

## Limitations of watershed-wide data narrow scope of the online Athabasca State of the Watershed Report—Phase 2

The Athabasca Watershed Council (AWC-WPAC) met for a workshop on January 19-20, 2012 to follow-up on the progress of their ongoing project, the online Athabasca State of the Watershed (SoW) Report—Phase 2 (SoW P2). The project started in September 2011.

The consultant for the project, Fiera Biological Consulting, presented and requested input from workshop participants including the AWC-WPAC governing board and staff, and a representative from Athabasca University.

A major feature of the project is an online Interactive Atlas that presents watershed data and information in map format (spatial layers). Information can be viewed at the watershed, sub-watershed, and tertiary watershed scales. There are 10 sub-watersheds and 31 tertiary watersheds as shown in Fig. 1.

A key component of the SoW P2 project was to derive a Watershed Health Index (WHI) for each of the 10 sub-watersheds and the entire Athabasca watershed. A complete WHI model was not possible at this time because watershed-wide data was available for only **11 pressure indicators** out of a total of **33 condition and pressure indicators** needed to determine overall watershed health. These are listed on page 2 and the 11 pressure indicators are highlighted in blue.

In the future, the WHI of each sub-watershed will be determined based on the health rank (poor, fair, good) of all the 33 condition and pressure indicators. These ranks will be based on scientifically determined thresholds. WHI of the entire Athabasca watershed will be based on the WHI of all the 10 sub-watersheds.

Of the 11 pressure indicators that have watershed-wide data, only 3 or 4 indicators have scientific thresholds that indicate **pressures** to watershed health. At this time, the data collected are not sufficient to determine the actual **condition** or health of the sub-watersheds or watershed. The pressure indicator maps will be presented in the online interactive Atlas showing pressure ranks (low, moderate, high) derived at the tertiary watershed scale. An example of this map for the indicator, *stream connectivity*, is shown in Fig. 2.

The project is scheduled to be completed on March 1, 2012. It will be a living online report and will continually be updated as more information is compiled.

### Glossary of Terms:

**Criteria** are categories of conditions or processes that characterize the aquatic environment and can be used to evaluate watershed health. **Indicators** are measurable (quantitative) or descriptive (qualitative) variable that can be used to observe, evaluate, or describe trends as a criterion changes over time.

**Condition indicators** tell us exactly what is the condition of air, water, land/soil, and biodiversity through measurements by comparing them with established thresholds or guidelines values. **Pressure indicators** result from human activities that pose risk to air, water, land/soil and biodiversity.

