



# Mighty Peace Watershed Alliance

## LEARNING ABOUT OUR WATERSHED SYNTHESIS REPORT



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## INTRODUCTION

Population growth and economic development can increase our demand for water and impact our water resources. Periods of extended drought or climate change can further exacerbate water issues. For these reasons, Alberta's *Water for Life* strategy looks at how we can better manage water on a watershed basis and achieve the strategy's three goals including:

- Safe, secure drinking water supplies,
- Healthy aquatic ecosystems, and
- Reliable, quality supplies for a sustainable economy.<sup>1</sup>

A **Watershed** (also known as a *catchment* or *basin*) is an area of land that catches precipitation and drains into a common body of water, such as a marsh, stream, river or lake.

In the Peace River watershed, work to achieve these goals is being led by the Mighty Peace Watershed Alliance (MPWA). The MPWA is a multi-stakeholder, not-for-profit organization and is one of 11 Watershed Planning and Advisory Councils created under the *Water for Life* strategy. The implementation of the strategy and its goals in the Peace River watershed is guided by the MPWA's vision and mission:

**Vision** - *The Peace is a healthy, sustainable watershed that supports our social, environmental and economic objectives.*

**Mission** - *To promote watershed excellence, the Mighty Peace Watershed Alliance will monitor cumulative effects from land use practices, industry and other activities in the watershed and work to address issues through science, education, communication, policy and by supporting watershed stewardship.*

The MPWA uses consensus, adaptive management and innovation to understand and promote living within the Peace River watershed. Key tasks of the organization include reporting on the state of the watershed, leading watershed planning activities, promoting beneficial management practices and developing educational programs.<sup>2</sup>



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<sup>1</sup> For more on the Government of Alberta's *Water for Life* strategy, see <http://www.waterforlife.alberta.ca>.

<sup>2</sup> For more information about the work of the MPWA, see <http://www.mightypeacewatershedalliance.org/>.

Before starting on a state of the watershed report, the MPWA wanted to understand what is already known about drinking water, aquatic ecosystems and water supply in the Peace River watershed. To compile this information, they commissioned three technical reports and a watershed directory.<sup>3</sup> These reports summarize what is currently known about these topics, and where there are information gaps. In addition, the MPWA recognizes that the individuals that live, work and play in the Peace River watershed also have knowledge about the water resource and the issues that affect it. As well as conducting several open houses, the MPWA created a survey and made it available to stakeholders, government and industry sectors, and the public to further gather and verify information about the Peace River watershed.

A total of 116 surveys were completed online; another four participants completed the hard copy version. Assessing this response rate is a challenge. With the total population of the watershed approximately 160,000, a sample of 120 may seem small (less than 1/10<sup>th</sup> of 1%). However, the total number of people that were made aware of the survey, either by visiting the MPWA website, receiving their electronic newsletter or by other means, was likely about 500 to a 1,000 individuals. This gives a response rate of 12 - 24% - still a difficult figure to evaluate. Fortunately, today's online tools make surveys relatively simple to carry out and the MPWA looks forward to using this tool to continue to solicit feedback from residents in the future.

A majority of respondents (48%) identified themselves as members of the public. However, there was at least one response received from individuals representing agriculture, municipalities, oil and gas, forestry, utilities and tourism. While the majority (60%) of responses came from the Smoky-Wapiti sub-basin, at least two or more responses were received from each of the six sub-basins that make up the Peace River watershed (see map page 5). As well, a few respondents indicated they lived or worked on the British Columbia side of the Peace River watershed (i.e. the Hudson Hope, Fort St. John and Dawson Creek areas).

Information gathered via the technical reports and the survey is summarized in this report. As a key role of the MPWA is to see the implementation of the *Water for Life* strategy in the Peace River watershed, the outcomes of the strategy are used as a framework here to begin to synthesize what we know and where there are gaps in our information. This information will inform the MPWA as it moves forward with the next stage of its journey including selecting appropriate indicators to benchmark current watershed conditions and issues.

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<sup>3</sup> MPWA technical reports in full and as Executive Summaries are available for download on their website: see <http://www.mightypeacewatershedalliance.org/reports>.

## WHAT WE LEARNED ABOUT THE PEACE RIVER WATERSHED

The main stem of the Peace River is about 1,923 kilometres (km) in length. The river stretches from the head of the Finlay River, in the Rocky Mountains of British Columbia, to where it meets the Slave River in northeastern Alberta. The Peace River has a mean annual flow of 68,200,000 m<sup>3</sup>. Looking from the height of land, the Peace River watershed drains an area of approximately 302,500 square kilometres (km<sup>2</sup>), of which 60% (182,500 km<sup>2</sup>) is in Alberta. As Alberta's largest watershed, the Peace accounts for about 28% of the provincial landmass. In turn, the Peace River watershed is a sub-basin of the larger Mackenzie River Watershed.<sup>4</sup>

Within Alberta, the Peace River watershed can further be divided into six sub-basins. These include three sub-basins that make up the mainstem of the river as it travels from west to east (Upper, Central and Lower Peace sub-basins). It also includes two major tributaries: the Smoky-Wapiti river system starts south of Grande Cache near Mount Robson and joins the mainstem just before the Town of Peace River; the Wabasca River and its tributaries flow into the Peace River east of Fort Vermilion. Finally, the sixth sub-basin includes that portion of the Slave River that is in Alberta.<sup>5</sup>

