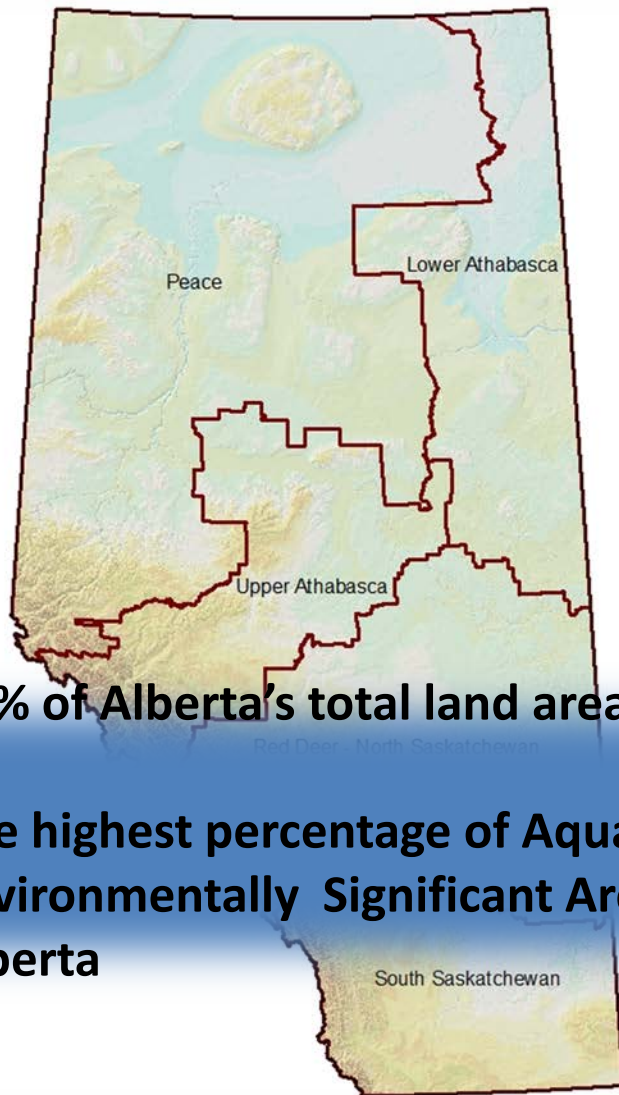


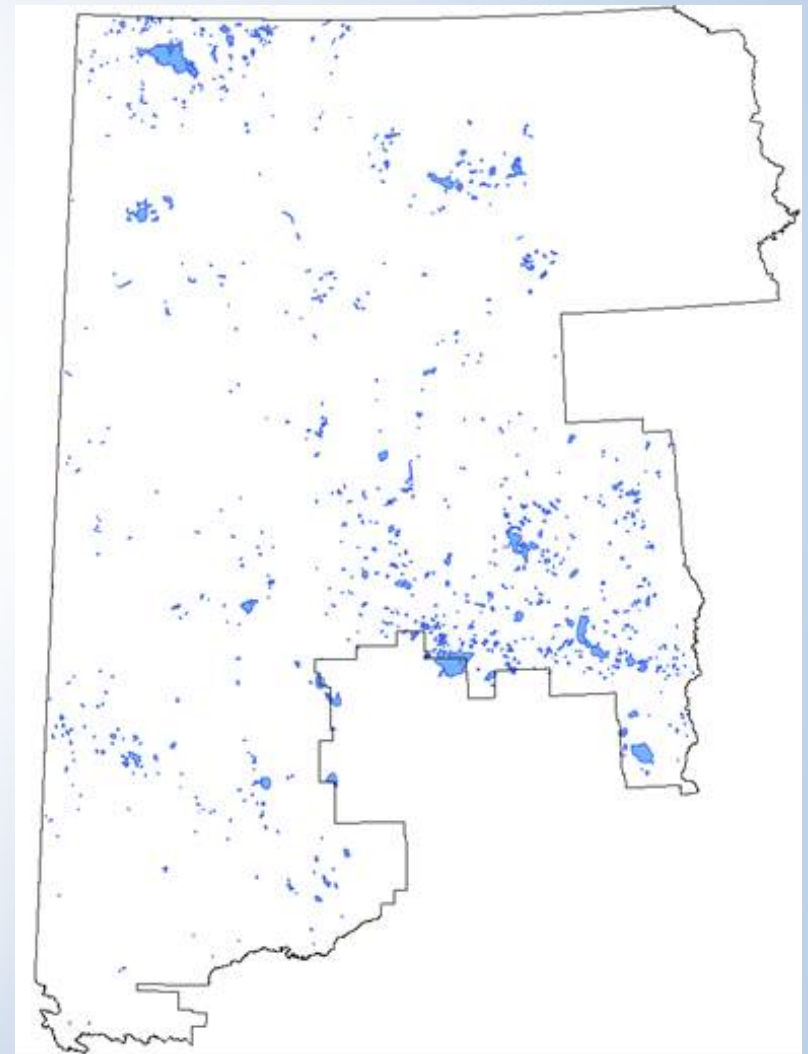
Lake Index and Lake Report Cards Peace Region Lakes

