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What's going on in Canada, eh?

Indicator reporting on water or watersheds?	National level	
	Province / Territory level	
	Watershed / Basin level	
Nesting/aggregation of indicators at watershed scales up to provincial/national scales?		

Watershed / Basin – Level Reports/Report Cards

Mackenzie River Basin State of the Aquatic Ecosystem
2003

2003, 2004, 2006, 2009
State of the Fraser Basin

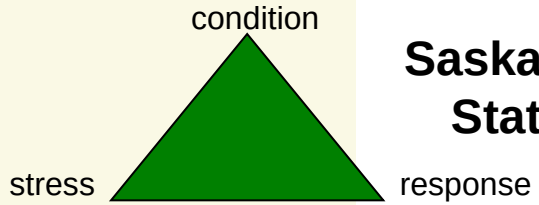
Saskatchewan State of the Watershed
2010

State of the Great Lakes
2005, 2007, 2009

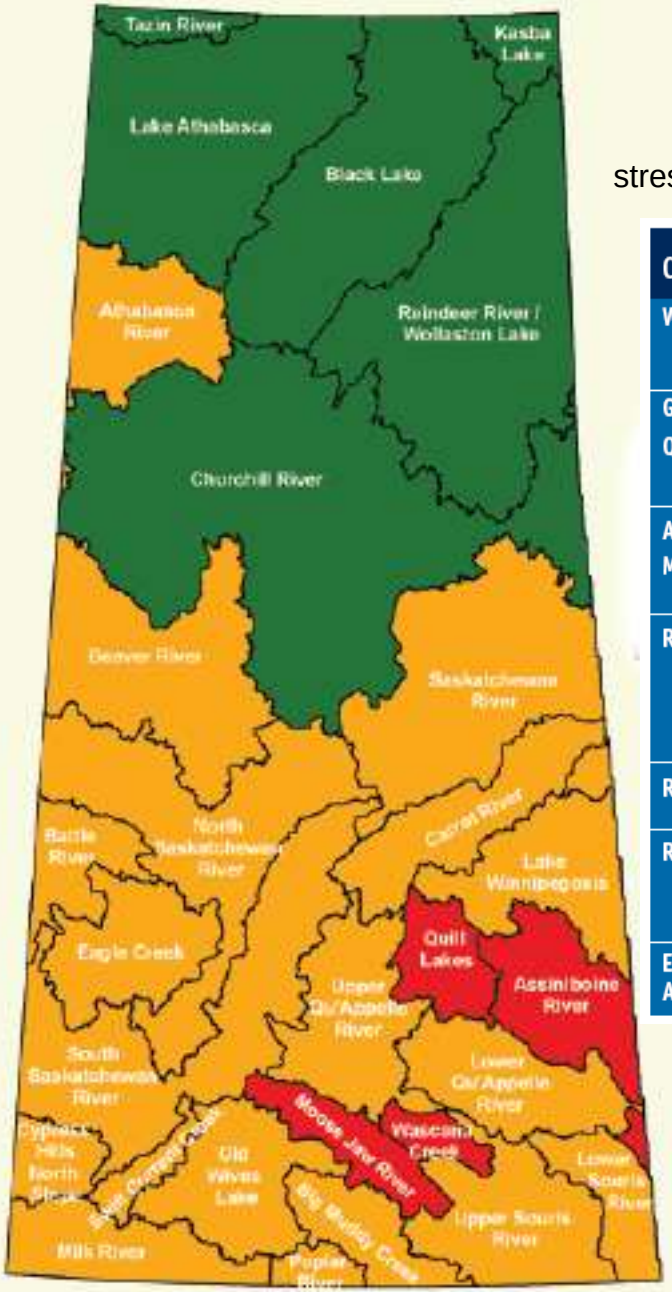
Report Cards for 36 Conservation Authorities