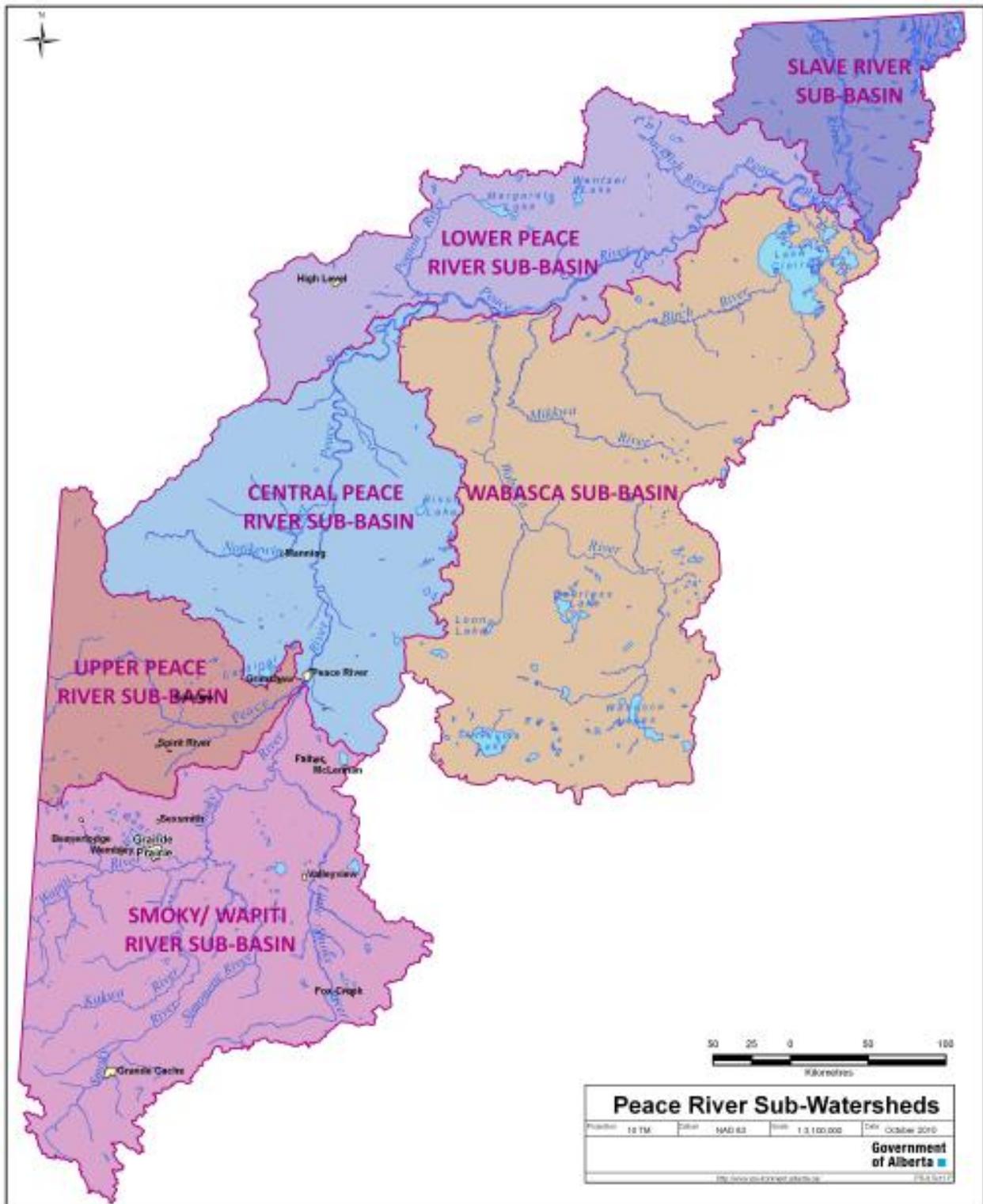
The Peace River watershed also includes a number of smaller tributaries, streams, creeks, lakes and wetlands. In addition to these surface water sources, the Peace River Watershed also has a number of springs and aquifers providing groundwater sources. In particular, the Grimshaw Gravel Aquifer lies under the Upper and Central sub-basins and is important to many users. Finally, this watershed is also known for the Peace-Athabasca Delta, one of the world's largest inland deltas.

As of 2011, approximately 165,000 people lived in the Alberta portion of the Peace River Watershed. This represents about 4.5 % of the Alberta population. People living in the Smoky-Wapiti sub-basin, which includes the City of Grande Prairie, account for almost two-thirds of this population. Grande Prairie, with a population of 55,000, is the only city in this watershed. There are however, several towns, villages, hamlets, Indian Reserves and Métis Settlements. Many people in the watershed are engaged in resource-based activities. Agriculture, conventional and *in situ* oil and gas, forestry, mining (aggregate and coal), tourism, recreation and other activities occur throughout the watershed.

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<sup>4</sup> For more information about the Mackenzie River Watershed, see <http://www.mrb.ca/>.

<sup>5</sup> Technically, the Slave River is part of the Great Slave River basin; however it has been included by Alberta Environment in the Peace River Watershed Planning Advisory Council (WPAC).



## WHAT WE LEARNED ABOUT SAFE, SECURE DRINKING WATER

*Water For Life* Outcome: Albertans Will Be Assured Their Drinking Water Is Safe.

### DRINKING WATER QUALITY

*Survey Results: Many survey respondents (90%) relying on regulated systems believe their drinking water is safe, that it meets a high standard of treatment and facilities are well maintained by qualified staff.*

The majority of residents of the Peace River watershed have good access to treated water suitable for drinking and other household uses.<sup>6</sup> That is, 59 government-regulated water treatment facilities provide treated water to 57 communities with 65% of the population of the Peace River watershed.<sup>7</sup>

First Nations make up another 13 communities in the Peace River watershed and account for about 7% of the population. Most of these communities are likely on their own regulated system or have an agreement with a local municipality. However, this area needs more investigation. It is worth noting that some First Nations communities currently have boil water advisories in effect (for a listing of boil water advisories, see <http://www.water.ca/maptest4.asp?province=1>).

The remaining 28% of the population is more difficult to summarize as water sources vary. From the survey, 5% of respondents purchase and haul treated water from a municipal system in a nearby community and store it in a cistern. Another 18% reported having unregulated private systems, usually a dugout or a groundwater well. At least one individual indicated use of

The **City of Grande Prairie** is home to almost a third of the residents of the Peace River watershed. To provide city residents drinking water, raw water is withdrawn from the Wapiti River and treated by Aquatera Utilities. This system is regulated by Alberta Environment & Sustainable Resource Development. Information on all regulated systems in the province can be found online at

<http://environment.alberta.ca/apps/regulateddwq/Default.aspx>.

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<sup>6</sup> Though primarily treated to provide drinking water and water for other household uses, waters from a regulated system can be used for a variety of purposes including watering private and public lawns and other landscape features, local businesses, industry, etc.

<sup>7</sup> Aquality Environmental Consulting Ltd. *State of Drinking Water in the Peace River Watershed*. Prepared for the Mighty Peace Watershed Alliance, March 2012. 130 pp. Note that this report also provides a good overview of the current legislation, regulations and authorities governing drinking water quality in Alberta and is available on the MPWA website.

a rain water collection system. However, it is unknown if these survey percentages accurately reflect the broader population of the entire Peace River watershed.

Several survey respondents commented that they use ‘on-the farm’ water including wells and dugouts for household use but purchase bottled water from the nearest town for human consumption. Some are filtering and/or distilling raw water before using it for household use. To ensure their private drinking water systems meet health standards, some individuals are testing their water regularly (26%): some are testing irregularly (42%), or not at all (32%).<sup>8</sup>

While there is anecdotal information that some private systems may have issues impacting individuals with particular health concerns (e.g. sodium content and high blood pressure) there are few reported cases of water-related health issues across the Peace River watershed. However, this might warrant further investigation.