AEP Peace Region Resource Management

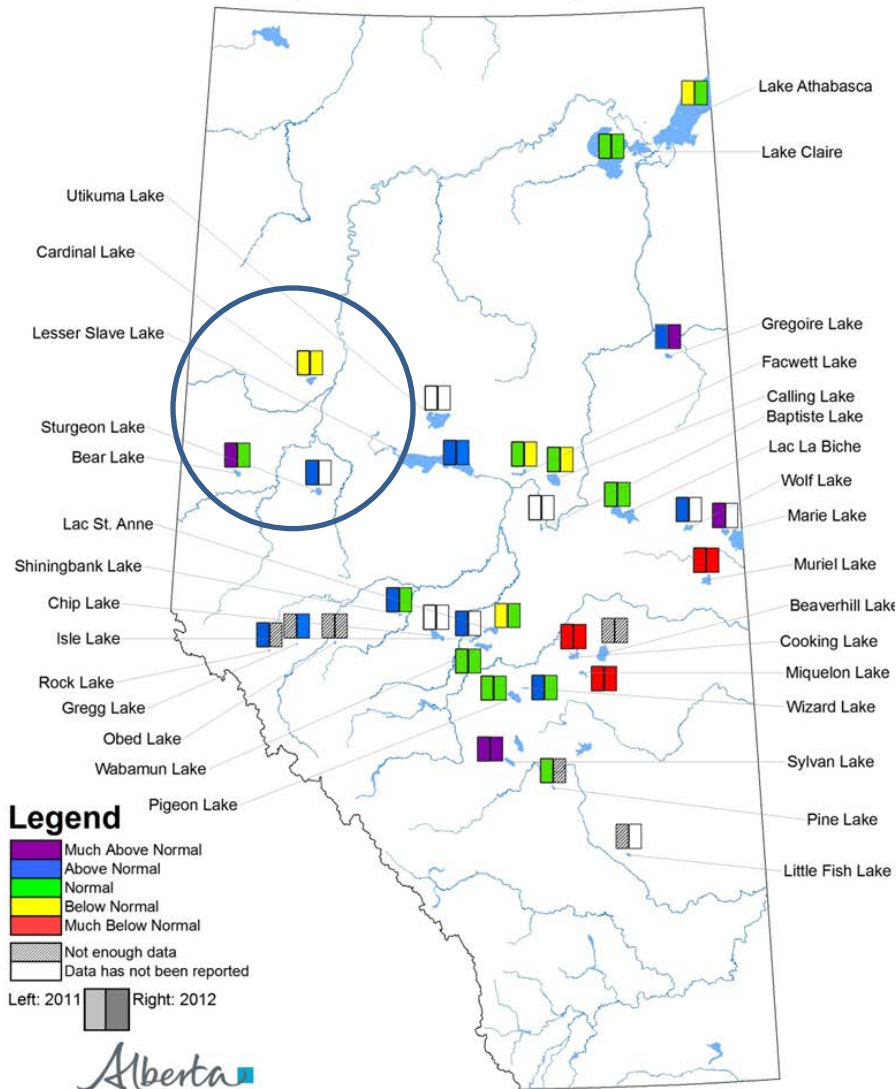


- **40% of Alberta's total land area**
- **The highest percentage of Aquatic Environmentally Significant Area in Alberta**