State of the St. Lawrence River

Saskatchewan Watershed Authority – State of the Watershed Report 2010



Condition Indicators	Indicator Descriptions	Impacted	Stressed	Healthy
Water Quality	The Water Quality Indicator is an assessment of the chemical, biological and physical constituents within the water.	< 45	45 to 79	80 to 100
Ground Water Quantity	The Ground Water Quality indicator measures the percentage of ground water wells that exceed human-influenced Maximum Acceptable Concentrations.	> 50%	> 0% to ≤ 50%	0%
Aquatic Benthic Macroinvertebrates	The Aquatic Benthic Macroinvertebrates Indicator assesses the health of aquatic benthic macroinvertebrates in Saskatchewan.	≤ 10%	11% to 89%	≥ 90%
Riparian Health	The Riparian Health Indicator measures the ability of a riparian area to perform the essential functions of trapping sediment, filtering runoff, stabilizing streambanks, recharging ground water, and providing wildlife habitat.	< 60%	60% to 79%	80% to 100%
Riparian Buffer	Riparian Buffer is the percent of permanent cover within a 40 metre strip of the adjacent waterway.	< 25%	25% to 74%	75% to 100%
Rangeland Health	The Rangeland Health Indicator measures the ability of a rangeland to perform the essential functions of reducing soil erosion, increasing water infiltration and reducing runoff.	< 50%	50% to 74%	75% to 100%
Environmental Acid Deposition	This indicator measures the exceedance of critical load of atmospheric sulphur and nitrogen deposition.		> 0 eq/ha/yr	≤ 0 eq/ha/yr



Watershed Health

- Healthy
- Stressed
- Impacted

Watershed colour = "worst' score among indicators

Figure 3. Health of watersheds based on condition indicators.

Watershed	Condition	Stressor	Response	Footprint value
Black Lake	Healthy	Low Intensity	High Response	3
Churchill River	Healthy	Low Intensity	High Response	3
Lake Athabasca	Healthy	Low Intensity	High Response	3
Reindeer River/ Wollaston Lake	Healthy	Low Intensity	High Response	3
Athabasca River	Stressed	Low Intensity	High Response	4
Kasba Lake	Healthy	Low Intensity	Moderate Response	4
Milk River	Stressed	Low Intensity	High Response	4
Saskatchewan River	Stressed	Low Intensity	High Response	4
Tazin River	Healthy	Low Intensity	Moderate Response	4
Battle River	Stressed	Moderate Intensity	High Response	5
Beaver River	Stressed	Moderate Intensity	High Response	5
Big Muddy Creek	Stressed	Low Intensity	Moderate Response	5
Carrot River	Stressed	Moderate Intensity	High Response	5
Cypress Hills North Slope	Stressed	Moderate Intensity	High Response	5
Eagle Creek	Stressed	Low Intensity	Moderate Response	5
Lake Winnipegosis	Stressed	Moderate Intensity	High Response	5
Lower Souris River	Stressed	Moderate Intensity	High Response	5
North Saskatchewan River	Stressed	Moderate Intensity	High Response	5
South Saskatchewan River	Stressed	Moderate Intensity	High Response	5
Swift Current Creek	Stressed	Moderate Intensity	High Response	5
Upper Qu'Appelle River	Stressed	Moderate Intensity	High Response	5
Lower Qu'Appelle River	Stressed	High Intensity	High Response	6
Old Wives Lake	Stressed	High Intensity	High Response	6
Poplar River	Stressed	High Intensity	High Response	6
Quill Lakes	Impacted	Moderate Intensity	High Response	6
Upper Souris River	Stressed	High Intensity	High Response	6
Assiniboine River	Impacted	High Intensity	High Response	7
Moose Jaw River	Impacted	High Intensity	High Response	7
Wascana Creek	Impacted	High Intensity	High Response	7

Footprint values by watershed

Looking Ahead…

Canadian Water Security Index

- ecosystem health
- human health
- water quantity
- water quality

- Composite index; will roll up
- Led by UBC Program on Water Governance (many partners)

New Canadian *Development Sustainability Act*

- Requires scientifically measurable sustainability targets, plans to meet them, and annual reporting on performance