The *Water for Life* strategy promotes the use of regional water treatment and distribution networks to provide all Albertans safe, secure water supplies. However, the logistics of this large basin and associated infrastructure costs (estimated at \$285 million<sup>9</sup>) may limit the development of such networks in all areas.



**Did you know?** Private water well owners in Alberta are responsible for managing and maintaining their own wells. The **Working Well** program provides owners with the information and tools they need to properly care for their wells. For more information about this program, see <http://environment.alberta.ca/01317.html>.

Private systems should be tested regularly to ensure they meet drinking water standards. Public Health Inspectors with Alberta Health Services can advise private homeowners with wells, cisterns or dugouts about the safety of their water and possible treatment options. For more information about this service, see <http://www.albertahealthservices.ca/services.asp?pid=service&rid=1052212>.

<sup>8</sup> Note that the sample size for this question was small (29).

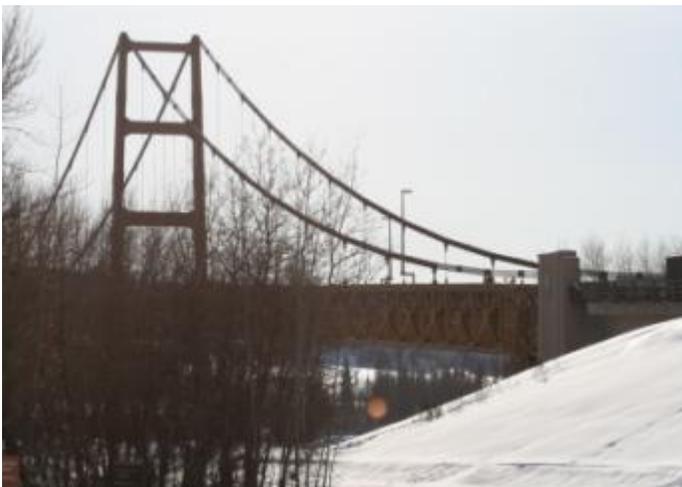
<sup>9</sup> Source: Associated Engineering Ltd., Peace River Regional Water Pipeline – 2008 feasibility Study.

## DRINKING WATER SUPPLY

*Survey Results: When asked, a slight majority of survey respondents (57%) were able to identify their drinking water source. Source waters include the Peace River mainstem as well as a number of its tributaries (e.g. the Spirit, Wapiti, Smoky, Little Smoky and Beaverlodge rivers). Additionally, a number of lakes (e.g. Winagami, Footner and Cadotte lakes) and groundwater sources (e.g. Grimshaw Gravel Aquifer, Whitelaw Springs and Warrensville Well) were also named. Dugouts, private wells and rainwater collection systems also provide a source of water to many residents of the Peace River watershed.*

As the Peace River is the largest river in Alberta, it is assumed that drinking water supplies are readily available throughout the watershed. However, few communities withdraw water from the main stem of the river with the exception of the Town of Peace River, Fairview, Northern Sunrise County, the Village of Nampa, Fox Lake, Garden River and Fort Vermilion (less than 10% of the population).<sup>10</sup> The remaining 54 communities draw their water from smaller tributaries, groundwater aquifers and lakes.

*Survey Results: A large majority (83%) of survey respondents said they believe their drinking water supply is secure and will continue to provide water for the next 10 to 25 years. However, some qualified this statement by adding “at current usage levels”. Several noted that they were comfortable looking out 10 years but 25 years away was harder to predict. Several comments indicated that respondents would like to know more about the available supply.*



While the long term outlook for drinking water supply is generally good, some issues have arisen. The City of Grande Prairie has experienced rapid growth in the last decade and will require additional water supply in the near future. Many residents of the County of Grande Prairie rely on groundwater and aquifer levels have been dropping in recent years. Valleyview and several other communities that draw from the Little Smoky have restrictions on their

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<sup>10</sup> While it doesn't technically draw from the Peace River surface waters, La Crete does draw its water from wells that are in the flats of the Peace River.

licences and may seek new sources in the future. For several small communities that draw their water from groundwater aquifers, sustainable pumping rates may be unknown, making it difficult to predict the security of future supply.

Whether drawing from regulated or unregulated systems, groundwater or surface water, several respondents (35%) did raise concerns about their source water supply. One of the most frequently heard concerns about future water supplies was the increase in oil and gas activities (drilling, fracturing, processing, etc.) and its potential effect on groundwater supplies. The impact of climate variability (extended drought, changes in precipitation/ snowpack, glacier loss, etc) on future supply is also an unknown.



One survey respondent stated *“We are heavily reliant on surface water that is affected by drought and is easily polluted from runoff.”* With the increase in population growth and industrial development, the potential for both surface and groundwater contamination from agricultural run-off, oil and gas spills, recreation, etc. may become more of an issue in the future.

With the Peace being such a large and sparsely populated watershed, source water protection has not been a big topic in the past. However, several survey respondents (56%) are starting to take steps to protect their drinking water sources before they are treated. This might include improving security (e.g. fencing) around reservoirs; conducting upstream assessments and mitigating potential contamination issues; participating in inter-municipal planning, water management planning<sup>11</sup>, aquifer protection planning; stewardship initiatives; and supporting the MPWA in increasing awareness and understanding of the issues.

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<sup>11</sup> For an example of a watershed management plan developed to address source protection, see the Heart River Watershed Management Plan at [http://www.aquality.ca/uploads/news/id93/Heart\\_River\\_WMP.pdf](http://www.aquality.ca/uploads/news/id93/Heart_River_WMP.pdf).

## WHAT WE LEARNED ABOUT HEALTHY AQUATIC ECOSYSTEMS

*Water For Life* Outcome: Albertans Will Be Assured That the Province's Aquatic Ecosystems Are Maintained and Protected.

*Survey Results: When asked to identify their favorite waterbodies, survey respondents provided a long list including the Peace River mainstem, many of its tributaries and smaller streams and creeks. A number of lakes were also named. Interestingly, there were several references to aquifers/springs, wetlands and the Peace-Athabasca Delta. Several respondents noted that 'all sources of water belong to the public and are important'. The condition of these 224 named waterbodies was rated by respondents as good (30%), fair (46%) and poor (24%). Many respondents (71%) noticed changes to aquatic health in recent years with issues such as eroded or degraded shorelines, loss of wetlands, lake algal blooms, creeks going dry, fish populations declining, etc.*

All bodies of water, be they rivers, lakes or wetlands, support an aquatic ecosystem. In order to sustain water supply, for humans as well as other biodiversity, it is important that these ecosystems are healthy: that is, they are robust and resilient to change over time. Aquatic ecosystem health can also provide a good measure of what is happening on the landscape.

