



# Kettle River Watershed Management Plan

VERSION 1.0 - NOVEMBER, 2014

*The Kettle River starts here.*



*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.*

## **Acknowledgements**

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Thank you to RDKB and municipal staff, Stakeholder Advisory Group, Technical Advisory Committee and other participants for your ideas, networking and in-kind support in developing this work.

Cover Photo: "Facing upstream" – Roly Russell  
Design by [heffley.ca](http://heffley.ca)

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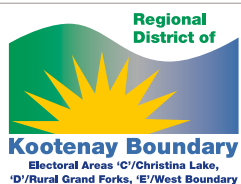
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*Photo by Christopher Heffley*



## Executive Summary

The Regional District of Kootenay Boundary (RDKB) has developed 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 Plan presents a vision for the Kettle River watershed that is drawn from this 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 affect 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 Plan answers these challenges by presenting four broad strategies containing eighteen directions for management and fifty-nine actions to be undertaken by stakeholders in collaboration over the coming years. It builds on the analysis and discussions in the Phase 1 Technical Report<sup>1</sup> and five issue-specific papers developed and shared in 2013 and 2014.<sup>2</sup>

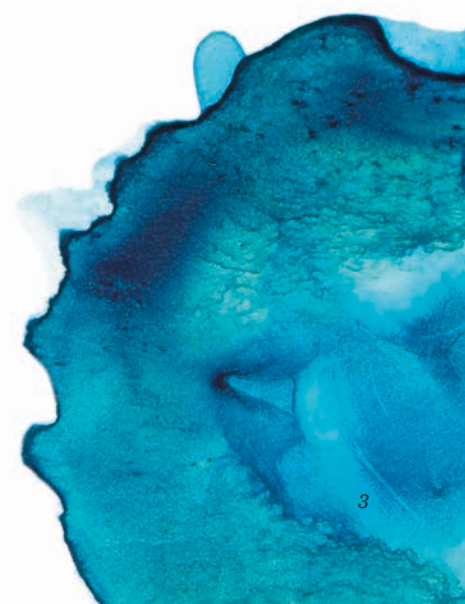
The first overall strategy, and the highest priority, is to increase community understanding, support and capacity for stewardship of the Kettle River watershed. This includes developing a governance and funding structure to implement the plan, growing understanding and awareness through a broad education 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 all of our connections to water.

The key to success of a watershed plan is the dedication and ability to carry out the actions. The Regional District of Kootenay Boundary Directors for the Boundary Electoral Areas have committed to funding coordination and leading the next three years of implementation. The work will be governed by the Steering Committee and an Implementation Team that is drawn from the Advisory Group and representatives of key organizations. A watershed ‘Round Table’ committee will periodically review progress and provide advice on plan implementation, review, and priorities for further work.

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

<sup>2</sup> Discussion papers are all available at [kettleriver.ca/what-we-are-planning](http://kettleriver.ca/what-we-are-planning)



# 1 Introduction

The Regional District of Kootenay Boundary (RDKB) has developed 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 review of current watershed conditions and a foundational analysis of water supply and demand [18]. It built on several decades of monitoring and management planning that was mainly concerned with water supply, aquifer quality and fisheries management.<sup>3</sup>

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 [14], the Plan is intended to provide actions to be undertaken by the RDKB and other stakeholders which:

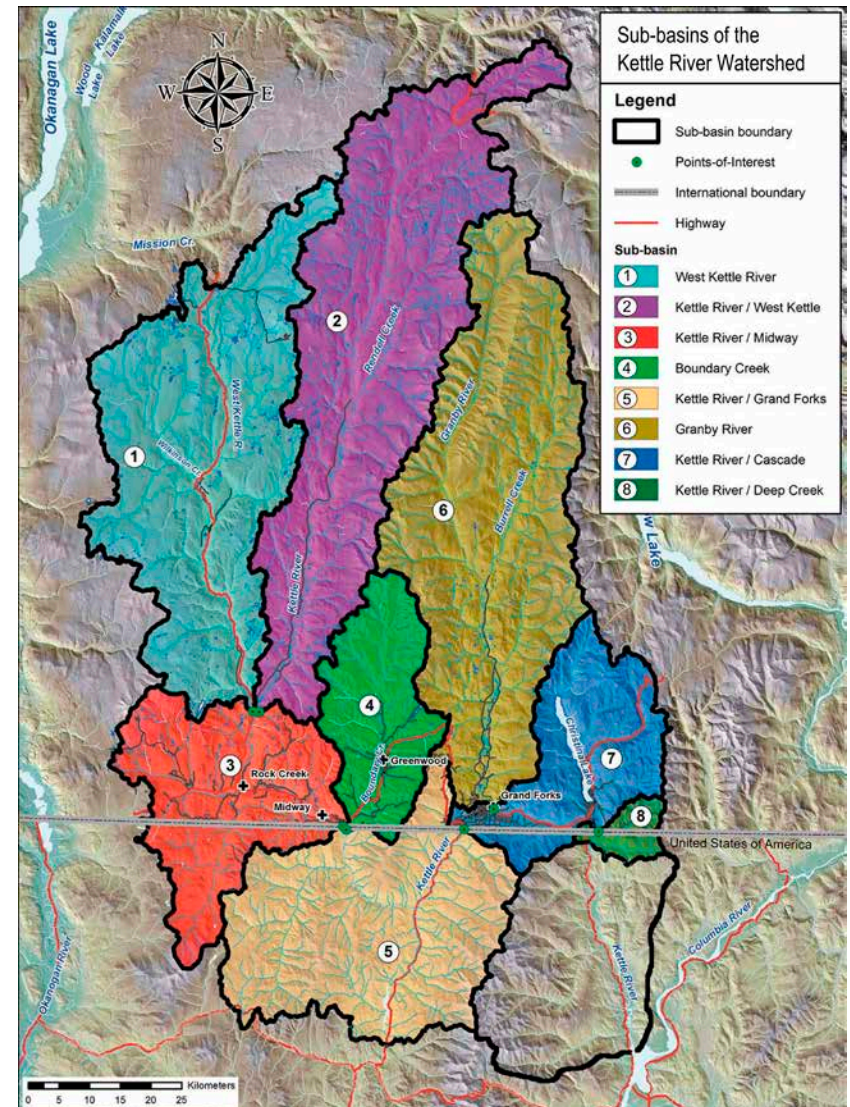
- Balance water supply and use today and in the future;
- Protect water quality and the ecological function of the system;
- Increase the understanding of the Kettle River Watershed and the issues associated with it;
- Promote an ethic of water conservation throughout the watershed; and
- Build support for watershed management initiatives through thorough public engagement.

<sup>3</sup> Recent key documents at [kettleriver.ca/state-of-watershed](http://kettleriver.ca/state-of-watershed)

This Plan presents a vision for the Kettle River watershed that addresses challenges 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 was supported by a Stakeholder Advisory Group (Advisory Group; Appendix) representing a broad range of interests from across the Boundary region and other areas. Over the past year, the Advisory Group and other stakeholders have developed five discussion papers focusing on watershed management challenges, strategies and opportunities, organized around the strategies outlined in Section 3 of this document:

- Discussion Paper 1 – Towards the Kettle River Watershed Management Plan: A Vision for the Kettle River Watershed [19]
- Discussion Paper 2 – Working together: Growing our capacity for watershed stewardship in the Kettle River Watershed [21]
- Discussion Paper 3 – Sustaining the flow: Managing water supply and demand to support ecosystem health and community needs [22]
- Discussion Paper 4 – Water Quality and Source Water Protection: Issues and Strategies in the Kettle River Watershed [23]
- Discussion Paper 5 – Stepping Back From the Water: Managing Wetlands, Riparian Areas and Floodplains in the Kettle River Watershed [24]





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 [20];
- 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;
- Regular columns in local newspapers and an active website and social media presence to keep the watershed plan in the public view [15]; and
- Draft Plan review period for public, stakeholders, and government agencies.

Going forward, the Steering Committee seeks collaboration with all parties with interests in the Kettle River watershed, including residents, government agencies, other stakeholders, and Aboriginal Peoples and First Nations. In particular, the Steering Committee looks forward to future engagement with First Nations in order to understand and incorporate important traditional knowledge, information, perspective, and protocol.

The issues, strategies and actions presented in this Plan have been reviewed in depth by the Advisory Group and are presented for consideration and use by individuals, agencies and groups with an interest in the Kettle River Watershed. All stakeholder groups and government agencies are asked to endorse the Plan and to participate in or support its implementation.

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 is intended to provide guidance for watershed management and does not present guidelines or standards, nor commit agencies to actions which conflict with their area of jurisdiction. Instead, it invites new ways of collaboration to achieve more than could be done alone.



## Watersheds & 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 and human components including upland plant communities, wetlands, riparian areas, and aquifers. 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 working in cooperation. Their success depends on building support with the public and all affected stakeholders, developing scientific understanding while learning from citizens, and building capacity for making and carrying out decisions [21]. Watershed management plans also consider the interaction and mutual influence of upland land and water use, riparian and wetland ecosystems, and in-stream and groundwater conditions.

Figure 1. The water cycle

## 2 A Vision for the Kettle River Watershed










The vision statement and goals are 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 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, supports 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).