Emerging trend → economic valuation of water

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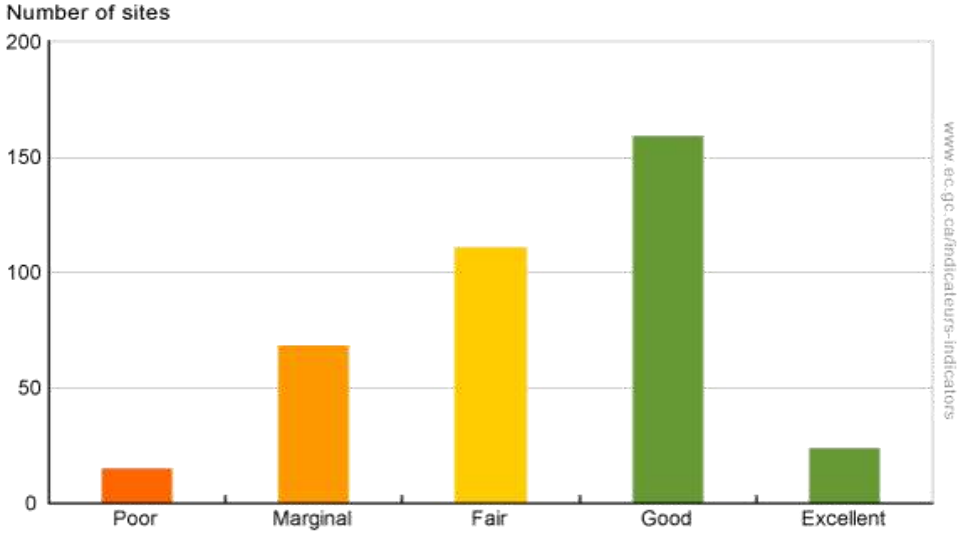
Extra slides follow…

National Level

Status of freshwater quality for protection of aquatic life at monitoring sites in southern Canada, 2004 to 2006



Note: Water quality was assessed using the Canadian Council of Ministers of the Environment's (CCME) Water Quality Index (WQI). This chart is based on data from 379 monitoring sites, including 11 lake sites and 368 river sites in southern Canada. Although 9 sites in Manitoba had 1 fewer sample than required for 2004 and 2005, these sites were retained in the histogram, as they were for the 2007 report. Full validation of the data for 35 sites in Manitoba has not been completed.

Source: Data assembled by Environment Canada and Statistics Canada from federal, provincial, territorial and joint water quality monitoring programs.

☹ ***"No centralized framework of indicators, either standards or guidelines at a fed/prov level (aside from the CCME WQI)."***

☹ ***"Each jurisdiction develops tools within their boundaries. No national framework."***

☹ ***"There is no central place to access or locate information (web portal or database)."***

