TOWARDS THE KETTLE RIVER WATERSHED MANAGEMENT PLAN: A VISION FOR THE KETTLE RIVER WATERSHED

DISCUSSION PAPER 1 – SEPTEMBER 4, 2013

Regional District of Kootenay Boundary

Kettle River Watershed Management Plan

The Kettle River Starts Here

SUMMARY

The Regional District of Kootenay Boundary (RDKB) is developing 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 region.

This discussion paper is the first of several papers that will provide ideas and options for strategies and actions to be included in the watershed management plan, which will be finalized in 2014. The purpose of these discussion papers is to help the citizens of the Boundary and other stakeholders become better informed about the challenges affecting the Kettle River watershed and better able to participate in developing and implementing solutions. This first paper includes a draft vision and goals for the Kettle River Watershed; a summary of watershed management challenges; and an overview of potential strategies for addressing challenges and achieving the goals.

The Advisory Group recognizes the vital importance of reliable, quality water and healthy aquatic ecosystems for our communities, and recommends the following draft vision statement:

> *Our communities envision a healthy, resilient and sustainable Kettle River watershed, with a landscape that functions to meet community needs and values, and communities that act as stewards of the watershed.*

This vision statement is accompanied by three overarching goals: 1) Healthy aquatic ecosystems sustain native biodiversity and aquatic life; 2) Safe & secure water supports healthy communities; and 3) Reliable, quality water supplies support a sustainable economy and food system. Each goal includes sub-goals that relate to topics such as water flow patterns, water quality, habitat, drinking water, shoreline stability and community values.

We recognize that many challenges exist to meeting these goals. For instance, naturally low flows in late summer are made worse by high water use. Changes in the climate and land use are affecting the reliability of water supplies and aquatic ecosystem health. We know that cumulative changes within the watershed impair water quality, aquatic ecosystems, and recreational and other values that are important to Boundary businesses and citizens. We also know that the current overall capacity of organizations, in terms of money, human resources, and governance issues, is not strong enough to respond proactively to challenges across the Kettle River Watershed.

So what can we do - as communities, businesses and individuals - to respond to the challenges we have in the Kettle River watershed? As a starting point, this paper proposes four strategic directions: 1)

Increase community understanding, support and capacity for stewardship; 2) Improve the quality, reliability and security of water supplies through sustainable management of water resources; 3) improve watershed health and function; and 4) Maintain or enhance recreational, cultural and amenity values.

Forthcoming discussion papers will expand on these themes and identify options and specific actions to be undertaken by the RDKB, other stakeholders and citizens of the Boundary. We look forward to receiving your input on this process using the feedback sheet at the end of the document, or at meetings with your community group or professional association and at meetings with the public that will be held throughout the Boundary.

Figure 1. Members of the Stakeholder Advisory Group and other participants learn about riparian health on Boundary Creek in the spring of 2013.

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1. INTRODUCTION

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.[1] It is an ecosystem with complex interacting natural components, which include 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 influence 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 purveyors and consumers, watershed management planning involves multiple institutions, regulatory frameworks, and jurisdictions in cooperation.

Watershed management plans also consider the interaction and mutual influence of upland land and water use, riparian and wetland ecosystems, in-stream conditions, and groundwater conditions.

In order for watershed management plans to succeed, those involved in planning need to:

- 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).

These considerations inform the ideas and strategies outlined in this discussion paper. Other key concepts related to ecosystems and sustainability are discussed in Appendix 2.

[1] Also called river basin. In Europe, watershed means the height of land dividing different drainage basins.

1.2. What is the Kettle River Watershed Management Plan?

The Regional District of Kootenay Boundary (RDKB) is developing a watershed management plan for the Kettle River in British Columbia (**Error! Reference source not found.**). The Kettle River Watershed Management Plan is a collaborative initiative with participation from local and provincial governments, and representatives from industry, agriculture, forestry, mining, recreation, business and non-governmental sectors and organizations (Figure 2).