Icon <sup>4</sup>	#	GOAL
	1	Healthy aquatic ecosystems sustain native biodiversity and aquatic life
	1a	Healthy flow regimes and water levels
	1b	Excellent water quality
	1c	Excellent quality habitat in wetlands, riparian areas and associated uplands
	2	Safe and secure water supports healthy communities
	2a	Safe and secure drinking water
	2b	Safe water-based recreation and quality leisure and recreational activities
	2c	Community enjoyment and expression of spiritual, cultural, heritage and aesthetic values
	2d	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

<sup>4</sup> Nicholas Mollet (no date). Map Icon Collection. Creative Commons 3.0 Attribution and Share Alike. [mapicons.nicolasmollet.com](https://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 [20].

Over 70% 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. This sense of caring is often reflected in the management choices of individual landowners, recreation enthusiasts, municipal governments and resource users and tenure holders, although there is much to be done in working together to better manage resources and environmental values.

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 peoples of the Interior Plateau [8,11]; the eastern watershed is part of Sinixt territory [8,17]; and the eastern edge borders Ktunaxa territory.

The health of the lands and waters here continues to be of critical importance for First Nations and Aboriginal Peoples. 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 [12].” The Okanagan Nation Alliance has also been instrumental 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 [16].

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 are not available for the Boundary, there is no doubt that tourism, recreation and water-based amenities 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 [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.<sup>5</sup>

<sup>5</sup> [poliswaterproject.org/sites/default/files/watersheds2014/Watersheds2014Consensus\\_FINAL.pdf](http://poliswaterproject.org/sites/default/files/watersheds2014/Watersheds2014Consensus_FINAL.pdf)



Figure 2. Shawn Lockhart carefully releases a Rainbow Trout (C. Lockhart)

*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.*





Photo by Christopher Heffley

## 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 the goals described above. 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 [18], 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 objectives [20]. Respondents were least concerned about impacts to amenity and aesthetic values of the watershed, and most concerned about water quantity as well as wastewater and stormwater impacts on surface water.

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 industrial forestry, illegal dumping, and overall degradation of watershed function. The overall impacts affect water quality and quantity, habitat and 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 impacts from some recreation use is far too high [20]. For instance, 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 [26], 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.



TOPIC	CHALLENGE
Low Flows	<b>Seasonal low river flows affect the reliability of water supplies and aquatic ecosystem health.</b>
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. There has been a small but significant decrease in the volume of low flows since water monitoring began in 1929 [22].
Forest Cover	Decreasing forest and natural vegetation cover can contribute to higher, earlier spring floods, higher overall flow and quicker stream flow response to precipitation, especially at the local scale. Decreasing vegetation cover can worsen droughts and exacerbate low flow conditions [22].
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. Future water demand in dry years could cause extended extreme low flows or zero flow periods if comprehensive water conservation, regulations, and water storage strategies are not instituted [22].
Cumulative Effects	<b>Cumulative changes to the landscape and water systems impair water quality, aquatic ecosystems, and recreational and amenity values.</b>
Riparian Impacts	Human activities including forest harvest, road development / use, range and agricultural practices, and motorized recreational activities increase erosion, damage riparian vegetation and decrease riparian and wetland function in filtering pollution and sediment [24]. Sediment is one of the main water quality concerns and has been increasing in recent reports [23]. Road/stream crossings are a major source of sediment, especially if there is poor maintenance. Analysis of compiled road and stream data has shown there may be up 15,000 km of resource roads and up to 11,000 road/stream crossings in the Canadian portion of the watershed.
Fluvial Impacts	Increased sediment and higher peak flood flows cause changes to floodplains and river channels, harming fish habitat and damaging property and infrastructure [24]. Migration of river channels is threatening farmland and increasing erosion in floodplain sites that are cleared of riparian forests.
Development Impacts	Residential, industrial, and recreational property development encroaches on shorelines and decreases riparian and wetland area and function, while increasing risks of flood damage. This also increases pollution from runoff, septic systems, and dumping of garbage and yard waste [24].
Fisheries Impacts	Cumulative impacts of riparian degradation, sedimentation, invasive species and high water temperatures impact fish population health. Overfishing prevents native fish stocks from recovering during periods of better flows and water quality [22, 23, 24].
Pollution Impacts	Agricultural, urban, industrial and other land management practices increase pollution of groundwater and surface water, which can threaten human and aquatic ecosystem health [23]. Nitrate-nitrogen levels were previously detected at high levels in portions of the Grand Forks Aquifer, but are now stable or declining in most sites [25]. Water quality measured on the Kettle River is 'generally good,' though some years are only in fair conditions and there have been increasing trends in sediments and fecal coliforms [23].
Capacity Constraints	<b>The community's ability to respond to watershed issues is constrained by capacity, money, policy support and public understanding.</b>
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 [21].
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 [21].
Understanding/Commitment	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 [21]. Of the 10 water suppliers contacted, only one had a comprehensive water conservation plan addressing leak repair, sprinkler regulations, conservation education/incentives and metering (City of Grand Forks). Most focused mainly on infrastructure maintenance and sprinkling regulations.





