water/our-syilx-water-project/>.

- [11] Patricia L. Olsen, Nicholas T. Legg, Timothy B. Abbe, Judith K. Radloff, *A Methodology for Delineating Planning-Level Channel Migration Zones*, Washington State Department of Ecology, Olympia, Washington, 2014. Available: <https://fortress.wa.gov/ecy/publications/SummaryPages/1406025.html>.
- [12] Regional District of Kootenay Boundary, *Kettle River Watershed Management Plan Terms of Reference*, Management. (2010). Available: http://kettleriver.ca/wp-content/uploads/2012/04/kettleriver_tor.pdf.
- [13] Regional District of Kootenay Boundary, *The Kettle River Starts Here*, (2014). Available: <http://kettleriver.ca>.
- [14] Joanne Sasvari, *It takes a community: despite the odds, Okanagan salmon is back*, Vancouver Sun. (2014). Available: <http://www.vancouversun.com/life/takes+community+Despite+odds+Okanagan+salmon+back/10073276/story.html>.
- [15] Sinixt Nation, *Sinixt Territory*, (2013). Available: <http://sinixtnation.org/content/sinixt-territory>.
- [16] Summit Environmental Consultants, *Kettle River Watershed Management Plan: Phase 1 Technical Assessment*, Regional District of Kootenay Boundary, Grand Forks, BC, 2012. Available: <http://kettleriver.ca/state-of-watershed/>.
- [17] The KRWMP Stakeholder Advisory Group, *Towards the Kettle River Watershed Management Plan: A Vision for the Kettle River Watershed*, Regional District of Kootenay Boundary, Grand Forks, BC, 2013. Available: <http://kettleriver.ca/what-we-are-planning/discussion-paper1/>.
- [18] The KRWMP Stakeholder Advisory Group, *Stakeholder Engagement and Survey Results: Summary and Key Themes for Discussion*, Regional District of Kootenay Boundary, Grand Forks, BC, 2013. Available: <http://kettleriver.ca/what-we-heard/>.
- [19] The KRWMP Stakeholder Advisory Group, *Working Together: Growing our Capacity for Watershed Stewardship in the Kettle River Watershed*, Regional District of Kootenay Boundary, Grand Forks, BC, 2014. Available: <http://kettleriver.ca/what-we-are-planning/discussion-paper-2-working-together-growing-our-capacity/>.
- [20] The KRWMP Stakeholder Advisory Group, *Water Quality and Source Water Protection: Issues and Strategies in the Kettle River Watershed. Discussion Paper Four for the Kettle River Watershed Management Plan*, Regional District of Kootenay Boundary, Grand Forks, BC, 2014. Available: <http://kettleriver.ca/what-we-are-planning/discussion-paper-4>.

- [21] The KRWMP Stakeholder Advisory Group, *Stepping back from the water: managing wetlands, riparian areas and floodplains in the Kettle River watershed*, Regional District of Kootenay Boundary, Grand Forks, BC, 2014. Available: <http://kettleriver.ca/what-we-are-planning/summary-plan>.
- [22] Western Water Associates, *Review of Ambient Groundwater Quality Monitoring Networks in the Okanagan Kootenay Region*, BC Ministry of Forests, Lands and Natural Resource Operations, Penticton, BC, 2011. Available: <http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=23602>.
- [23] Tara White, *Kettle River Streamflow Protection Plan: Presentation to KRWMP Advisory Group, November 7 2013*, (2013).