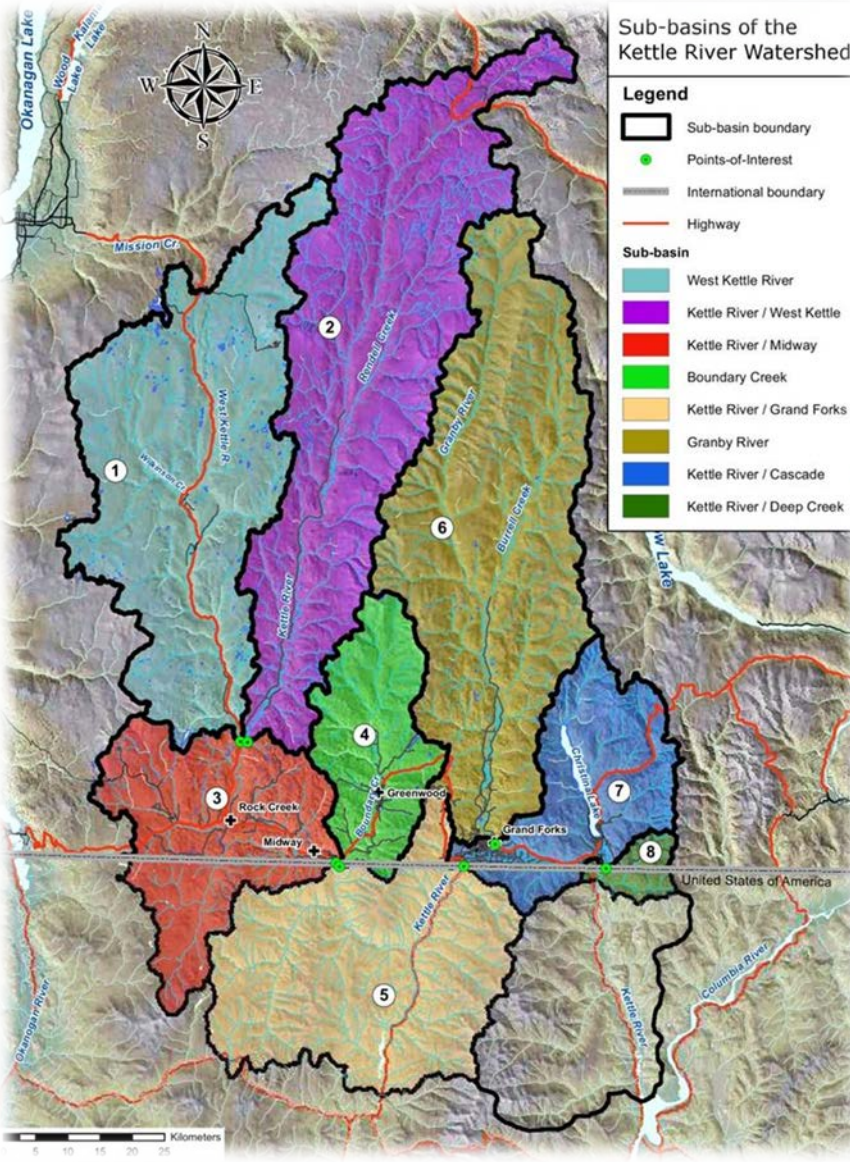

Figure 2. Sub-basins of the Kettle River watershed

This discussion paper is one of a series of steps on the way to the plan. The Kettle River Watershed Committee met in 2010 to create a Terms of Reference for the plan, and the Regional District contracted Summit Environmental to conduct a Phase 1 technical "State of the Watershed" report. A Technical Advisory Committee with representatives from multiple agencies and organizations supported the project.

With the Phase 1 study complete, the Regional District started Phase 2 of the plan in May 2012. The Stakeholder Advisory Group (Figure 1) is working closely with the Steering Committee, Project Coordinator and the Regional District to give advice on goals, issues and solutions. The Advisory Group also acts as the hub for public involvement for Phase 2 (May 2012-June 2014).

The Kettle River Watershed Management Plan is intended to provide guidance to decision-makers, resource managers, and users and residents regarding land and water resources in the watershed. The plan will provide actions to be undertaken by the RDKB and other stakeholders which:

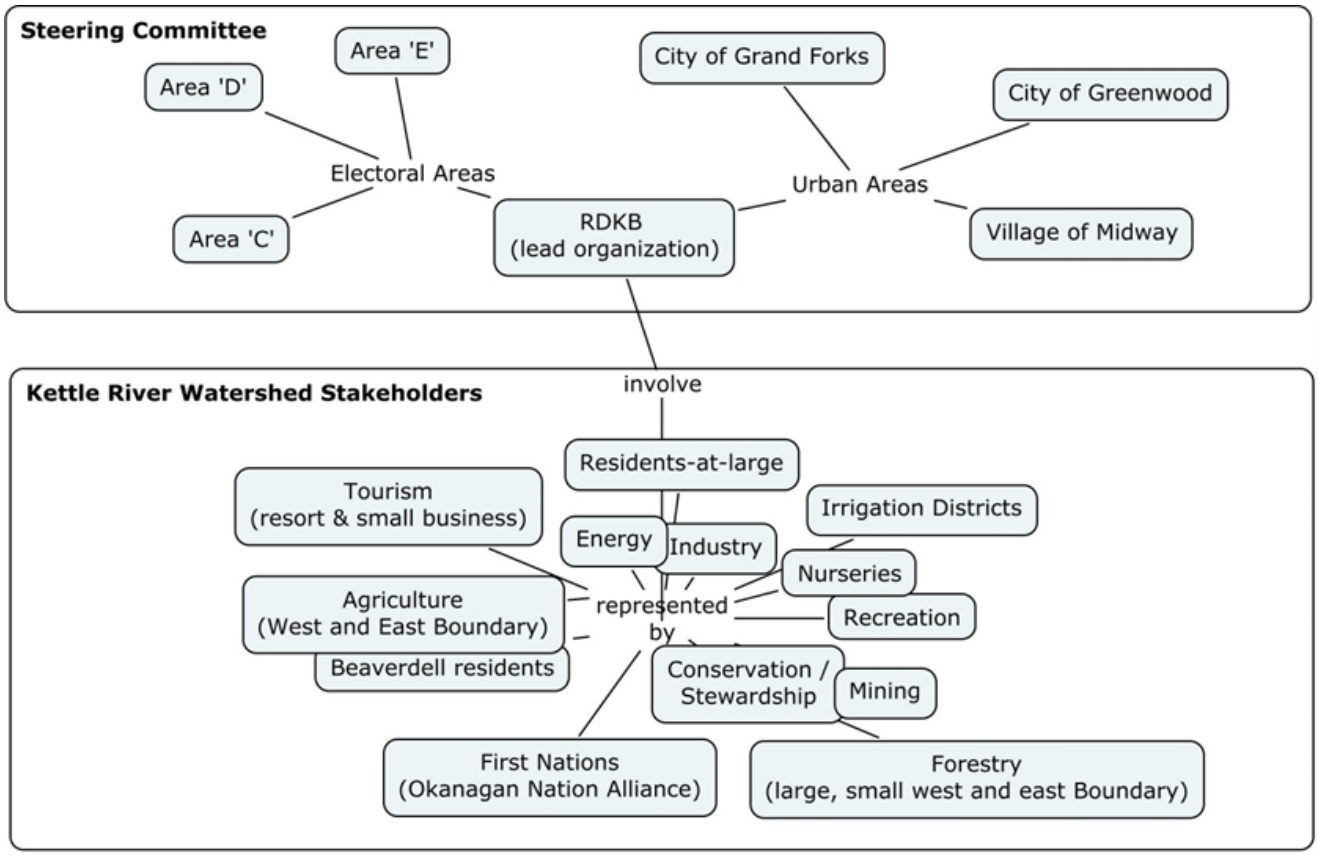

Figure 3. Organizations and stakeholders involved in the Stakeholder Advisory Group

- Balance water supply and use today and in the future;
- Protect the water quality and ecological function of the system and provide for continual improvement across the watershed;
- 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 a thorough public engagement process across the communities of the watershed.

The watershed management plan will address issues associated with water quantity, quality, and aquatic ecosystems. Key considerations will also include climate change, drought, slope stability, and flood hazard mitigation. The plan will be integrated and ecosystem-based, meaning that it considers inter-relationships between land, water, natural ecosystems and human communities.

1.3. Discussion papers and the planning process

This discussion paper provides information, ideas and options for developing the strategies and actions contained in the watershed management plan. It is intended to serve as a foundation for discussion by the Stakeholder Advisory Group on achieving the identified goals and resolving the key challenges in the watershed. This paper includes:

- Draft Vision and Goals for the Kettle River Watershed, as identified in public engagement in 2012 and early 2013;
- A summary of watershed management challenges facing the communities of the Kettle River Watershed; and
- A preliminary overview of strategies that could be used to address watershed challenges and achieve the goals.