*Photo by Lorne Smithson*

# 3 Strategies, Directions and Actions

This section presents the strategies, directions and actions considered by the Advisory Group. Strategies and directions were first outlined in the five discussion papers, and are expanded on with additional actions to be undertaken by specific agencies or organizations, with suggested timelines over the first phase of implementation (2014-2017).

The 'Implementation Team' is a key group in the coordination and monitoring of the actions undertaken by the RDKB and other agencies and groups [21]. The Implementation Team will be composed of a partnership of the RDKB, other government agencies, local organizations and individuals, and will evolve into a more formal organization or partnership following a governance study by the Implementation Team.

This section discusses an overall approach to achieving goals and addressing challenges with a set of strategies, management directions and actions (defined here using the numbering format and style in this section).

## Capacity & Governance

- *Build capacity and mandate of network and organization*
- *Implement a Watershed Education Strategy*
- *Implement a framework for monitoring, reporting, and watershed plan review*

## Water Conservation

- *Water conservation plans for suppliers*
- *Information and support for water users*
- *Demonstration sites*

## STRATEGY

STRATEGIES ARE OVERALL STATEMENTS OF INTENT ABOUT HOW WE AS A COMMUNITY SHOULD ADDRESS THE CHALLENGES AND ACHIEVE THE VISION.

- *Outcomes have been identified for the desired future conditions intended to result from implementing the strategies, management directions and actions. Further information will be required to translate outcomes to measurable objectives.*

**DIRECTION 0.1.** DIRECTIONS SPECIFY WHAT NEEDS TO BE ACCOMPLISHED, CHANGED, IMPROVED OR MAINTAINED IN ORDER TO MEET THE WATERSHED GOALS.

**ACTION 0.1.1** Actions describe a specific activity that will be taken by specified organizations, agencies or sectors with the knowledge or mandate to implement the direction and contribute to achieving the goal. The Advisory Group requests the specified organizations to consider their responsibility, scope of activity, and role(s) in implementing the actions, within the timeline indicated over the next three years or beyond.

## Water Quality

- *Improve water quality monitoring*
- *Develop water quality objectives*
- *Improve practices impacting water quality*
- *Undertake increased source water protection*

## Watershed Stewardship & Restoration

- *Watershed restoration strategy*
- *Funding framework for conservation and stewardship*
- *Work in partnership to restore damaged areas*



# STRATEGY 1

*Increase community understanding, support and capacity for stewardship of the Kettle River Watershed.*

Increasing understanding, support and capacity for stewardship is the foundation of success in watershed planning. This Plan gives considerable weight to developing governance, building policy support, and improving both the scientific information base and public understanding. To carry out these strategies, the Advisory Group recommends the establishment of a watershed organization, partnership or authority that directly follows from and builds on the current planning work (*referred to as the watershed entity*). To that end, we have identified the following outcome related to governance and capacity (*adapted from Discussion Paper 2 [21]*).

**DIRECTION 1.1.** DEVELOP LEADERSHIP AND GOVERNANCE THROUGH THE DEVELOPMENT OF A GOVERNANCE FRAMEWORK FOR WATERSHED DECISION-MAKING, PLAN IMPLEMENTATION AND REVIEW.

**ACTION 1.1.1** Establish a KRWMP Implementation Team to coordinate implementation of the Plan among stakeholders; act as a bridge to other sectors and organizations; monitor and report on progress made; review new information; and review and update the Plan on a three-year basis. (*RDKB and Steering Committee; 2014*)

**ACTION 1.1.2** Study and recommend governance model for long-term watershed management that includes greater sharing in decision-making for water management, in consultation with the Province and community members (*Implementation Team, Province; 2015*)

**ACTION 1.1.3** Develop a long-term funding model to improve capacity for planning, implementation, and monitoring, and align activities and funding among stewardship groups, conservation funding sources, and government agencies to support conservation of water and aquatic ecosystems (*Implementation Team, in collaboration with local government and Province; 2015*)

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

**ACTION 1.1.5** Ensure engagement and collaboration among local government and First Nations regarding regional water strategy development, restoration programs, and cultural initiatives in the Kettle River watershed (*RDKB, local government, First Nations [Okanagan Nation Alliance, Ktunaxa Nation Council, Sinixt Nation Society], and Implementation Team; 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 (*i.e. ecosystems, aquifers and other watershed components*) 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 (*Implementation Team, Province; 2015*).

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

**ACTION 1.2.4** Quantify ecosystem goods and services<sup>6</sup> provided by watershed components (*water bodies, riparian areas and wetlands, grasslands, forests*) (*Implementation Team, Province; 2017*).