An **aquatic ecosystem** is an area where water and other living and non-living elements of the environment interact. This includes the physical, chemical, and biological processes and characteristics of rivers, lakes, wetlands and aquifers and the plants and animals associated with them. A **healthy** aquatic ecosystem is one that sustains its ecological structure, processes, functions and resilience within its range of natural variability.

Under *Water for Life*, a number of projects on aquatic ecosystem health have been carried out. For more information about these projects, see <http://www.waterforlife.alberta.ca/03325.html>.

The biggest impact on the Peace River mainstem was the construction of the WAC Bennett Dam for hydro-electric power generation in the late 1960s. While the dam has changed the pattern of flow, sedimentation and possibly the frequency of flooding in the Peace-Athabasca Delta, it is unclear if these changes have affected the health of this ecosystem.<sup>12</sup> Further work to understand the effects of river regulation may be required and may be undertaken during development of a bilateral agreement between Alberta and British Columbia.<sup>13</sup>

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<sup>12</sup> For more information about the WAC Bennett Dam, see [http://www.bchydro.com/community/recreation\\_areas/w\\_a\\_c\\_bennett\\_dam\\_visitor\\_centre.html](http://www.bchydro.com/community/recreation_areas/w_a_c_bennett_dam_visitor_centre.html).

<sup>13</sup> For more information about bilateral negotiations, see <http://www.waterforlife.alberta.ca/03330.html>.

Today, the Peace River watershed is experiencing increased growth and intensification of urban development, recreation, agriculture, forestry, conventional and *in situ* oil and gas, mining (gravel and coal) and hydroelectric development - all with its associated increase in linear disturbance, such as roads and cutlines. An increase in land-use activities can affect the health of aquatic ecosystems including increasing the amount of habitat degradation and point and non-point source pollution. Impact may be greater on small streams, lakes and wetlands than on the mainstem river, which has a large dilutive capacity. Some signs of stress might include fish declines, algal blooms, degraded water quality, etc.

Since the construction of the WAC Bennett Dam, there have been a large number of studies undertaken on the Peace River, particularly for the Peace-Athabasca delta. As the contribution of the Smoky-Wapiti River system is also significant, this system has also been well-studied.<sup>14</sup> Charette *et al* indicated that there is good information about the water quality of the Peace main stem and Smoky-Wapiti sub-basin.<sup>15</sup> However, less is known about the other sub-basins and about sediment quality and non-fish biota.

Unfortunately, there has never been a comprehensive effort to systematically measure and monitor the health of the Peace River. Without a suite of health indicators, as well as benchmarks and ongoing assessments of these indicators, it is difficult to measure changes due to development. It is also challenging to know what information we need and what is missing in order to understand the cumulative effects of all these activities on the Peace River watershed.

Fortunately, many sectors are implementing beneficial management practices (BMP) and taking other actions to lessen their impact on aquatic ecosystems. For example, agriculture promotes BMPs such as nutrient management, soil conservation and vegetative buffers around riparian areas and wetlands. Municipal governments are using BMPs for stormwater management as well as setbacks and other bylaws to protect waterbodies. They are also working to improve the treatment of wastewaters released downstream. Similarly, the Provincial Government uses buffers and protective notations on riparian lands and river corridors. Likewise, fishing, quadding, boating and stewardship groups are getting into the picture - promoting BMPs, responsible use and stewardship of our aquatic resources.

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<sup>14</sup> One example of a major study was the Northern River Basins Study/ Northern Rivers Ecosystem Initiative. For more on this, see <http://www.ec.gc.ca/nature/default.asp?lang=En&n=9F1F07FE-1>. For a state of the watershed of the entire Mackenzie River basin, of which the Peace River watershed is a part of, see <http://www.mrb.ca/information/34/index.html>.

<sup>15</sup> CharettePellPoscente Environmental Corp and Hutchinson Environmental Sciences Ltd. *Aquatic Ecosystem Health of the Peace Watershed Project: final report June 2012*. Prepared for the Mighty Peace Watershed Alliance, June 2012. 102 pp. Available on the MPWA website.

## WHAT WE LEARNED ABOUT RELIABLE, QUALITY SUPPLIES FOR A SUSTAINABLE ECONOMY

*Water For Life* Outcome: Albertans Will Be Assured That Water Is Managed Effectively To Support Sustainable Economic Development.

*Survey Results: Although most sectors (74%) felt their current water supply is of sufficient quality and quantity to sustain their activities for the next 10-25 years, some qualified this statement by adding 'at current consumption levels'. As mentioned previously, several respondents noted that predicting 25 years ahead was harder to do. Some noted that increased measures, such as re-use, recycling and conservation will be needed to meet all needs. Others felt they didn't have the information they needed to answer the question.*

Many Albertans assume that given the size of the Peace River, water supply is not an issue and agricultural, industrial and other growth opportunities abound in this watershed. And in general, with current allocations somewhat less than 1% of the Peace River average annual volume, water supply is not as big a concern as it is in the southern part of the province. However, many users do not draw directly from the Peace River main stem. Instead, water is withdrawn from lakes, tributaries and aquifers throughout the watershed. Thus supply issues are very dependent on where you are in the watershed. Additionally, periods of prolonged drought or a future change in climate may exacerbate local water supply conditions.

Watercon Consulting *et al* reported that current water allocations (withdrawals for municipal, industrial, agricultural and other uses) in the Peace River watershed are largely from surface water sources (89%) versus groundwater (11%) although this ratio will probably change with greater reliance on groundwater in the future.<sup>16</sup> Of the total current surface water allocations, more than half are from the Smoky sub-basin. Groundwater allocations are largely from the Smoky and Wabasca sub-basins.



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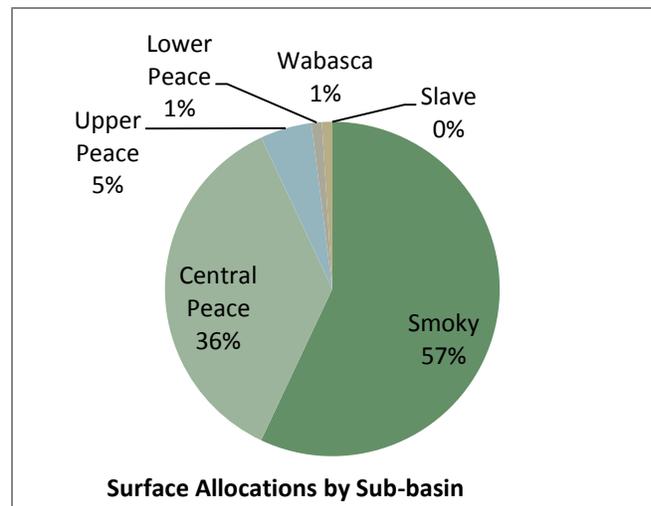
<sup>16</sup> Watercon Consulting, Ellehoj Redmond Consulting, Aquality Environmental Consulting Ltd. and Duane McNaughton, P. Geol. *The Peace Watershed: Current and Future Water Use and Issues*. Prepared for the Mighty Peace Watershed Alliance, March 2012. 125 pp. Available on the MPWA website.