APPENDICES

A. PLANNING TEAM

Steering Committee	
Bill Baird (Chair)	Electoral Area of West Boundary
Grace McGregor	Electoral Area of Christina Lake
Roly Russell (Irene Perepolkin)	Electoral Area of Rural Grand Forks
Brian Taylor	City of Grand Forks
Nipper Kettle	City of Greenwood
Marguerite Rotvold	Village of Midway
Stakeholder Advisory Group	
Roly Russell (Chair 2014 – ongoing)	Electoral Area of Rural Grand Forks
Grace McGregor (Chair 2012-2014)	Electoral Area of Christina Lake
Lorri Harpur	West Boundary Agriculture -Kettle River Stockmen's Assn.
Roly Russell (Chair 2014 – ongoing)	East Boundary Agriculture – Grand Forks and Boundary Regional Agricultural Society (2012-2013) Electoral Area of Rural Grand Forks (2014-)
Doug Noren	InterFor
Fred Marshall	Small Business Forestry – West Boundary
Mike Hooge (2012)	Small Business Forestry – East Boundary
Paul Plocktis Alternate: Darryl Arsenault	Tourism – Big White Ski Resort Limited
James Wilson	Tourism / Small Business – Regional Chamber of Commerce
Earl Lehmann (2012-2013)	Recreation – Kettle Valley Wildlife Association
Rick Simpson Alternate – Brad Siemens & Brian Hancock	Recreation – Grand Forks Wildlife Association and BC Wildlife Federation Region 8 and Inland Fisheries Committee
Steve Babakaiff	Irrigation - Sion Improvement District
Jenny Coleshill	Conservation - Granby Wilderness Society
Brenda LaCroix	Conservation - Christina Lake Stewardship Society
Paul Manson - Alternate: Sonny Banjac	Energy – Powerhouse Developments Inc.
John Jewitt	Mining – Boundary Mining Association (President) Alternate:
James Pepper	First Nations – Okanagan Nation Alliance
Vacant	Nursery
Peter Shilton (2012-2013)	Industry - Roxul
Victor (Sonny) Lockhart	Beaverdell Resident
Dawn Guido	FLNRO (Grand Forks)
Larry Jmaiff	Resident-at-Large (Grand Forks)
George Dagg	Resident-at-Large (Rock Creek)
Gary Schierbeck	Resident-at-Large (Midway)

Kathy O'Malley	Resident-at-Large (Christina Lake)	
Dick Dunsdon	Resident-at-Large (Midway)	
Technical Advisory Committee		
Conrad Pryce	Section Head Allocation	MFLNRO (Penticton)
Michael Epp	Water Stewardship	MFLNRO (Vernon)
Tara White	Senior Fish Biologist	MFLNRO (Penticton)
Ted Van der Gulik (2011-2013)	Senior Engineer	Ministry of Agriculture (Abbotsford)
Carl Withler	Resource Stewardship Agrologist	Ministry of Agriculture (Kelowna)
Dawn Guido	BC Timber Sales Forester	FLNRO (Grand Forks)
Cheryl Unger	Drinking Water Protection Officer	Interior Health (Grand Forks)
Dean Watts	Water Use Biologist	DFO
Sasha Bird	Manager of Technical Services and Utilities	City of Grand Forks
Murray Knox	Manager	Grand Forks Irrigation District
Heidi McGregor (2011-2012)	Aquatic Habitat Biologist	Okanagan Nation Alliance
Jean Parodi	Water Quality Program	Washington Department of Ecology
Rusty Post	Watershed Planning Group	Washington Department of Ecology
Mark Andison	Director of Planning and Development	RDKB
Jeff Ginalias	Assistant Planner	RDKB
Bill Baird	Chair, Steering Committee	RDKB
Riparian Working Group		
Jenny Coleshill	Granby Wilderness Society	
Lisa Tedesco	Forests, Lands and Natural Resource Operations	
Doug Noren	Interfor	
Carl Withler	Ministry of Agriculture	
Dawn Guido	BC Timber Sales	
Brenda LaCroix	Christina Lake Stewardship Society	
Fred Marshall	Small forestry / Rancher	
Barb Stewart	Boundary Invasive Species Society	
Randy Trerise	BC Assn. Reg. Professional Foresters	
Michael White	Forests, Lands and Natural Resource Operations	
Darryl Arsenault	Big White Resort and Golder Associates	

- Project Coordinator (contract) – Graham Watt, Cordilleran Ecological
- RDKB lead – Mark Andison (2010-2014). Donna Dean (2014 – ongoing).