Over the next several months, the Advisory Group and other stakeholders will review a series of short papers focusing on watershed management challenges, strategies and opportunities (Table 1), organized around the broad strategies outlined in Section 4 of this document. Additional papers on specific topics or for individual sectors will be prepared as needed to support stakeholder discussions.

Table 1. Proposed discussion papers in the development of the Kettle River Watershed Management Plan

#	Title
1	Towards the Kettle River Watershed Management Plan: A Vision for the Kettle River Watershed Presents overview of goals, challenges, and potential strategies.
2	Working together: Growing our capacity to manage the watershed Presents options for management, governance and decision making structures to ensure the vision, goals and strategies are implemented.
3	Sustaining the flow: managing water resources to improve quality, reliability and security of water supplies Considers issues of water supply and demand including options for source-water protection, water storage, and water conservation.
4	Stepping back from the water: Protecting and restoring watershed health and function Identifies options for improving overall watershed health including riparian areas, wetlands, and uplands.
5	Enjoying it wisely: Encouraging responsible recreation, tourism and amenity development

These papers will not constitute a “draft plan” but are intended to engage discussion about issues and challenges, available options, and recommended actions. The papers will all be available on the website (http://kettleriver.ca) and shortened versions will be published as columns in local newspapers. Public meetings focused on these discussion papers will be held throughout the fall and winter to gather feedback on watershed challenges and strategies.

Following deliberation of these papers we will draft the Watershed Management Plan by the spring of 2014 and present it to stakeholders for review and further discussion. By summer 2014 we will finalize the plan, together with an implementation strategy, and request endorsement from all involved stakeholders to initiate implementation of the recommended strategies and actions.

We recognize 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 requirements. All involved and affected stakeholders will be asked to endorse the plan upon completion.

Figure 4. Nelson Jatel of the Okanagan Basin Water Board (right) explains a governance exercise to participants at the 'Rethinking our Water Ways' Special Meeting in 2012.

2. A Vision for the Kettle River Watershed

2.1. Public input on Watershed Vision & Goals

A key purpose of the public engagement activities has been to gather input on the interests, values, and aspirations of the public and various stakeholders regarding the Kettle River watershed. As we analyzed the results of the survey and other forms of public input, we found several key themes about what people wish to see for the future of the watershed, and what they hoped the plan would achieve. We organized these themes into a vision statement and a set of watershed management goals.

The vision statement and goals are high-level aspirations about the long-term results of the watershed plan that are intended to be foundational principles in the Kettle River Watershed Management Plan. They also help the Stakeholder Advisory Group understand issues and develop recommendations that reflect public interests and values.

2.2. Vision – What does the community want?

Reliable, quality water and healthy aquatic ecosystems are known to be 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 belonging to and ownership of the Kettle River and its tributaries, and clearly wish to maintain and enhance these values: “Water for our future generations… is priceless.”

Therefore, we envision **a healthy, resilient and sustainable Kettle River Watershed, with a landscape that functions to meet community needs and values, and communities that act as stewards of the watershed.**

2.3. Watershed Management Goals

The Stakeholder Advisory Group has learned from public input to develop a set of draft goals for the Kettle River Watershed that they believe expresses the conditions of the watershed that the community wishes to achieve and maintain, and spells out the outcomes of implementing the vision.

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 key concepts of ecosystem health and sustainability underpin this vision and goals (Appendix 2).

Goals are listed with a representative icon in Table 2 (icons are used for cross-referencing goals, watershed challenges, and strategies in Table 5). These draft goals are a starting point that will be

further clarified and elaborated on through discussions with the Advisory Group and the public over the coming months for each topic area.

Table 2. Goals for the Kettle River Watershed

Icon[2]	#	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

[2] Nicholas Mollet (no date). *Map Icon Collection*. Creative Commons 3.0 Attribution & Share Alike. http://mapicons.nicolasmollet.com/

3. Watershed Challenges

3.1. Feedback on watershed issues

Over the last three years, the Stakeholder 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. These issues were raised by the community during initial consultation in 2010 and through surveys and public engagement in 2012. The Phase 1 Technical "State of the Watershed" report also examined available information about watershed issues.

In the fall 2012 survey, residents of the Kettle River watershed were asked to rate how well the watershed meets a variety of generic watershed objectives.[3] Respondents were least concerned about impacts to amenity and aesthetic values of the watershed, and most concerned about water quantity and wastewater and stormwater and drainage impacts on surface water.