**ACTION 1.2.5** Develop and implement a watershed education strategy to translate watershed science and monitoring results as well as improving overall watershed literacy (*Implementation Team, educational organizations [School District 51, Selkirk College]; 2015*)

Communities in the Kettle River watershed, through the watershed entity, will have a fundamental role in the sustainable management of water and related resources in the region, including emergency planning, resource development projects, and other concerns. This role will be enabled in legislation and have a broad base of support, with active representation by all interested stakeholders, government agencies, and First Nations. The entity will have a sustaining funding base drawn from a diversity of sources that enables ongoing coordination in the fulfilment of priority actions.

This strategy contains four directions and fourteen actions to develop leadership and governance, improve understanding, build support, and increase capacity for watershed stewardship.

**Additional outcome:**

- *Watershed residents of all ages will have an increased awareness of watershed issues and watershed function, and will demonstrate increased watershed stewardship through actions and practices on private and publicly managed lands.*

**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 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; 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*).

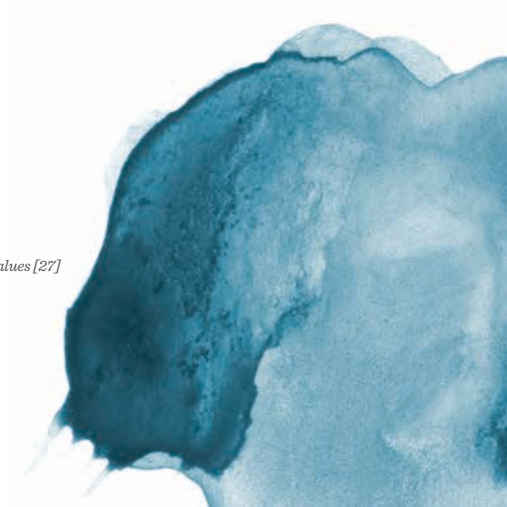
**DIRECTION 1.4.** IMPROVE CAPACITY FOR WATERSHED STEWARDSHIP.

**ACTION 1.4.1** Enable increased funding for conservation and stewardship on private land by developing a local conservation fund that can also be used as a source of matching funds in funding proposals (*Implementation Team, Boundary Habitat Stewards<sup>7</sup>; 2015*)

**ACTION 1.4.2** Create a water supply working group to pool expertise and other resources and meet regularly to discuss source water protection and water supply management, share learning and resources, and report on links with watershed management (*Implementation Team, municipalities, water suppliers; 2015*)

<sup>6</sup> Ecosystem goods and services are the benefits (to humans and other life forms) arising from the ecological functions of healthy ecosystems, for instance clean air, high quality water, non-timber forest products, and social and cultural values [27]

<sup>7</sup> The Boundary Habitat Stewards is a collaboration between local conservation organizations and individuals including Granby Wilderness Society, Christina Lake Stewardship Society, Boundary Invasive Species Society, Grand Forks Wildlife Association, RDKB and BC Forests, Lands and Natural Resource Operations.





# 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 twenty-two 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 AND SUPPORT FOR 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 water use alterations to flow regimes (Province, Implementation Team, water suppliers and local organizations; 2015 and ongoing).

**ACTION 2.1.2** Complete a comprehensive Environmental Flow Needs assessment<sup>8</sup> 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 assessment<sup>9</sup> to characterize current conditions along the main stem of the West Kettle, Kettle, and Granby Rivers (Province, university researchers; 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, Christina Creek); and in sites downstream of proposed new forest harvest, mining and road-building activities. (Province, water suppliers, Implementation Team; 2017).

**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).

## **DIRECTION 2.2.** BUILD POLICY SUPPORT FOR MANAGING WATER QUALITY AND ENVIRONMENTAL FLOWS

**ACTION 2.2.1** 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, IHA, and permit holders; 2016 for sites with available long-term data, 2020 for additional sites*). Outcomes:

**ACTION 2.2.2** Consider legal designations to protect environmental flows, water quality and temperature in the Kettle River and tributaries (*Fish Protection Act, Forests and Range Practices Act, Water Sustainability Act*) (Province, with support from Implementation Team; 2016).

**ACTION 2.2.3** Prioritise the high-demand aquifers of the Kettle River watershed for groundwater licensing and regulation in support of maintaining environmental flows (Province; during implementation of the *Water Sustainability Act*)

**ACTION 2.2.4** Manage the water allocation, permitting, licensing and approval process (*including groundwater*) to support environmental flow requirements and water quality objectives (Province; ongoing)

## **DIRECTION 2.3.** IMPROVE WATER CONSERVATION AND INCREASE EFFICIENCY AND PRODUCTIVITY OF WATER USE IN ALL SECTORS

**ACTION 2.3.1** Identify, implement and report on water conservation goals and measures (*infrastructure renewal, education, incentives, regulations and pricing*) in water conservation plans for water suppliers (*with support for institutional, commercial, agricultural and industrial water users*) (water suppliers, Province, Implementation Team; ongoing).