Of all the sub-basins in the Peace River watershed, the **Smoky-Wapiti Sub-basin** is currently the most highly impacted, with the largest population (Grande Prairie and surrounding communities), the most water withdrawals and a number of cumulative impacts from a broad range of land-use activities that occur within its boundaries. The Smoky-Wapiti River system was the subject of controversy over the use of dioxins in the pulp mill industry in the 1980s. The City of Grande Prairie also discharges its treated wastewater to this river system. Over the past three decades, the treatment of wastewaters discharged to the river has been much improved. Additionally, downstream monitoring is now a requirement of licensees, many who participate in joint monitoring and research projects to better understand the requirements of this aquatic ecosystem.

Water use is also predicted to increase in this basin by 26% by 2025. While much of the water withdrawn from this river system is eventually treated and returned, increased withdrawals could further exacerbate water quality and aquatic ecosystem health, particularly during periods of low flow or extended drought. To ensure this sub-basin remains healthy, a water management plan is being developed by Alberta Environment and Sustainable Resource Development and its partners. This plan will look at the instream flow needs of this river system and set a water conservation objective to guide future water allocations. Other management actions for this sub-basin might include enforcing beneficial management practices that limit point and non-point source pollution and an increase of buffers through the protection of riparian areas and wetlands. The MPWA is involved with these sub-basin efforts to ensure outcomes are consistent with outcomes of downstream sub-basins and the Peace River watershed as a whole. For information about water management planning in Alberta, see

[http://environment.alberta.ca/documents/Framework for water management planning.pdf](http://environment.alberta.ca/documents/Framework%20for%20water%20management%20planning.pdf)

Commercial activities (coal, pulp and thermal electricity generation) are the biggest holders of surface water licences (67%) in the Peace River watershed, followed by municipalities (19%), oil and gas (7%) and agriculture (5%). The oil and gas sector holds more than 50% of all groundwater licences. However, what a licensee is allocated, and what is actually diverted and consumed are different stories. Also, many licensees are obligated to return much of their flow (i.e. treated municipal wastewater or pulp mill effluent).



While reporting actual water use is a requirement of many larger-volume licensees, some smaller licensees are unaware that they can voluntarily report their actual water use via an online reporting tool. This information can help inform water managers about true consumption rates and sustainable use. In the Peace River watershed, 57% of respondents with an allocation licence report their actual water use via the on-line reporting tool. Some licensees are unaware of the benefit of reporting, were unsure if they were required to report, or indicated that no one had requested the information from them. [For more information about Water Use Reporting, see Alberta Environment and Sustainable Resource Development webpage at <http://www.waterforlife.alberta.ca/02642.html>.]

Watercon *et al* predicts that water use will increase by 40% in the Peace River watershed between now and 2025. The majority (61%) of this growth will be in industries involved in development of the *in situ* oilsands and heavy oil deposits found within the Central Peace and Wabasca sub-basins. Some population growth and agricultural intensification will also result in more water use in these sectors. Again, with current allocations adding up to less than 1% of the average annual flow of the Peace River, a 40% increase may not seem very large. However, this number should be investigated further to determine local impacts on the Central Peace and Wabasca sub-basins, where much of this growth will occur. The MPWA might benefit from developing water supply scenarios for these sub-basins under moderate and extreme growth predictions. This could be done in conjunction with the Land Use Framework regional planning initiative. The MPWA might also encourage government and industry to conduct more groundwater research in those areas of future anticipated use.



## WHAT WE LEARNED ABOUT KNOWLEDGE AND RESEARCH

*Water For Life* Outcome - Albertans Will Have The Knowledge Needed To Achieve Safe Drinking Water, Efficient Water Use, And Healthy Watersheds.

*Survey Response: When asked whether they had enough information about the water resource in the Peace River watershed, 47% of respondents said 'no', with the rest split between 'yes' or 'maybe'. Many respondents indicated they were not sure if they had all the information they needed. One stated, "I thought I did, but after taking this survey I realize how little I know!" Some suggested it would be helpful if more information was readily available.*

Through the commissioning of four technical reports and the gathering of responses from the survey, the MPWA learned that there is a great deal of information available about the Peace River watershed (including the source, quality and security of drinking water supplies; water use and what individuals and sectors can do to conserve and use it more efficiently; and the health of aquatic ecosystems). However, not everyone has the same access to the same information and information does not necessarily translate into shared knowledge, management decisions and implementation of those decisions.

While there were many suggestions on what additional information was needed, there are some topics that are cited more often (i.e. are more of a concern than others). These are discussed later in this report.



## WHAT WE LEARNED ABOUT PARTNERSHIPS

*Water For Life* Outcome: Citizens And Stakeholders Will Have Opportunities To Actively Participate In Watershed Management On A Provincial, Regional And Community Basis.



*Survey Results: Respondents were mixed on whether there were adequate opportunities to participate in watershed management activities in the Peace River watershed. Some admittedly hadn't really looked into the opportunities, didn't have the time, or weren't sure how to get involved. One respondent noted that while there are adequate opportunities to participate, this does not necessarily lead to changes being implemented.*

Although it is a relative newcomer on the landscape (formed in 2011), the MPWA was formed to give sectors and people living, working and playing in the Peace River watershed an opportunity to participate in water management using a consensus and watershed-based approach. The MPWA is also represented in water policy discussions at the provincial level via the WPAC seat on the board of the Alberta Water Council.<sup>17</sup>

Additionally, local stewardship groups are encouraged to address water issues at a local scale. Stewardship groups (e.g. West County Watershed Society, Clearhills Watershed Initiative, Heart River Watershed and Grimshaw Gravels Aquifer Management Advisory Association) also provide opportunities for individuals and sectors to be involved at the local level. And finally, many other sectors, research, environmental and other organizations are doing water-related work in the Peace River watershed.<sup>18</sup>

In general, people indicated that they would appreciate more information about opportunities to participate. Ways to engage the public, stakeholders and sectors could include more information through social and electronic media, forums and open houses and promoting the formation of more sub-basin or local groups.