When asked to consider causes (pressures) and effects (issues), 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.

A number of constraints to addressing these challenges have been identified, including

- Lack of money, resources and capacity
- Lack of economic valuation of watershed functions
- Excessive individual freedom, competing interests
- Lack of knowledge, data and perspectives
- Lack of public ownership, interest and understanding
- Insufficient leadership, governance, oversight and regulation, inconsistent policy application
- Global warming

[3] Survey and public engagement methods and results are at http://kettleriver.ca/what-we-heard

3.2. Overview of Watershed Challenges

We organized the various watershed issues raised by stakeholders into a set of challenges to managing land and water in the Kettle River Watershed (Table 3). 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. We will explore these challenges in more detail in the forthcoming discussion papers.

Table 3. Watershed Management Challenges

#	Keywords	Challenge
1	**low flows**	**Seasonal low river flows affect the reliability of water supplies and aquatic ecosystem health.**
1.1	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.
1.2	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.
1.3	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.
2	**cumulative effects**	**Cumulative changes to the landscape and water systems impair water quality, aquatic ecosystems, and recreational and amenity values.**
2.1	riparian impacts	Human activities including forest harvest, road development / maintenance, range and agricultural practices, and motorized recreational activities increase erosion, damage riparian vegetation and decrease riparian and wetland function in filtering pollution and sediment.
2.2	fluvial impacts	Increased sediment and higher peak flood flows cause changes to floodplains and river channels, harming fish habitat and damaging property and infrastructure.
2.3	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.
2.4	fisheries	Cumulative impacts of riparian degradation, sedimentation, invasive species and high water temperatures impact fish population health. Overfishing

#	Keywords	Challenge
	impacts	prevents native fish stocks from recovering during periods of better flows and water quality.
2.5	pollution impacts	Agricultural, urban, industrial and other land management practices increase pollution of groundwater and surface water, threatening human and aquatic ecosystem health.
3	**capacity constraints**	**The community's ability to respond to watershed issues is constrained by capacity, money, policy support and public understanding**
3.1	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.
3.2	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 (3.1) means less capacity for informed decision-making at all levels of government and in watershed planning groups.
3.3	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.

4. How are we going to get there? Strategies & Management Directions

So what can be done to meet the goals in light of these challenges? We've learned from the public that there are many potential solutions to individual issues. A major focus of upcoming discussions of the Stakeholder Advisory Group will be to develop solutions that are integrated, realistic, effective, and sustainable.

This section discusses an overall approach to achieving goals and addressing challenges with a set of *strategies* and *management directions* (Table 4).

- **Strategies** are overall statements of intent about how we as a community should address the challenges and achieve the goals.
- **Management directions** specify what needs to be accomplished, changed, improved or maintained in order to meet the watershed goals.

These strategies and management directions are certainly not complete; they are simply an initial proposal to provoke discussion by the Advisory Group and other stakeholders about available options. We will continue developing the strategies based on feedback on this discussion paper, and in the upcoming discussion papers they will be presented with an analysis of options as well as proposed *actions, indicators,* and numeric *targets* (where appropriate) (see Appendix 2, Key Concepts).

- **Actions** describe a specific activity undertaken by specified organizations, agencies or sectors with the knowledge or mandate to implement the management direction and contribute to achieving the goal.

Table 4. Draft strategies and management directions

#	Keywords	Strategy / Management Direction
1	**Capacity**	**Increase community understanding, support and capacity for stewardship of the Kettle River Watershed**
1.1	develop governance	Develop capacity for watershed stewardship through the development of a governance framework for watershed decision-making, plan implementation and review
1.2	build support	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.
1.3	improve understanding	Improve public understanding of watershed function, integrity, resilience, and sustainability. Fill gaps in understanding through scientific studies and ongoing monitoring.
1.4	improve capacity	Improve capacity for watershed stewardship through financial and technical support of beneficial management practices and ecosystem restoration by landowners, local