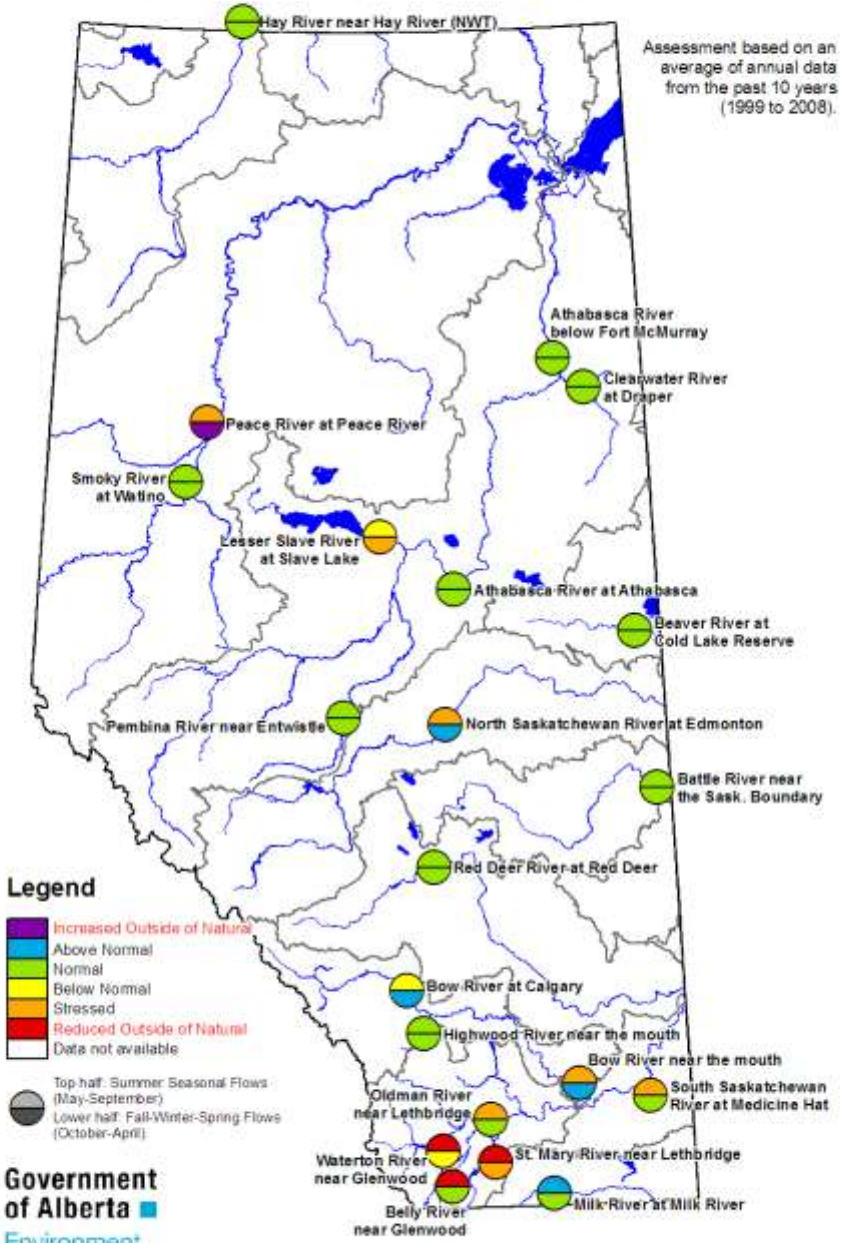
☹ ***"It is difficult and time consuming to search the many disparate systems to gather information."***

☹ ***"A patchwork quilt of indicators and models, with too little consistency and too much potential for either overlap and duplication of effort, or gaps that need to be addressed"***

From: Dunn 2009. http://www.watergovernance.ca/PDF/IndicatorsReportFINAL2009.pdf

Provincial Level example

Water Resources Reporting in Alberta



Indicator	Safe Secure Drinking Water Supply	Healthy Aquatic Ecosystems	Reliable, Quality Water Supplies for a Sustainable Economy
Lake Level Index	Little or no relationship	Strong relationship	Little or no relationship
Lake Trophic Status	Little or no relationship	Strong relationship	Little or no relationship
Reservoir Index	Little or no relationship	Strong relationship	Strong relationship
River Flow Quantity Index	Strong relationship	Strong relationship	Strong relationship
River Water Quality Index	Strong relationship	Strong relationship	Strong relationship
River Nutrient Index	Little or no relationship	Strong relationship	Little or no relationship
River Bacteria Index	Strong relationship	Strong relationship	Little or no relationship
River Pesticide Index	Strong relationship	Strong relationship	Little or no relationship
Trends in Groundwater Observation Wells	Little or no relationship	Little or no relationship	Strong relationship
Groundwater Well Density	Little or no relationship	Little or no relationship	Little or no relationship
Water Allocations by Sector	Strong relationship	Little or no relationship	Strong relationship
Water Allocations - Compared to Natural Flows	Strong relationship	Strong relationship	Little or no relationship
Hydrometric Monitoring Network	Little or no relationship	Strong relationship	Strong relationship
Waters Used for Oilfield Injection	Little or no relationship	Little or no relationship	Little or no relationship
Water Used for Irrigation	Little or no relationship	Little or no relationship	Little or no relationship
Sharing Water	Little or no relationship	Little or no relationship	Strong relationship
Pulp Mill Effluent Loads	Little or no relationship	Little or no relationship	Little or no relationship
Watershed Organizations	Strong relationship	Strong relationship	Strong relationship