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<sup>17</sup> For more information about the Alberta Water Council, see <http://www.albertawatercouncil.ca/>.

<sup>18</sup> Many of these organizations are identified in the MPWA commissioned report *Peace Watershed Directory of Water Organizations and Information Sources* written by Aquality Consulting and posted on their website at <http://www.mightypeacewatershedalliance.org/reports/>.

## WHAT WE LEARNED ABOUT WATER CONSERVATION, EFFICIENCY AND PRODUCTIVITY

*Water For Life* Outcome: Albertans Will Be Leaders In Conservation By Using Water Efficiently And Effectively.

Because of its size, one might think that water conservation, efficiency and productivity have not been a big focus in the Peace River watershed (except in areas of shortage or periods of drought). However, survey results indicated there is a growing awareness about the need to conserve our water resource.

*Survey Results: Many respondents (77%) said they think it is important to conserve water as a valued resource, regardless of the state of supply. Many individuals and sectors are taking steps to reduce their water consumption and make conservation a way of life as opposed to responding only to an urgent concern.*

Water conservation, efficiency and productivity is a big focus of the *Water for Life* strategy which calls for all seven major water-using sectors to produce Water Conservation Efficiency and Productivity (CEP) plans.<sup>19</sup> This planning effort has benefits for the Peace River watershed as well. For example, the Forest Sector has developed a water CEP plan to reduce water use and improve efficiency in the two bleach kraft mills located in the Peace River Watershed. Many municipalities are installing water meters, increasing water delivery costs, and promoting the use of water-saving devices such as low flow toilets or shower heads. Less domestic use equals lower costs associated with treating and releasing wastewaters. Some municipalities are working with industry to re-use treated municipal wastewaters. Industry is looking for an alternative to using non-saline waters. And finally, Agriculture has long been promoting zero or reduced tillage to keep moisture in the soil and reduce run-off.

Individuals can also do their part to reduce water consumption. Many suggestions were made in the survey including reducing household use by being more conscious of water (when brushing teeth, washing dishes, showering, etc); having water-efficient appliances; not having a lawn or using drought-resistant landscaping; using dugout or rain barrels to water the garden; etc.

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<sup>19</sup> For more about these water CEP plans, see <http://www.albertawatercouncil.ca/Projects/WaterConservationEfficiencyandProductivity/tabid/115/Default.aspx>

## BRINGING IT ALL TOGETHER

With technical information, survey responses, and input from several open houses in hand, the MPWA now has a better understanding of what the technical experts, and the people who live, work and play in the Peace River watershed, know about its drinking water, aquatic ecosystems and water supplies. In addition, they have a better understanding of the issues (whether real or perceived) that could be further investigated and addressed. A list of these issues is provided in Appendix 1.



As the MPWA carries out future work on a state of the watershed report and watershed management plan, it may consider the following areas of work:

- *Raise awareness about*
  - The sources of drinking water throughout the watershed;
  - Best practices for preventing and testing for well and dugout contamination; and
  - The types and effectiveness of drinking water filtration systems.
  
- *Improve and share knowledge about*
  - Sustainability of the Grimshaw Gravel Aquifer;
  - Current and future water use, demand and available supply, particularly for groundwater use by the oil and gas sector (for fracturing and injection);
  - Potential risk of, and beneficial management practices to prevent, source contamination particularly in agricultural areas (nutrient and pesticide run-off); downstream of municipalities and industries (cumulative impact of wastewater discharges) and in areas of high recreational use;
  - State of aquatic ecosystem health, particularly for small streams and lakes including fisheries, instream flow needs and riparian health; and
  - The impact on water quality and hydrology from changes in climate, glaciers, precipitation (rainfall and snowpack), surface-groundwater interactions, wetlands/muskeg, permafrost, etc.
  
- *Promote*
  - The formation of watershed stewardship groups;
  - The need for source water protection activities;
  - The use of beneficial management practices by all sectors around waterbodies;
  - Water reuse and recycling and improved wastewater treatment; and
  - The development of Water Conservation, Efficiency and Productivity plans.

- *Undertake specific water management actions including*
  - Develop a water management plan for the Wapiti sub-basin;
  - Develop a selenium management plan for the Upper Smoky and its tributaries;
  - Facilitate a discussion about the Winagami - Kimiwan Lake situation;
  - Prioritize lakes requiring further research or lake management plans to address algae and other issues; and
  - Develop indicators of watershed health and benchmark the current state of these indicators in a state of the watershed report from which future changes can be measured.

While all of the above tasks are important, some have greater priority. For example, the development of key indicators to benchmark the state of aquatic health is probably the highest priority as it will be a guide to all future work. This type of work is also best suited to a multi-stakeholder body, and no other body is likely to undertake it in the near future.

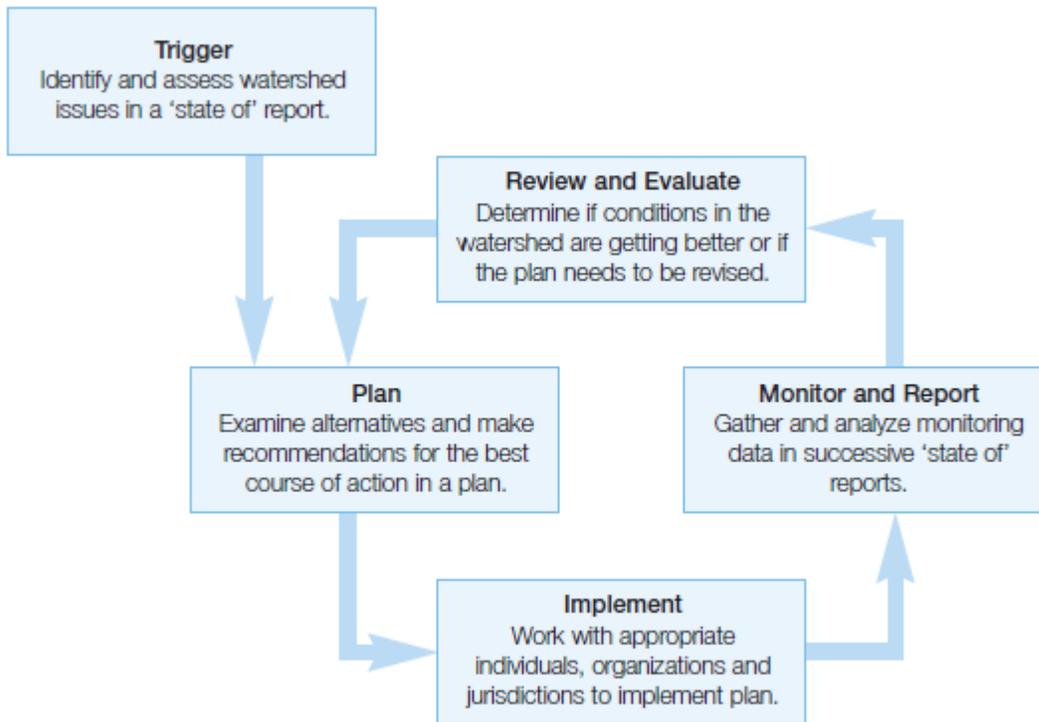
The MPWA should select indicators based on science and the issues identified as impacting aquatic ecosystems specific to the Peace River watershed. A number of examples of indicators are included in the table in Appendix 1. For more information about several of these indicators, see the recently released report, *Guide to Reporting on Common Indicators used in State of the Watershed Reports*.<sup>20</sup> Note also that the report *Peace River Watershed Directory of Water Organizations and Information Sources* written by Aquality Consulting for the MPWA (available on the MPWA website) also provides a detailed list of possible indicators as well as topics that can be included in a state of the watershed report. This directory also provides a listing of existing sources of data in the Peace River watershed.