#	Keywords	Strategy / Management Direction
		governments, resource industries and the public.
2	**Water supply**	**Improve the quality, reliability and security of water supplies through sustainable management of water resources**
2.1	conserve water	Improve water conservation and increase efficiency and productivity of water use in all sectors
2.2	plan for water use	Improve water security by developing and implementing drought management plans and water use plans
2.3	plan for water storage	Improve water supply by evaluating water storage needs and implementing, where appropriate, water storage strategies for surface and ground water
2.4	protect water quality	Maintain or improve water quality through control of point source and non-point source pollution
2.5	protect drinking water sources	Develop and implement aquifer protection plans & source water protection plans for priority aquifers and drinking water sources
3	**Watershed function**	**Improve watershed health and function in the Kettle River Watershed**
3.1	maintain permanent vegetation	Maintain or increase the extent and cover of permanent vegetation, including forests, in uplands, stream corridors and on floodplains
3.2	protect soil	Protect soil and improve soil health to improve water retention ability and decrease erosion
3.3	protect riparian areas	Maintain or increase the areal extent and function of wetlands and riparian areas across the watershed. Encourage shoreline and bank protection measures that restore and protect aquatic and riparian habitat.
3.4	improve connectivity	Maintain or improve the connectivity of stream corridors in the landscape
3.5	plan floodplain use	Control and limit development on active floodplains
4	**recreation & cultural values**	**Maintain or enhance recreational, cultural and amenity values**
4.1	protect fisheries	Maintain a healthy sport fishery through habitat restoration, continued stocking of recreational lakes and the protection of native fish populations in tributaries and rivers
4.2	improve parks and recreation	Increase the areal extent and ecological integrity of aquatic ecosystems represented in municipal, regional and provincial parks systems

4.1. Integrating Strategies and Management Directions

The goals, challenges and strategies presented in this paper are highly inter-related. Each goal has multiple challenges to meeting it, and will require different kinds of strategies and actions. Viewing the goals, challenges, and strategies as a matrix (Table 5) may help readers visualize the connections between different aspects of managing the Kettle River watershed.

Note that some of these connections are direct links that will be explored in upcoming discussion papers, while other connections only show a relationship or potential link. Where strategies address challenges across multiple goals, the water droplet icon ( ) is used to denote the overall vision of a healthy, functioning watershed.

Figure 5. Drip irrigation being installed at the Kettle River Community Garden.

Table 5. Matrix of watershed goals, strategies and challenges. Goals (and icons) are listed in Table 2, challenges in Table 3, and Strategies & Management Directions in Table 5. The overall vision is illustrated with the droplet icon, which means multiple goals are met with the identified strategy.

	Management Directions	water reliability			cumulative effects					capacity constraints		
Challenges	Goals	1.1 high water use	1.2 forest cover	1.3 climate change	2.1 riparian	2.2 fluvial	2.3 development	2.4 fisheries	2.5 pollution	3.1 regulatory capacity	3.2 governance and funding	3.3 understanding
Capacity	1.1 develop governance									●	●	
	1.2 build support									●	●	●
	1.3 improve understanding									●	●	●
	1.4 improve capacity									●		
Water supply	2.1 water conservation	●		●		●		●		●	●	●
	2.2 water use planning	●		●				●		●		
	2.3 water storage planning			●		●		●				
	2.4 water quality				●		●	●	●	●		
	2.5 source water protection				●		●		●	●	●	●
Watershed function	3.1 land cover		●		●							
	3.2 soil health		●		●	●	●	●				
	3.3 riparian health		●		●	●	●	●	●			
	3.4 connectivity		●		●	●	●	●	●			
	3.5 floodplain management		●		●	●	●	●		●		●
Rec & Cultural	4.1 fisheries							●				
	4.2 parks and recreation		●		●		●	●				●

APPENDICES

1. Planning Team

Steering Committee	
Bill Baird (Chair)	Electoral Area 'E'
Grace McGregor	Electoral Area 'C'
Roly Russell (Irene Perepolkin)	Electoral Area 'D'
Brian Taylor	City of Grand Forks
Barry Noll	City of Greenwood
Marguerite Rotvold	Village of Midway
Stakeholder Advisory Group	
Grace McGregor (Chair)	Electoral Area 'C'
Lorri Harpur	West Boundary Agriculture -Kettle River Stockmen's Ass.
Roly Russell	East Boundary Agriculture – Grand Forks and Boundary Regional Agricultural Society
Doug Noren	InterFor
Fred Marshall	Small Business Forestry – West Boundary
Mike Hooge	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	Recreation – Kettle Valley Wildlife Association
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)
Vacant	First Nations – Okanagan Nation Alliance
Vacant	Nursery
Peter Shilton (observer)	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)
Tara White	Senior Fish Biologist	MFLNRO (Penticton)
Ted Van der Gulik	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	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