Legend	Strong relationship	Moderate relationship	Little or no relationship

From: http://www3.gov.ab.ca/env/soe/water.html#print

Annual Alberta River Flow Quantity Index: 1986 - 2006 Historical Summary

Alberta Environment

- Seasonal flow exceeded outside of natural range] Increased Outside of Natural
- Seasonal flow above normal natural] Above Normal
- Seasonal flow within normal natural] Normal
- Seasonal flow below normal natural] Below Normal
- Seasonal flow much below normal natural] Stressed
- Seasonal flow diminished outside of natural range] Reduced Outside of Natural

Summer seasonal flow (May to September)

Fall-Winter-Spring (F-W-S) seasonal flow (Oct. to Dec. (prev. year) plus Jan. to Apr.)

White/blank indicates fow data not available

Seasonal natural normal flow (green) = 50% probability

River	Season	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Long term (10-Year) Assessment
Athabasca River at Athabasca (natural flow)	Summer																						Normal
	F-W-S																						Normal
Athabasca River below Fort McMurray (natural flow)	Summer																						Normal
	F-W-S																						Normal
Battle River near the Saskatchewan Boundary (minor regulation and flow diversion)	Summer																						Below Normal
	F-W-S																						Normal
Beaver River at Cold Lake Reserve (natural flow)	Summer																						Normal
	F-W-S																						Normal
Belly River near Glenwood (significant regulation and flow diversion)	Summer																						Reduced
	F-W-S																						Normal
Bow River at Calgary (regulation)	Summer																						Below Normal
	F-W-S																						Above Normal
Bow River near the mouth (significant regulation and flow diversion)	Summer																						Reduced
	F-W-S																						Normal
Clearwater River at Draper (natural flow)	Summer																						Normal
	F-W-S																						Normal
Highwood River near the mouth (flow diversion)	Summer																						Normal
	F-W-S																						Normal
Lesser Slave River at Slave Lake (weir-regulated lake outflow)	Summer																						
	F-W-S																						
Milk River at Milk River (significant flow diversion into system)	Summer																						Above Normal
	F-W-S																						Normal
North Saskatchewan River at Edmonton (regulation by Bighorn & Brazeau Dams-TAU)	Summer																						Stressed
	F-W-S																						Above Normal
Oldman River near Lethbridge (significant regulation and flow diversion)	Summer																						Stressed
	F-W-S																						Normal
Peace River at Peace River (regulation by Bennett Dam-BC Hydro)	Summer																						
	F-W-S																						
Pembina River near Entwistle (natural flow)	Summer																						Normal
	F-W-S																						Normal
Red Deer River at Red Deer (regulation by Dickson Dam)	Summer																						Normal
	F-W-S																						Normal
Smoky River at Watino (natural flow)	Summer																						Normal
	F-W-S																						Normal
South Saskatchewan River at Medicine Hat (significant regulation and flow diversion)	Summer																						Stressed
	F-W-S																						Normal
St. Mary River near Lethbridge (significant regulation and flow diversion)	Summer																						Reduced
	F-W-S																						Stressed
Waterton River near Glenwood (significant regulation and flow diversion)	Summer																						Reduced
	F-W-S																						Below Normal

Stress

- Low Intensity
- Moderate Intensity
- High Intensity

Figure 4. Stress rating of watersheds based on stressor indicators.