Most of the indicators listed in Appendix 1 have at least some data available. However the MPWA should consult with its partners to confirm that indicators are appropriate, that data sets are available and ongoing monitoring programs are in place to ensure these indicators can monitor change over time.

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<sup>20</sup> This guide is available online at <http://environment.gov.ab.ca/info/library/8713.pdf>.

Identifying issues and what is known about them is an important first step in the adaptive management approach utilized by Alberta’s Watershed Planning and Advisory Councils (Figure 1 below). With this information in hand, the MPWA can now move forward with assessing issues and benchmarking indicators in a state of the watershed report. Readers who want to stay informed about the future work of the MPWA should ensure they are signed up for the MPWA newsletter. Questions can also be directed to staff at the MPWA office.



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## APPENDIX 1. LIST OF ISSUES IDENTIFIED FOR THE PEACE RIVER WATERSHED

| What is the concern?   | What data currently exists to inform us about this issue?   | How could we benchmark, monitor, or assess this issue in the future?                        | What further information is required but currently missing?  | What other action can the MPWA take to resolve this issue?   |
|--|---|---|--|--|
| The MPWA lacks knowledge about the state of First Nations drinking water and wastewater treatment facilities in the Peace.             | Information is available but challenging to collect. Federal and provincial reports; FN offices; etc.                       | Number of boil water advisories   | Do FN's have access to safe, secure drinking water supplies? How are wastewaters treated and released?                           | Work with Aboriginal MPWA board members to collect this information (via a hired consultant, targeted survey, phone calls, visits, etc.) |
| Some gaps in information about regulated drinking water and wastewater systems for some communities (e.g. subdivisions, water co-ops). | Contact these communities. The MPWA might also consider making a FOIP request to AESRD for non-compliance reports.          | Number of operators in violation of their approvals (provincial and federal).               | Would be good to complete the tables in the Aquality report with details on water treatment and wastewater systems in the Peace. | Continue to follow up with communities and AESRD.  |
| The MPWA did not get a high survey response from more northern sub-basins and the oil and gas and forestry sectors.                    | Likely to be more analysis and discussion about northern and sector water issues through the LUF regional planning process. | Re-run the survey with a target of higher response rates from these sectors and sub-basins. | Are these areas/sectors water issues different than what has already been identified?  | Work with MPWA board members representing CAPP, AFPA and other industry associations to improve sector input into MPWA activities.       |
| Not all private system drinking water operators are testing regularly  | AB Health and Wellness (AHW) and academic papers on provincial testing rates  | Re-run the survey after a PR campaign to see if testing rates improve                       | How many private systems exist; how many are testing their wells; how can rates be improved?                                     | Promote testing via education and outreach campaigns; measure uptake.  |
| Private drinking water system operators lack knowledge about treatment options.  | There is a great deal of information about treatment systems online.  | Could re-run surveys targeted at private system owners.                                     | What treatment options are available; which are more cost effective?   | Work with AHW and ag groups to deliver more info to private owners about cost and efficacy of various treatments.                        |
| Not all residents have access to regulated drinking water systems; cost of building networks may be prohibitive.                       | Both provincial and federal governments have produced reports.  | Surveys to find the percentage of basin residents on regulated networks.                    | What is the cost and efficacy of regional water delivery networks/pipelines; how can small municipalities manage costs?          | Municipalities can continue to work with the GOA and other partners to build networks. The MPWA should be aware of these initiatives.    |

| What is the concern?  | What data currently exists to inform us about this issue?  | How could we benchmark, monitor, or assess this issue in the future?  | What further information is required but currently missing?  | What other action can the MPWA take to resolve this issue?  |
|---|--|---|--|---|
| Some areas are experiencing source water supply issues now.   | AESRD licensing and water use reporting information.   | <p>Support development of a water management plan for the Wapiti River that includes indicators for future monitoring of the achievement of plan outcomes.</p> <p>Encourage AESRD to undertake instream flow studies and add hydrometric stations with real time data capabilities to those communities with instream flow limits on their water withdrawals.</p> | <p>Which source waterbodies require future work?</p> <p>What is the state of the Wapiti River; how can current quantity/quality pressures be managed?</p> <p>What are the water supply needs of Kimiwan Lake; how can these be met?</p> <p>What does a future 40% increase in water use look like in the Wabasca and Central Peace sub-basins?</p> | Develop an inventory of current water supply; do some scenario work to determine future human, industry and environmental needs and areas of potential shortfall; prioritize waterbodies (reaches of the mainstem, major and other tributaries, small streams, lakes, aquifers) which may require further management including evaluating instream flow needs before major developments/ withdrawals. |
| Potential for source water contamination by non-point pollution (run-off) and degradation of buffers (riparian areas and wetlands) in agricultural areas. | <p>Surface water is monitored by AESRD as part of the Long Term River Network. Stations are on the Smoky River at Watino and the Peace River at Fort Vermilion. For more information, see <a href="http://environment.alberta.ca/01275.html">http://environment.alberta.ca/01275.html</a>.</p> <p>Some tributaries are monitored by local Ag and stewardship groups. Very few lakes are monitored.</p> | <p>Surface Water Quality Indicator*</p> <p>Nutrient [N,P] concentrations*</p> <p>Bacteria concentrations*</p> <p>Riparian Health*</p> <p>Land cover/land use indicator* as a proxy for high risk areas for non-point source pollution</p>   | <p>What is the impact of non-point pollution from agriculture now? How will this change as agriculture intensifies in the future? Where will the impact be greatest?</p>   | <p>Raise awareness by develop a map/list of all waterbodies that are a source of someone's drinking water.</p> <p>Promote the use of BMPs (buffers, etc); enforce legislated setback, riparian and wetland requirements where they exist; improve community source protection assessments.</p>  |