Project Coordinator (contract) – Graham Watt, Cordilleran Ecological

RDKB lead – Mark Andison, Director of Planning and Development

2. Key Concepts

Ecosystem health. While the concept of health for a single organism (like a person), population or species is relatively intuitive, a healthy *ecosystem* is more complex. An **ecosystem** is the interdependent web of all of the organisms, their interactions and their nonliving environments (air, rock, water) in a given place. Ecosystems can be described in terms of their **structure** (life forms, species, and their arrangement and abundance), **processes** (energy and nutrient flows), as well as the **functions** and **services** they provide that maintain the ecosystem or benefit society (nutrient cycling, climate regulation, flood abatement).

Aquatic ecosystems are the plant and animal communities associated with bodies of water such as streams, rivers, lakes and wetlands. They include the environments and organisms in the water, in soils and plant communities affected by the presence of water (riparian areas), and organisms that depend on the water for part of their life cycle.

Aquatic ecosystem are dynamic, constantly shifting and responding to changing temperatures, precipitation, populations of different organisms, and disturbances such as drought, flood or fire.

While we may want to draw a solid line around water bodies, aquatic ecosystems vary over time and are also tightly connected to upland conditions and impacts from various land uses.

Natural and cultural disturbances such as fire, flood, or drought are key processes in aquatic ecosystems. Normally ecosystems 'bounce back' to similar structure, processes and functions following natural disturbance through re-colonization, succession, and development of plant and animal communities. This bouncing-back is called **resilience.**

But when ecosystems are stressed by human activity and disturbances different than naturally experienced there (known as the *natural range of variability*), their resilience may be lower and they might change into very different ecosystems. This can be seen at a large scale in the algae blooms and fish community collapse in Lake Winnipeg. **Ecological integrity** is the degree to which an ecosystem's structure processes and functions are unimpaired by human-caused stresses or non-native species. Parks and protected areas are often managed primarily for ecological integrity.

So, *aquatic ecosystem health* means the combined measure of a water body's ecological integrity and function, stability within the natural range of variability, ability to provide designated uses and services, and resilience to disturbance.

The word '**biodiversity**' is a contraction of biological diversity, which refers to variety within the living world. It is defined in terms of genetic, species, and ecosystem diversity:

- Genetic diversity represents the heritable variation within and between populations of organisms
- Species diversity (sometimes species richness) is the number of different types of organisms in a habitat
- Ecosystem diversity (also habitat diversity) is the variety of different types of ecosystems or habitats in a region

Indicators are meaningful, understandable measures of social, economic and environmental conditions that are used to communicate the status and trends of things that we value. In environmental management, we measure different types of indicators including:

- *Condition indicators* (also known as *state indicators*) describe the biological and physical state of the environment (i.e. water temperature, numbers and diversity of fish);
- *Pressure indicators* describe the human activities causing changes in the environment (land-clearing, development, overfishing); and

- *Response indicators* describe the social and institutional response to changes in the environment that aim to reduce pressures or improve conditions (policy changes, implementation of best management practices, ecological restoration).

Targets are quantitative objectives that may accompany Management Directions to specify the desired future status of condition, pressure and response indicators. Targets may be based on general guidelines or, where there is enough scientific information available, be site-specific and suitable to the uses, values and conditions of the watershed in a given area, such as a lake, tributary, or reach of the main stem of the river.

Sustainability in the context of watershed management planning refers to the community developing strategies and actions to ensure the watershed's long-term health and functions so that communities can meet their needs and the needs of the watershed while providing for future generations.

FEEDBACK SHEET

Please provide your feedback to help us improve on the ideas in the discussion paper – here are some questions to get you started. Please provide page number and section for any specific comments, and email your comments to Graham Watt at plan@kettleriver.ca, or bring your thoughts on this sheet to 2140 Central Ave, Grand Forks.

1) Do the planning process and the scope of the discussion papers, as described, include the major topics that you think need to be addressed in the watershed planning process?

2) Do the Vision and Goals reflect your ideal for the future of the Kettle River Watershed? Why or why not?

3) Do the watershed challenges described in part 3 encompass the watershed issues that you think should be addressed in the watershed plan? Is there anything that is missing or that requires more detail?

4) Is the overall intent of the each of the draft strategies and management directions clear? To what extent do they address the challenges and help meet the Vision and Goals?

5) Are there any other comments you would like to make?