#### Key outcomes include:

- Water quality will be rated good or better for all water quality index parameters, for instance surface and groundwater sources could be drinkable with minimal source treatment necessary.
- Negative impacts on drinking water sources, fish and aquatic life, or recreational enjoyment of water will be minimized, and measured amounts of nutrients, pathogens and sediment at water quality monitoring sites will decrease where possible.
- All water suppliers will develop and adopt water conservation strategies by 2018
- At least 50% of new water demand will be met by water conservation by 2020

#### **DIRECTION 2.4.** IMPROVE WATER SECURITY BY DEVELOPING AND IMPLEMENTING DROUGHT MANAGEMENT PLANS AND WATER STORAGE STRATEGIES

**ACTION 2.4.1** Establish and implement drought management strategies that identify land and water management responses during periods of extreme low flows (Province, water suppliers group, Implementation Team; 2017)

**ACTION 2.4.2** Identify water storage needs based on projections of future supply, demand, conservation and environmental flow needs. Determine operable storage capacity required for augmenting flows (Implementation Team, water suppliers, Province; 2015).

**ACTION 2.4.3** Identify potential water storage sites, prioritize for further study, and calculate water storage potential for high priority sites. Include quantification of water storage 'service' of upland ecosystem and land management options (soil management, forest cover). (Implementation Team, water suppliers, Province; 2017)

**ACTION 2.4.4** Develop water storage sites where the community and affected parties deem essential and appropriate (lead as appropriate, Province; ongoing)

#### **DIRECTION 2.5.** IMPROVE WATER QUALITY IN RELATION TO POINT AND NON-POINT SOURCE POLLUTION

**ACTION 2.5.1** Identify, implement and report on water quality improvements for point (i.e. stormwater, wastewater, and other discharge sites) and non-point (i.e. road management, development, agriculture) sources (Implementation Team, municipalities / water treatment facilities, industry sectors, Province; ongoing)

**ACTION 2.5.2** Consider strategies for augmenting or replacing wastewater treatment outfalls with alternative land-based treatment (treatment wetlands, irrigation of biomass plantings)<sup>10</sup> to reduce nutrient loads entering water bodies during low flows (municipalities, Implementation Team; 2017).

**ACTION 2.5.3** Adjust permitting, approvals, and land use by-laws to support the remediation of areas where water quality is not meeting objectives (Province and local governments; ongoing).

#### **DIRECTION 2.6.** PROTECT DRINKING WATER SUPPLIES THROUGH SOURCE-WATER PROTECTION ASSESSMENT, ANALYSIS AND PLANNING

**ACTION 2.6.1** Continue risk screening and assessment activities in collaboration with local water suppliers and watershed partnerships (Interior Health Authority, Water Suppliers, Implementation Team; ongoing)

**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, Province, Environmental Farm Plan, Implementation Team; 2016).

**ACTION 2.6.4** Consider source water protection, water conservation and aquifer recharge protection in local government planning documents (RDKB, municipalities, with support of Implementation Team; ongoing).

<sup>8</sup> Including flow objectives for fish (including non-game fish), aquatic ecosystem, water quality, infrastructure and recreation

<sup>9</sup> Synoptic water quality assessments 'follow' the water downstream from headwaters to outlet, sampling water quality at the confluence of major tributaries to characterize changes.

<sup>10</sup> [publications.gc.ca/collections/collection\\_2012/rncan-nrcan/Fo147-1-11-2012-eng.pdf](https://publications.gc.ca/collections/collection_2012/rncan-nrcan/Fo147-1-11-2012-eng.pdf)



## 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 fourteen 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 communities on shorelines and floodplains.

### **DIRECTION 3.1.** IMPROVE UNDERSTANDING OF WATERSHED HEALTH AND FUNCTION, INCLUDING FLOODPLAIN DYNAMICS, IN THE KETTLE RIVER WATERSHED

**ACTION 3.1.1** Create a Sensitive Ecosystem Inventory<sup>11</sup> for the Kettle River Watershed, with particular emphasis on identifying wetlands and riparian areas (*Province, local government, Implementation Team; 2016*).

**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 government, Province, Implementation Team; 2017*).

**ACTION 3.1.3** Consider undertaking a planning-level Channel Migration Zone (CMZ) [13] 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, 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*)

**ACTION 3.1.5** Undertake a literature review and study of forest harvest impact on stream temperature in headwater streams and review measures for mitigating effects (*Province, forestry industry, Implementation Team; 2016*)

**ACTION 3.1.6** Characterize cumulative impacts of road system (including highways, public roads, and resource roads)<sup>12</sup> development and maintenance and develop management objectives and measures for reducing impacts (*Province, resource users, Implementation Team; 2017*).