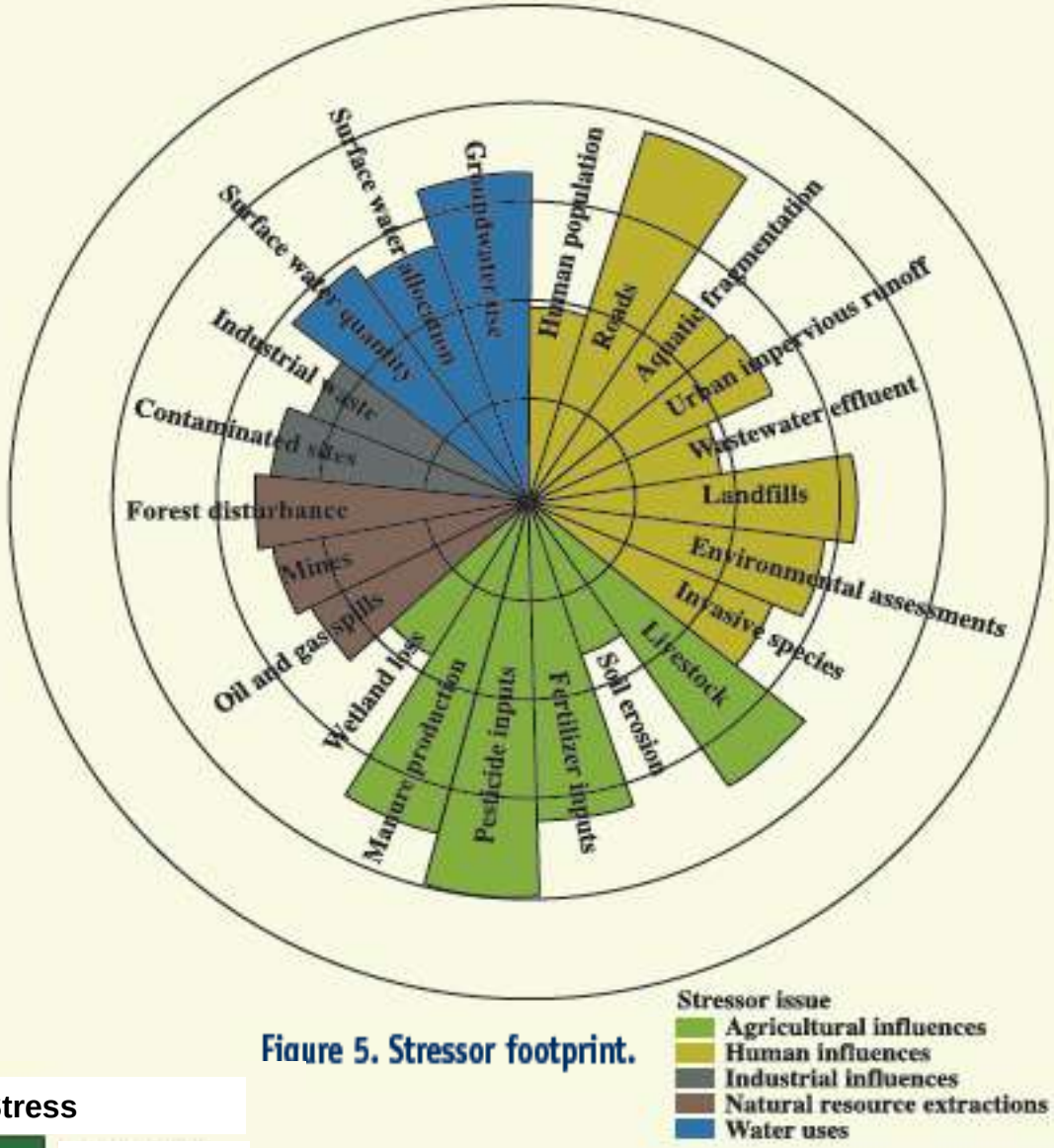
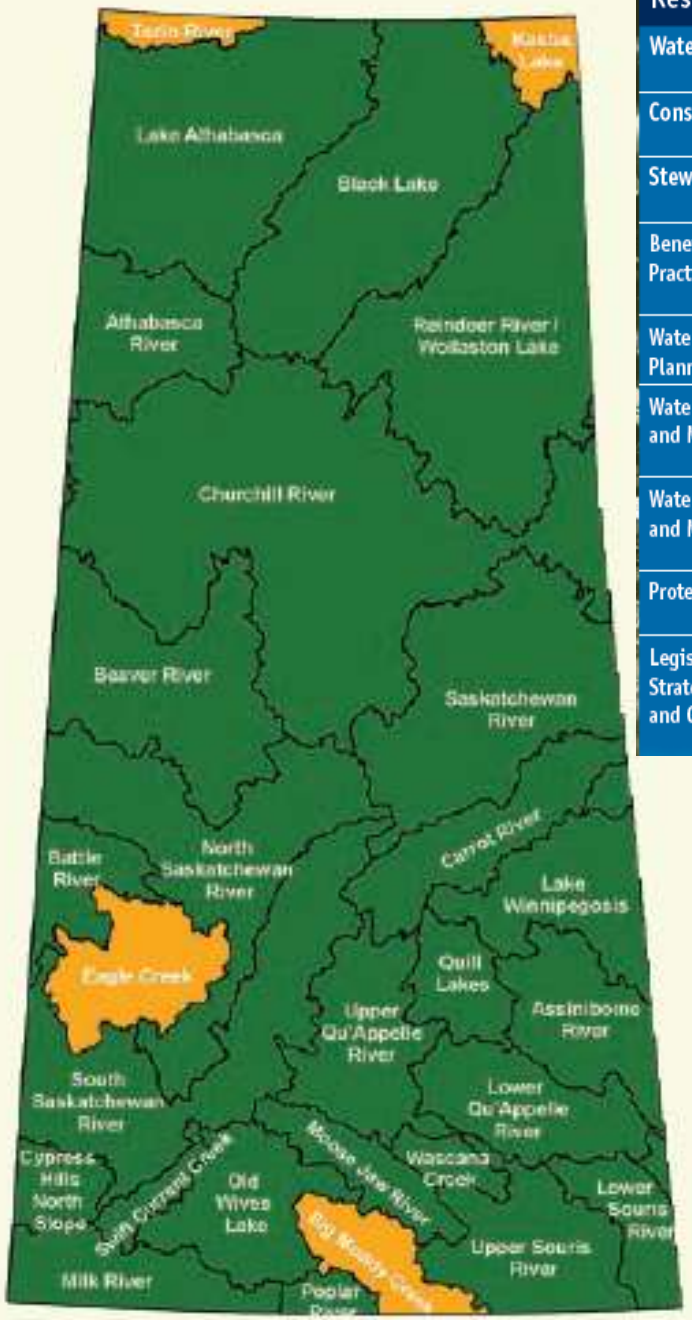