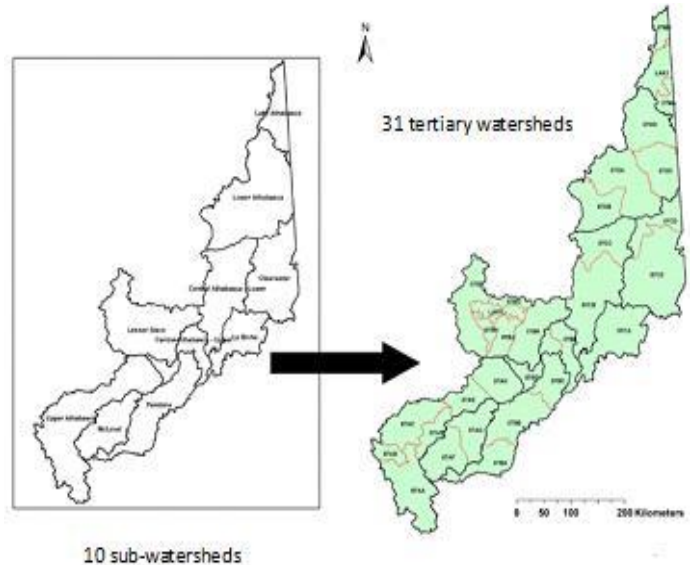


Fig. 1 Sub-watersheds and tertiary watersheds

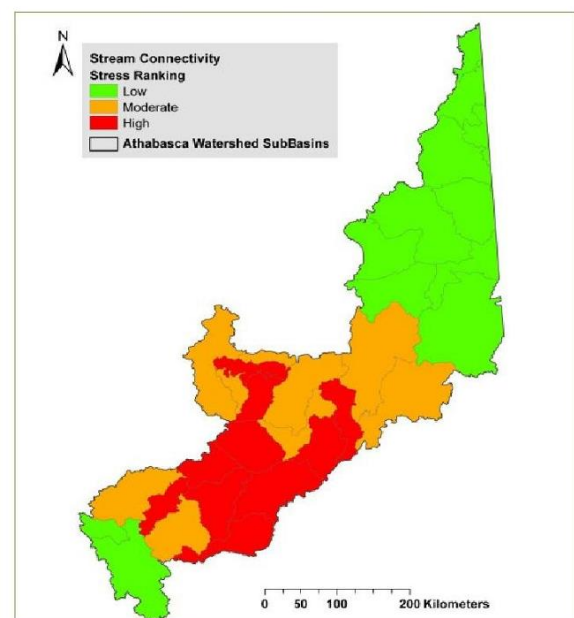


Fig. 2 Pressure ranks for stream connectivity

## Criteria and Indicators for Determining the Athabasca Watershed Health Index

### Criterion 1 Conservation of Biological Diversity

Proposed Indicator	Indicator Type	Proposed Measure
1.1 Fish Community	Condition	Occurrence of focal fish species
1.2 Aquatic Bird Community	Condition	Occurrence of aquatic bird guilds
1.3 Amphibian Community	Condition	Occurrence of focal species or species guilds
1.4 Macro-invertebrate Community	Condition	Intactness Index
1.5 Mammal Community	Condition	Species occurrence for mammals associated with aquatic or riparian habitats
1.6 Rare Species	Condition	Occurrence or rare or threatened species
1.7 Focal Habitat	Condition	Presence of critical habitat
1.8 Wetland intactness	Condition	Intactness Index
<b>1.9 Stream Connectivity</b>	<b>Pressure</b>	<b>Contiguous reaches streams &amp; rivers unimpeded by roads, dams, or control structures</b>

### Criterion 2 Maintenance of Surface Water Quality

2.1 Surface Water Quality	Condition	Seasonal measure of metals, nutrients, bacteria, & pesticides in major rivers
2.2 Lake Trophic Status	Pressure	Chlorophyll-a concentration
<b>2.3 Landscape/Stream Intactness</b>	<b>Pressure</b>	<b>Total area of intact and road-less native vegetation, Riparian Health*</b>
2.4 Land Use Nutrient Runoff Coefficient Model	Pressure	Landscape-level Index of Phosphorus, Nitrogen, & Sediment Stream Runoff
2.5 Sediment Quality	Condition	Seasonal measure of metals, nutrients, bacteria, & pesticides in river sediments
2.6 Water Clarity	Condition	Total Suspended Solids in the Athabasca main stem

### Criterion 3 Maintenance of Ecologically Significant Water Levels & Flows

<b>3.1 River Water Flow &amp; Availability</b>	<b>Pressure</b>	<b>River Flow Quantity Index; surface water allocation; flow vs. water conservation objectives</b>
3.2 Lentic Water Availability	Pressure	Water availability in lakes & wetlands
<b>3.3 Surface Water Withdrawals</b>	<b>Pressure</b>	<b>Total Volumes</b>

### Criterion 4 Maintenance of Groundwater Quality & Quantity

<b>4.1 Groundwater Withdrawal</b>	<b>Pressure</b>	<b>Density of licensed wells; Maximum annual groundwater allocations</b>
4.2 Groundwater Quality	Condition	[Data deficient]

### Criterion 5 Watershed Pressures

<b>5.1 Linear Disturbance</b>	<b>Pressure</b>	<b>Road density, density of all linear features</b>
5.2 Linear Disturbance Change	Pressure	% increase in linear features density over time
<b>5.3 Land Use/Land Cover</b>	<b>Pressure</b>	<b>Areal extent (%) of human disturbances (agricultural land, surface mining, cutblocks, etc.) cover. Areal extent (%) of natural land cover (native forest, grassland, riparian, etc.)</b>
<b>5.4 Land Use/Land Cover Change</b>	<b>Pressure</b>	<b>% Change in land use/ land cover by category between 1976-2010</b>
5.5 Land Conversion	Pressure	Areal extent of land conversion from natural cover category to a human disturbance cover category between 1976-2010
<b>5.6 Point Source Contaminants</b>	<b>Pressure</b>	<b>Density of known industrial point source discharges</b>
<b>5.7 Agricultural Non-Point Source Contaminants</b>	<b>Pressure</b>	<b>Density of livestock; intensity &amp; extent of agricultural inputs (pesticides, fertilizer, manure)</b>
5.8 Climate Regime	Pressure	Change in mean annual & seasonal temperature. precipitation
<b>5.9 Population Density</b>	<b>Pressure</b>	<b>Increase in population density 2001-2006</b>
5.10 Wetland Loss	Pressure	% Loss of wetlands; number of Water Act approval issued for wetland drainage/filling
5.11 Mainstem Flow	Pressure	% Change in mainstem flow
5.12 Surface & sub-surface mining	Pressure	Area of permitted oil & gas wells & surface/subsurface material leases issues by AEW (5yr interval)
5.13 Traditional Land Use	Pressure	Demographic shift of First Nations from traditional lands to urban areas
5.14 Acid Sensitive Lakes	Pressure	% of lakes identified as being acid-sensitive