### **DIRECTION 3.2.** BUILD SUPPORT AND CAPACITY FOR IMPROVING WATERSHED FUNCTION

**ACTION 3.2.1** Utilize the findings of the forthcoming Riparian Threat Assessment and subsequent floodplain, erosion and channel migration studies to 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. Consider establishment of a) *Development Permit Areas for protection of development from hazardous conditions*; b) *Tree Cutting Permit Areas where there is evidence of the existence of the hazard*; c) *other environmental protection measures, where appropriate* (*RDKB, local government, with support of Implementation Team; 2015*).

**ACTION 3.2.2** Update and implement, as appropriate and through municipal and Electoral Area planning processes, riparian area development permit guidelines (*similar in intent to those previously drafted for Electoral Area C/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; 2015*)

**Key outcomes include:**

- Cover of native trees and shrubs in riparian areas and floodplains will be conserved and restored towards natural levels
- Increase in permanent roads will be minimized and support will be provided for proper maintenance, deactivation, and rehabilitation of roads where identified
- Impacts of pavement and impervious surfaces will be limited through low impact development and best management practices throughout the Plan area
- The areal extent and ecosystem integrity of aquatic and riparian habitats will be increased throughout the Plan area as represented in protected areas in the watershed

**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*).

**ACTION 3.3.2** Consider the extension and integration of ecosystem-based resource management<sup>13</sup> to increase protection and improvement of biodiversity and ecosystem services (*Province, resource users and tenure holders, BC Timber Sales, Implementation Team; ongoing*).

**ACTION 3.3.3** Develop a Watershed Restoration Program to strategically prioritize, design, fund and implement conservation and restoration projects for wetlands, riparian areas, and in-stream habitat (*Implementation Team, Province, Boundary Habitat Stewards; 2015*).

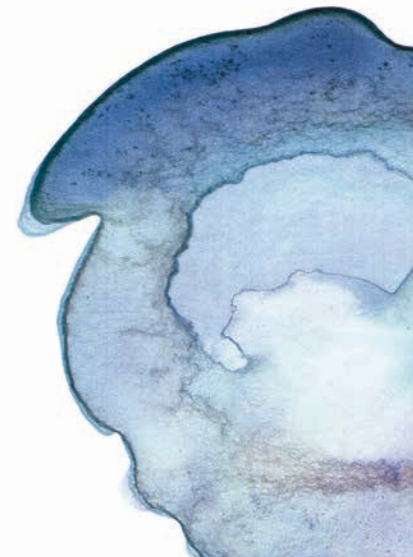
**DIRECTION 3.4.** PROTECT SOIL AND IMPROVE SOIL HEALTH TO IMPROVE WATER RETENTION AND DECREASE EROSION

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

<sup>11</sup> 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].

<sup>12</sup> A resource road is defined as roads utilized by motorized vehicles on Crown land, and roads on private lands authorized by government, but not including public roads, Mines Act permitted roads, and private roads [10].

<sup>13</sup> Ecosystem-based management (EBM) is an integrated, science-based approach to the management of natural resources that aims to sustain the health, resilience and diversity of ecosystems while allowing for sustainable use by humans of the goods and services they provide. Resources are managed in an integrative manner with holistic consideration of cumulative effects [7,9].





## STRATEGY 4 *Maintain or enhance recreational, cultural and amenity values*

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 three directions and nine 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 AND CELEBRATE CULTURAL CONNECTION TO THE WATERSHED

**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 place-name, cultural and heritage use studies to map and share information on places of significance in the watershed (*Implementation Team, Okanagan Nation Alliance, heritage and cultural organizations, Province; 2016*)

**ACTION 4.1.3** Recognize and celebrate cultural connection to water and the river through collaboration with arts, heritage, First Nations and recreational organizations (*Implementation Team, local and stakeholder organizations, First Nations; ongoing*)

### **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** Actively promote use of the provincial environmental hotlines (*i.e. RAPP / Report All Poachers and Polluters, Natural Resource Officer*) for all natural resource, wildlife and fisheries violations, and assess user experience for usability and perceived utility (*local government, Province, Implementation Team; ongoing*)

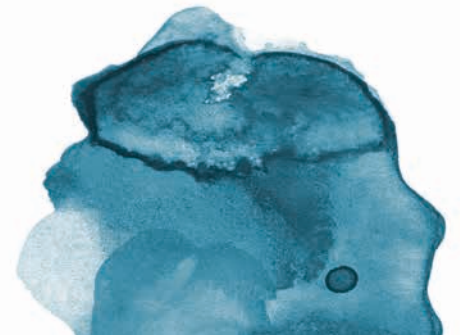
### **DIRECTION 4.3.** IMPROVE SUPPORT FOR PROTECTED AREAS AND INCREASE RESPONSIBLE RECREATION