Figure 5. Stressor footprint.

Green = <3 of the 22 indicators rated high intensity
Yellow = 3-5 rated high intensity
Red = >5 rated high intensity



Response Indicators	Indicator Descriptions	Absent/Gap	Present
Water Conservation	This indicator reports on the water conservation methods employed within Saskatchewan.	Yes	Yes
Conservation Stewards	This indicator reports on the number of volunteer stewards within a watershed.	Yes	Yes
Stewardship Workshops	This indicator reports on the number of stewardship workshops per watershed.	Yes	Yes
Beneficial Management Practices	This indicator outlines the Beneficial Management Practices that have been funded or adopted by watershed.	Yes	Yes
Watershed and Land Use Planning	This indicator assesses land use planning activities by watershed.	Yes	Yes
Water Quality Monitoring and Management	This indicator reports on the government-led water quality monitoring programs that are active by watershed.	Yes	Yes
Water Quantity Monitoring and Management	This indicator reports on the government-led water quantity monitoring programs that are active by watershed.	Yes	Yes
Protected Areas	This indicator reports on the percent of protected area by watershed.	Yes	Yes
Legislative Tools, Strategies, Policies, and Guidelines	This indicator reports on the federal and provincial legislation, strategies, policies and guidelines that have been developed to address environmental issues in Saskatchewan.	Yes	Yes

Responses

- Moderate response rating
- High response rating

Red = <50% of response indicators present/active
Yellow = 50-75% of response indicators present/active
Green = ≥75% of response indicators present/active in the watershed

Figure 6. Response rating by watershed.