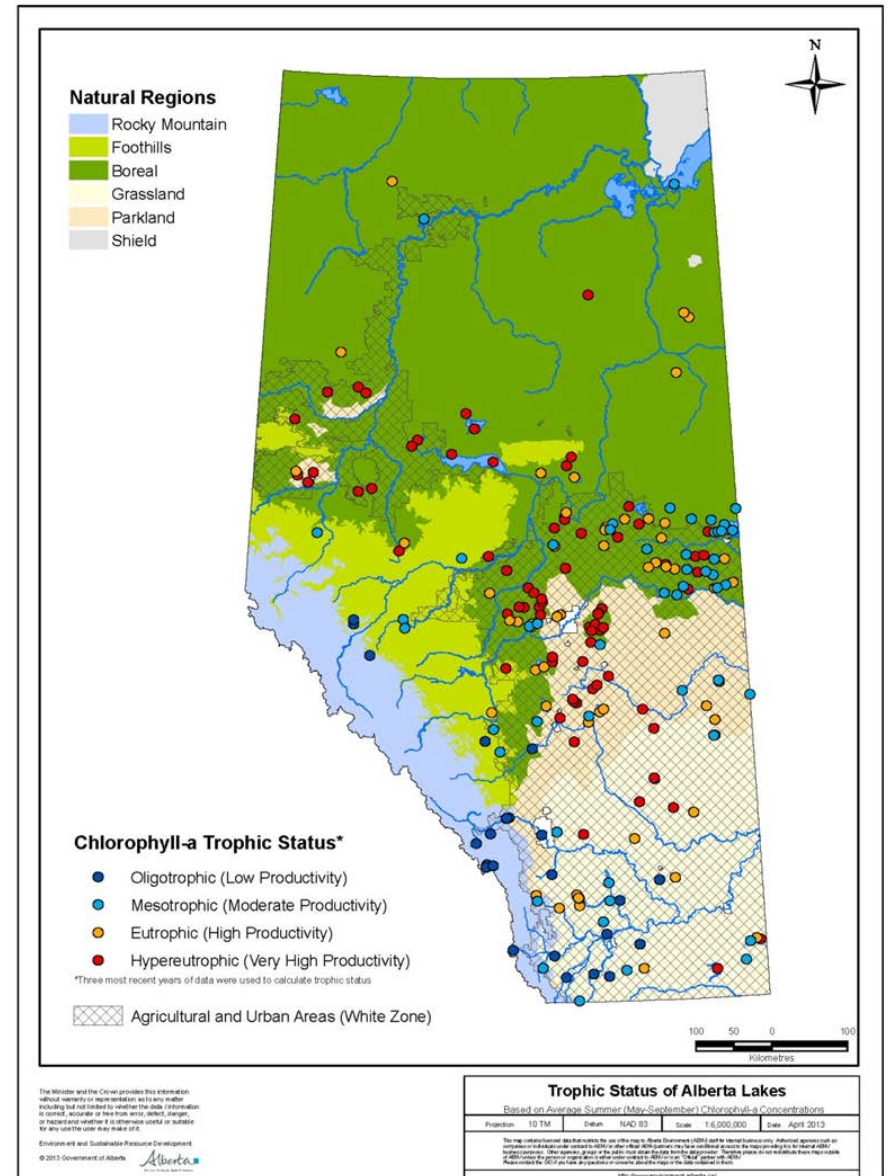
851 lakes - over 50 ha surface area



Alberta Lake Level Index (2011-2012)*



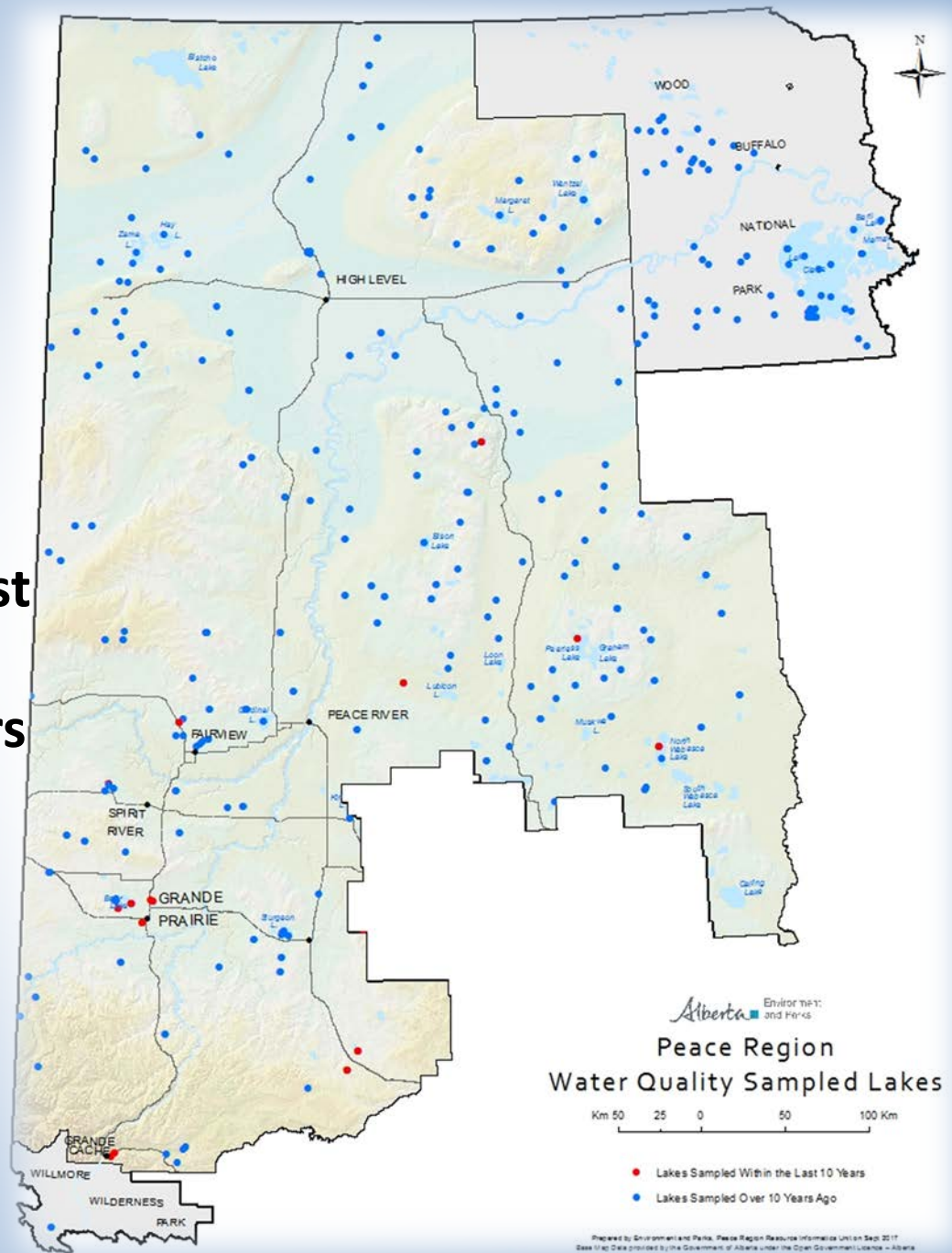
*Some or all data of 2011 & 2012 are preliminary and may be revised.



**About 60 lakes undergo
periodic fishery assessment**

**102 NAMED Lakes have been
sampled 1976-2017**

- 41 lakes sampled in the past 25 years
- 16 lakes in the past 10 years

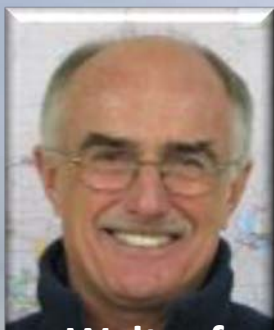


Objectives

Classify lakes to allow:

- **An assessment of their status**
 - Their relative importance to Albertans (ecological/recreational)
 - Their natural characteristics and resilience
 - Human disturbance (to land and water)
- **For public, NGO's, governments and industry to proactively plan, knowing current stresses, mitigate those stresses and participate in the restoration of watersheds.**