| What is the concern?  | What data currently exists to inform us about this issue?  | How could we benchmark, monitor, or assess this issue in the future?   | What further information is required but currently missing?   | What other action can the MPWA take to resolve this issue?   |
|---|--|--|---|--|
| Potential for source water contamination by cumulative point source pollution (treated wastewaters), non-point pollution (run-off), and degradation of buffers (riparian areas and wetlands) from municipal areas.                                  | Promote and encourage communities to develop source protection plans for surface and groundwater supplies  | Report on the number of communities that have completed source protection plans.   | What are sectors doing to limit source and non-point source pollution?  | In collaboration with board members, could develop fact sheets and other materials to support source water protection planning and reduction of non-point source pollution.  |
| Impact on hydrology, water quality and aquatic health of current and future hydro-electric power generation /river regulation   | Information is available on individual projects through environmental impact assessments; AESRD or academia could model cumulative effects   | Flow Commitments (WCO, IFN, transboundary)*  | What is the effect of current and future river regulation on aquatic health of the Peace River?   | Be informed of bilateral negotiations.   |
| Impact on supply, quality and aquatic health of extended periods of drought, changes in precipitation (glaciers, snowpack, rainfall, permafrost, etc) and/or climate change.  | As above, AESRD or academia could model cumulative effects   | Variations in Annual Flow and Lake Levels*   | Do we have sufficient gauging stations in the headwaters to detect changes?   | Encourage academics/ researchers to undertake climate change /glacier/snowpack and other research in order to predict the impact of climate change on this specific watershed  |
| Cumulative impact of growth and development (including the activities listed above and increasing linear corridors in AB and the headwaters in BC) on current and future water supply (particularly groundwater, lakes, small streams and wetlands) | Aqatera and Weyerhaeuser currently conduct some monitoring/studies on the Wapiti River.<br><br>Improve current monitoring to better understand seasonal and annual variations, impact of regulation, withdrawals, etc. | Linear disturbance*<br>Surface Water Allocations (compared to average natural flow)*<br>Variation of annual flow and/or lake levels*<br>Groundwater Allocations*<br>Groundwater Well Density*<br>Unlicensed Allocations and Withdrawals*<br>Land use/Land Cover* | How sustainable are our groundwater resources (aquifer recharge, discharge and allocation rates for the Grimshaw, Whitlaw and Warrensville aquifers)?<br><br>What is the impact of withdrawals on small streams; what are non-compliance rates with temporary diversions? | Work with others to improve knowledge of gw and small stream sustainability and lake health, particularly for source waters<br><br>Share knowledge about the effects of sector water use (particularly fracing and injecting and the Peace in situ oilsands) with the public |

| What is the concern?  | What data currently exists to inform us about this issue?  | How could we benchmark, monitor, or assess this issue in the future?   | What further information is required but currently missing?   | What other action can the MPWA take to resolve this issue?  |
|---|--|--|---|---|
| Water supplies may not meet all needs in all areas, over the long term (25 years)   | Water licensing and water use reporting.   | Report on water allocations  | How much water is actually consumed versus allocated.<br><br>What will future water use look like?  | Promote water re-use; water recycling; conservation, efficiency and productivity planning; and use of saline over fresh water supplies<br><br>Promote improved water use reporting; publish water use statistics – recognize sector improvements<br><br>Get a better understanding of water use needs for tourism and transportation/navigation |
| Cumulative impact of growth and development (including the activities listed above and increasing linear corridors in AB and the headwaters in BC) on aquatic health (particularly for lakes and small streams) | Individually, most sectors have data on where they are active. These data layers will likely be collected and amalgamated for the Land Use Framework Upper and Lower Peace Regional Plans. | Identify potential aquatic ecosystem health indicators for a state of report and prioritize waterbodies that are currently degraded for future work.<br><br>Lake Trophic status*<br><br>Set a wetland outcome in a wmp | Which waterbodies are degraded? How can they be restored?   | Do riparian assessment along the mainstem to determine impact of river regulation.<br><br>Determine if more natural flows are required to maintain river health (discussed through transboundary negotiations)  |
| The health of some waterbodies appears to have already declined.  | Depends on the topic: AESRD/DUC have some wetland data; Cows and Fish and some stewardship groups have riparian data; AESRD has fisheries data, etc.                                       | Fish Sustainability Index*<br>Fish Community Index*<br>Biotic Integrity*<br><br>Develop riparian and wetland health indicators   | What are the changes to water clarity/quality/ quantity; changes to fish and other aquatic species health; changes in erosion and enrichment / increases in algal blooms, wetlands, | Raise awareness about the importance of sustainable aquatic ecosystems; how users can reduce their impact<br><br>Improve knowledge regarding lake levels and occurrence of algal  |

| What is the concern?  | What data currently exists to inform us about this issue?                           | How could we benchmark, monitor, or assess this issue in the future?                          | What further information is required but currently missing?  | What other action can the MPWA take to resolve this issue?  |
|---|---|---|--|---|
|   |   | Develop a selenium management plan for waters affected by mining (Sheep and Beaverdam Creeks) |  | blooms<br><br>Identify and undertake restoration of degraded areas; work with DUC and other conservation groups to protect habitat  |
| Not everyone knows what their water consumption is or how to reduce it. Residents want more information about water easily accessible | Survey data. Some municipalities might have more information from their ratepayers. | Promote water metering  | Provide information on what sectors and individuals can do<br><br>Compare to other basins in Alberta; other jurisdictions. | Provide water use audits with tips on how to improve; Provide incentives for installing low flow fixtures; Provide education and outreach materials through school curricula, utility bill inserts, social media, documentaries, open houses, surveys; presentations to councils, industry groups, etc. |
| Individuals lack knowledge about what the MPWA does and how they can get more involved in watershed management issues                 | Survey results, open house anecdotal evidence.                                      | Re-do survey after a media campaign   | Nothing missing: the MPWA should continue to make its work known through its website, reports, open houses, etc.           | Support AQUA day; promote Cows and Fish and Living by Water. Promote stewardship groups at the sub-basin level, etc.  |

\*Indicators marked with an asterisk are indicators that have been identified in Alberta Environment and Sustainable Resource Development's *Guide to Reporting on Common Indicators Used in State of the Watershed Reports*.