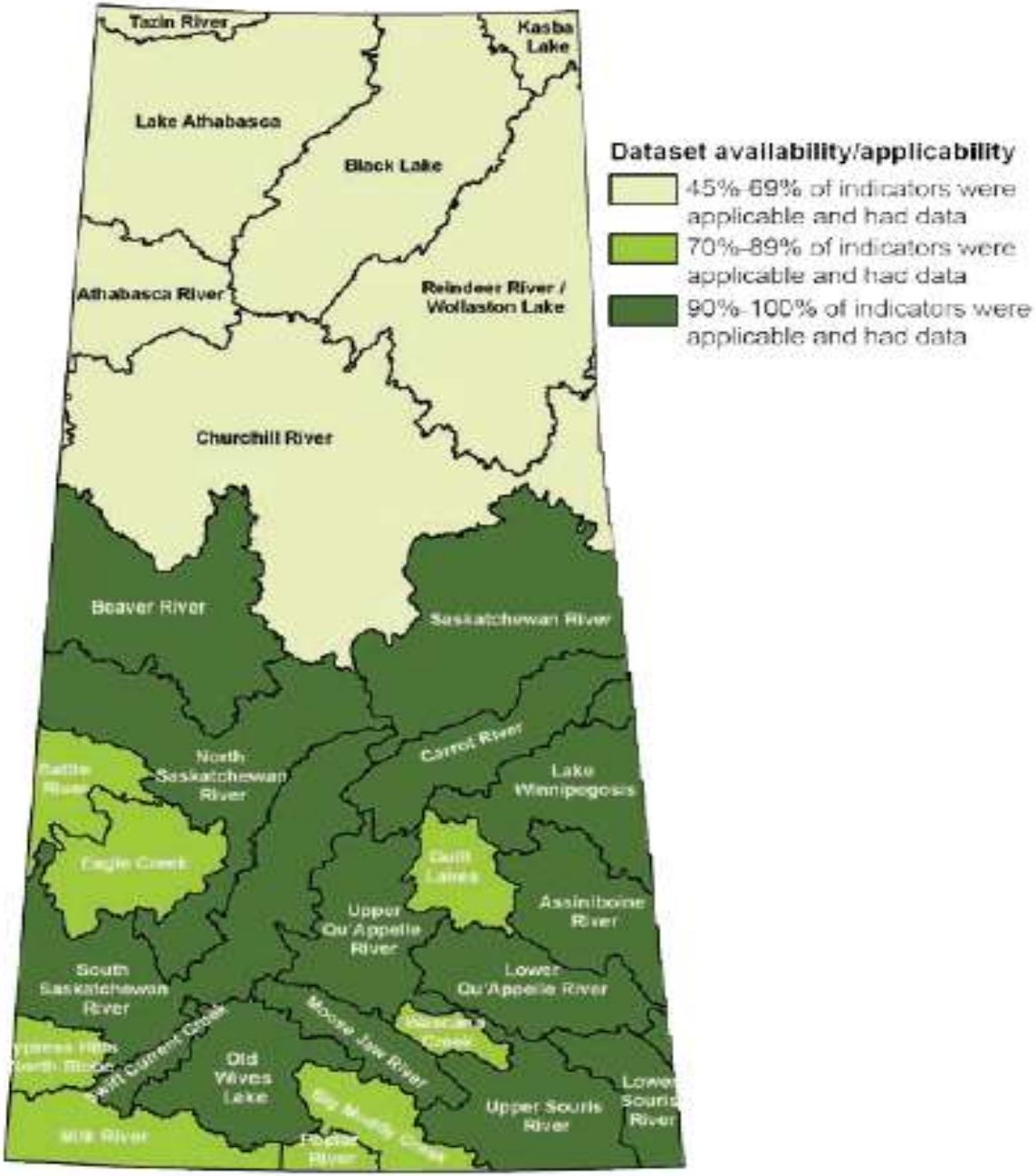


Figure 10. Indicator data availability and applicability by watershed.