Project Team



**Dave Walty- former
AEP Resource
Manager, MPWA**



**KayeDon Wilcox-AEP
Resource Manager**



Josef McLeod – AEP Fishery Management



**Courtney Hughes-AEP
Land Management**

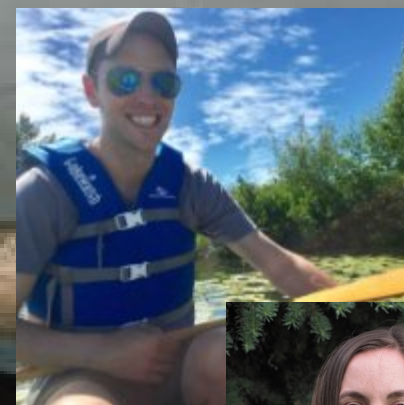


**Bonnie Nicolai-AEP, Peace
Region GIS/Mapping**



**Robert Magai-AEP
Environmental Modeller**

**Contributors: Brad Peter, ALMS
and Arin MacFarlane-Dyer, AEP**



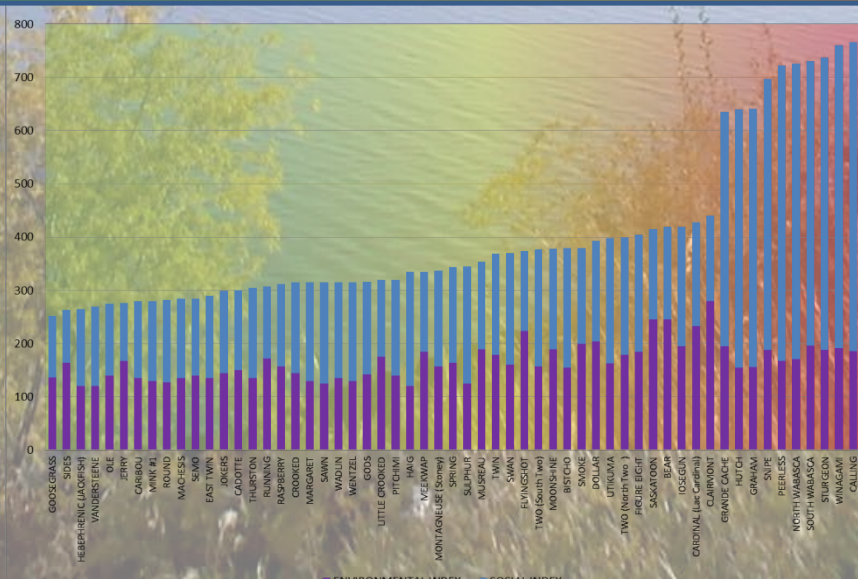
Project Products

- **LAKE INDEX** - An information tool that based on a set of indicators (criteria) provides a qualitative measure of lake status using a relative ranking system.
- Relative lake ranking:
 - **High ranking** (or high Lake Index value) identifies lakes for precautionary management planning or monitoring and study.

Low Index Value-Low Ranking Lakes

High Index Value-High Ranking Lakes

Higher management priority and precautionary planning/monitoring



Last Updated on July 17, 2017

Region Code: 07GE
Watershed: Peace River
Sub-watershed: Wapiti River

Twp-072 Rge-07 Mer-6
Long: 118° 59.304' W
Lat: 55° 15.318' N

SOCIAL VALUES

ENVIRONMENTAL VULNERABILITY

Soil Drainage: Moderately well
Buffering Capacity (%): 30.4
Fish and Wildlife Sanctuaries: Yes
Forest (%): 23

Last Updated on July 17, 2017
Twp-072 Rge-07 Mer-6
Long: 118° 59.304' W
Lat: 55° 15.318' N

	Morphology
	Lake Surface Area (ha): 3267.3
	Watershed/Lake Area Ratio: 36
	Lake Order (based on Strahler Order): 6
	Lake Network Number: 5
	Mean Depth (m): 1.6
	Max Depth (m): 2.5
	Physical Alteration: No
	<u>Surface Water Diversion Licences - Lake</u>
	Consumptive Use (m3): 39160
	Max Annual Diversion (m3): 39160
	<u>Fishery</u>
	Stocked Lake: No
	Fishing Pressures: Low
	Preferred Fish Species: No
	Fish Presence: BRST,NRPX,SPSH,WHSC,YLPR
	<u>Indigenous</u>
	Metis Settlement: None
	Metis Settlement (%): 0
	Indian Reserve: None
	Indian Reserve (%): 0
	Domestic Fishing Licences Yearly Avg. (1996-2016): 0