**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** Develop and implement integrated road and recreational access plans to improve access management and limit impacts in recreational settings (*including backcountry, settled area and water based recreation*) (*Province, local governments, recreation and trail groups; ongoing*)

**ACTION 4.3.3** Implement regulations or other measures to prevent user conflicts 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** Implement park and protected areas master planning in Plan Area and manage protected areas in ways that support watershed management goals (*RDKB and municipalities, Province; ongoing*)



# 4 Towards Plan Implementation

The Kettle River Watershed Management Plan is accompanied by an implementation strategy prepared for the RDKB and Implementation Team, which includes the prioritization, phasing, potential funding sources, linking, 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 that depend on the governance structure and requirements of the lead organization. Further studies need to be conducted to consider governance options such as informal networks, formal partnerships, non-profit societies, or some other form of watershed authority [3,21].

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

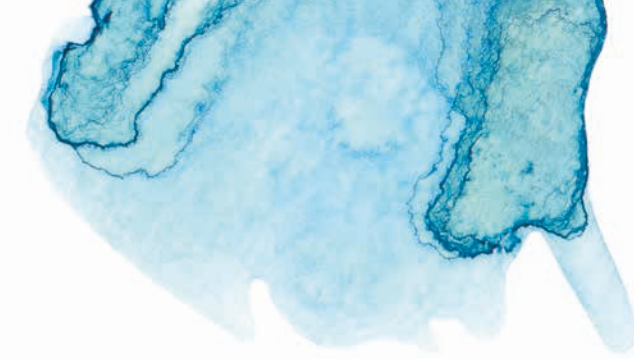
Funding for coordinating implementation could come from a combination of sources available to the RDKB, municipalities, and project partners. These include gas tax funds, climate mitigation and adaptation funds, outside granting organizations, and taxation (where activities fall under existing or future 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.

## Overview of Phase 3 (2015-2017)

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

1. The RDKB Board of Directors has 'endorsed' the Kettle River Watershed Management Plan. This means that the RDKB will consider information in the Plan in relevant discussion and decision-making; implement the priority strategies and actions, as appropriate through local government planning documents (i.e. official community plans and zoning bylaws) and participation in partnerships and collaborative initiatives; and promote implementation of the Plan through endorsing it for use by other local and regional organizations, governments and stakeholders, and lobby other levels of government and agencies for policy support and capacity improvement.
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" composed of the chair and 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 and funding, science and 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 and 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 the RDKB as lead.
6. The Stakeholder Advisory Group will continue to meet at semi-annual or regular meetings as the "Kettle River Round Table" to review progress, learn from project findings, and provide input on Plan implementation. All members of the Advisory Group are 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.
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, with an incremental 'update' version of the Plan (i.e. 1.0, 1.1) provided every year and a major update provided every 4-5 years in connection with a 'State of the Watershed' report.





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## STEERING COMMITTEE

Bill Baird (Chair)	Director, Electoral Area E/West Boundary
Grace McGregor (Vice-Chair)	Director, Electoral Area C/Christina Lake
Roly Russell (Irene Perepolkin 2010-2012)	Director, Electoral Area D/Rural Grand Forks
Brian Taylor	Mayor, City of Grand Forks
Nipper Kettle	Mayor, City of Greenwood
Marguerite Rotvold	Councillor, Village of Midway

## STAKEHOLDER ADVISORY GROUP

Roly Russell (Chair 2014 - )	East Boundary Agriculture – Grand Forks and Boundary Regional Agricultural Society (2012-2013); Director, Electoral Area D/Rural Grand Forks (2014-)
Grace McGregor (Chair 2012-2014)	Director, Electoral Area C/Christina Lake
Lorri Harpur	West Boundary Agriculture -Kettle River Stockmen's Assn.
Doug Noren	InterFor
Fred Marshall	Small Business Forestry – West Boundary
Mike Hooge (2012)	Small Business Forestry – East Boundary
Darryl Arseneault, for Paul Ploctis	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/ 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)
James Pepper	First Nations – Okanagan Nation Alliance
Vacant	Nursery
Peter Shilton (2012-2013)	Industry – Roxul
Victor (Sonny) Lockhart	Beaverdell Resident, British Columbia Snowmobile Federation
Dawn Guido	FLNRO / BC Timber Sales (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)

## Appendix: Planning Team

### 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
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 Development and Engineering	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	W.S. Department of Ecology
Rusty Post	Watershed Planning Group	W.S. Department of Ecology
Mark Andison	Manager of Planning and Development (General Manager of Operations)	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 (2013)	Forests, Lands and Natural Resource Operations

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