Network (km)		Stream Crossing		Ground Water Diversion Licences	
1 Road:	117.50	# of Stream Crossings:	416	# of Licences:	200
4 Road:	845.53	Stream Crossing Density (#/km2):	0.35	Consumptive Use (m3):	\$27350.90
proved Road:	641.31	ABM Land Cover		Max Annual Diversion (m3):	\$27350.90
ir Road:	0.00	Agriculture (%):	56	Surface Water Diversion Licences	
	51.84	Grazing Dispositions		# of Licences:	337
Roads:	1656.18	Disposition Coverage (%):	4	Consumptive Use (m3):	226387.00
Density (km/km2):	1.40	Grazing Disposition Types:	FGL & GRL	Max Annual Diversion (m3):	62492.00
Watershed					
Hard Surface Features			Human-Created Water Bodies		
	Road - Paved or Gravel (%):	1.0		Borrow-Pits/Dugouts/Sumps:	0.0
3	Airport Runway (%):	0.0		Canals:	0.0
0	Railway (%):	0.0		Muni Water and Sewage:	0.0
	Soft Linear Features			Reservoirs:	0.0
1.2	Pipelines:	0.9	Managed Forest Features		
1.0	Seismic Line:	0.6		CutBlocks (%):	2.1
.9	Transmission Line:	0.1	Resource Extraction Features		
	Vegetated roads, Verges and Ditches			Peat Mine (%)	0.0
	Vegetated strips along railways (%):	0.0		Mine Site (%)	0.0
	Road/Trail without gravel or pavement (%):	0.6		Misc.	
1.6	Vegetated strips along paved/gravel roads	1.5		Other Disturbed Vege (%)	0.1

Natural Conditions					
Watershed Slope (deg)		Wetlands (ha)			
Minimum Slope:	0	Open Water:	5480.82	Fen:	1236.04
Max Slope:	25	Swamp:	4501.27	Bog:	378.35
Mean Slope:	1	Marsh:	1623.86	TOTAL (%):	11

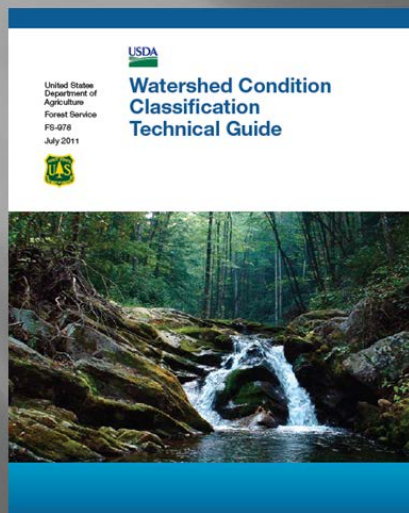


Station	Km 4	2	0	4	8 Km
---------	------	---	---	---	------

Cut Block
 Mine Site/Other Disturbed Vegetation
 Borrow-Pits/Dugouts/Quarry/Municipal Sewage/Reservoir

Index – not a new concept

USDA Watershed Condition Classification



12 INDICATORS

1. Water Quality
2. Water Quantity
3. Aquatic Habitat
4. Aquatic Biota
5. Riparian/Wetland Vegetation
6. Road and Trails
7. Soils
8. Fire Regime or Wildfire
9. Forest Cover
10. Rangeland Vegetation
11. Terrestrial Invasive Species
12. Forest Health

Saskatchewan State of the Watershed

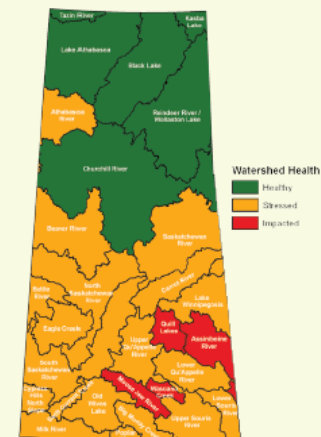
2010 Condition, Stressor, and Response Ratings

Condition

To assess the health of watersheds in Saskatchewan, nine condition indicators were developed (see Appendix A). Of these nine indicators, six have ecologically-based and scientifically-defensible rating schemes that allow for comparative assessments of watershed health. Only the six condition indicators for which rating schemes have been developed were used in determining the overall health of each watershed.

The health of each of Saskatchewan's watersheds was categorized into one of three classes based on ecosystem services, ecosystem function, and the watershed's resistance and resilience to change: **healthy**, **stressed** or **impacted**. A watershed was rated as:

- **Healthy** - if the watershed has no apparent change in function or services provided by water, and the system is both resistant and resilient to change.
- **Stressed** - if the watershed has no degradation in function and/or services it provides, but it has lost resistance to change.
- **Impacted** - if the watershed has a change and/or degradation in function and/or services.



EVI Report

at watershed's
efore, a
dition
ating for
tressed; or
healthy.

Figure 3. Health of watersheds based on condition indicators.

Based on this assessment, six of Saskatchewan's watersheds were identified as being **healthy**, 19 watersheds were identified as being **stressed**, and four watersheds were identified as being **impacted** (Figure 3).

See Appendix A for a detailed assessment of condition indicators.

Stressors

To assess the potential stress of human activities on watersheds in Saskatchewan, 22 stressor indicators were developed (see Appendix B). Stressor indicators were designed to focus on five issues associated with human activities: water use, human population, agricultural influences, industrial influences, and natural resource extractions. Each of the stressor indicators have rating schemes that allow stress to be rated at the watershed level. All of the stressor indicators were weighted equally to provide means of assessing the overall stress on each watershed.

Environmentally Significant Areas in Alberta: 2014 Update

FINAL REPORT

The

Environmental Vulnerability Index

(EVI) 2004



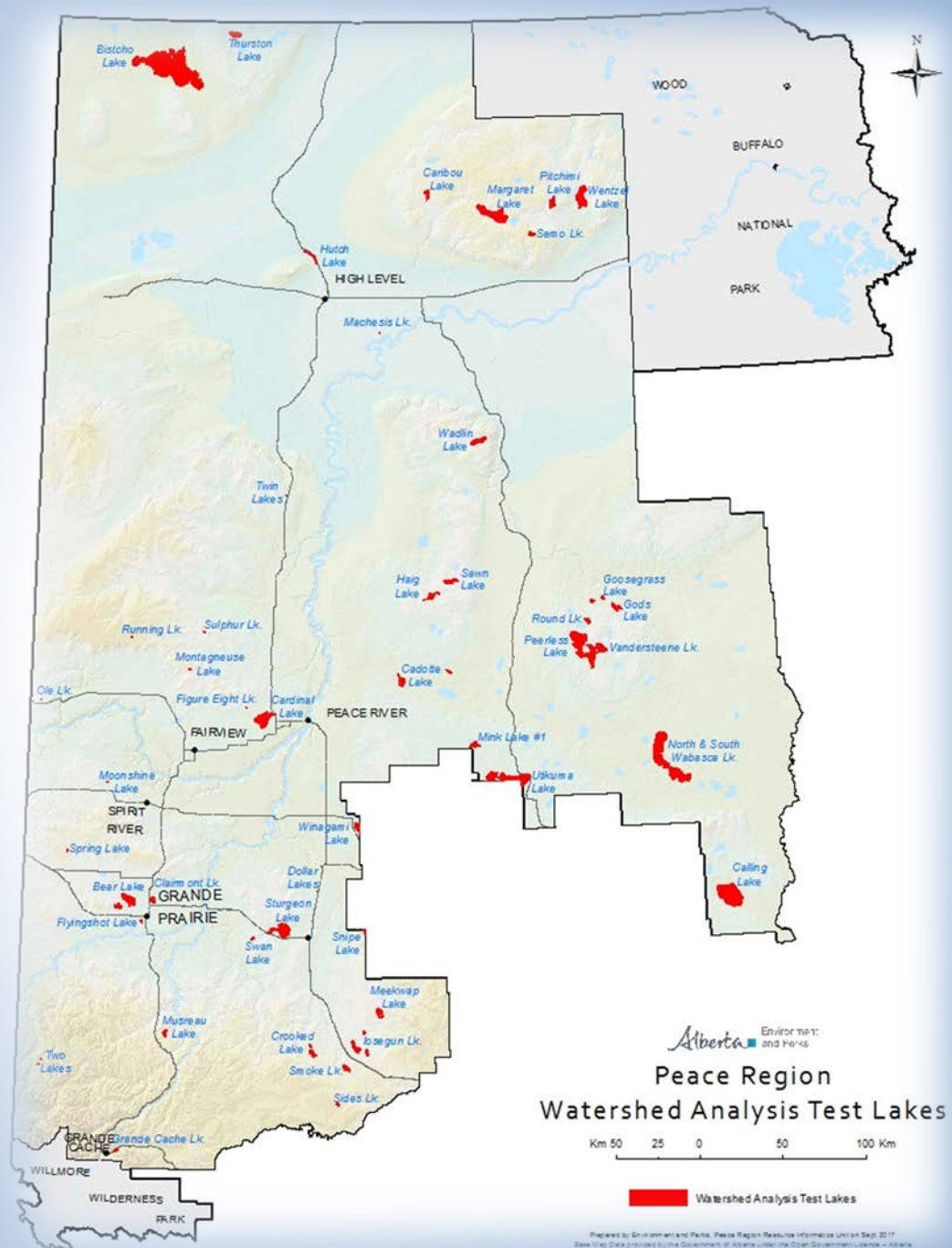
SOPAC

South Pacific Applied Geoscience Commission

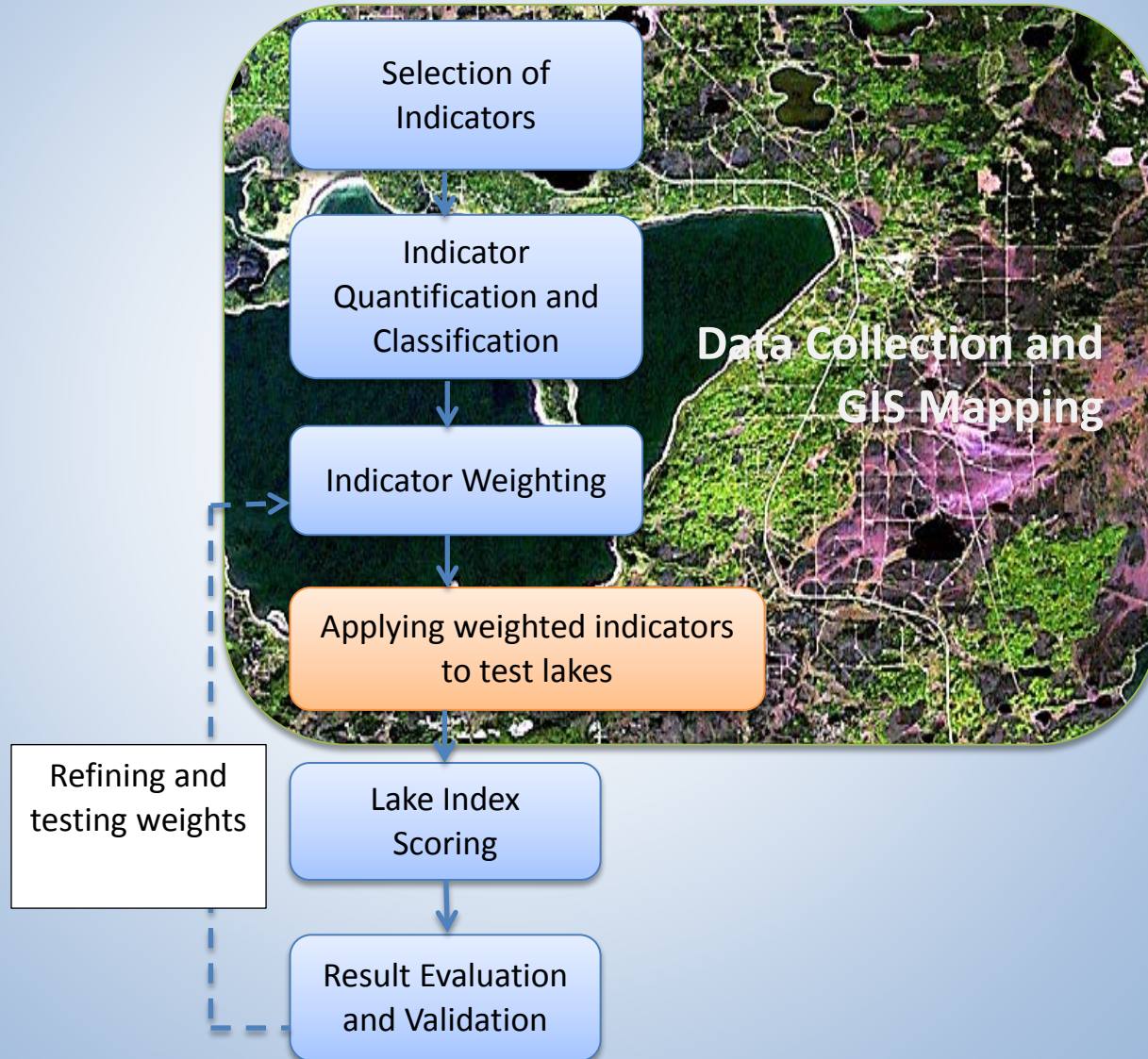
December 2004

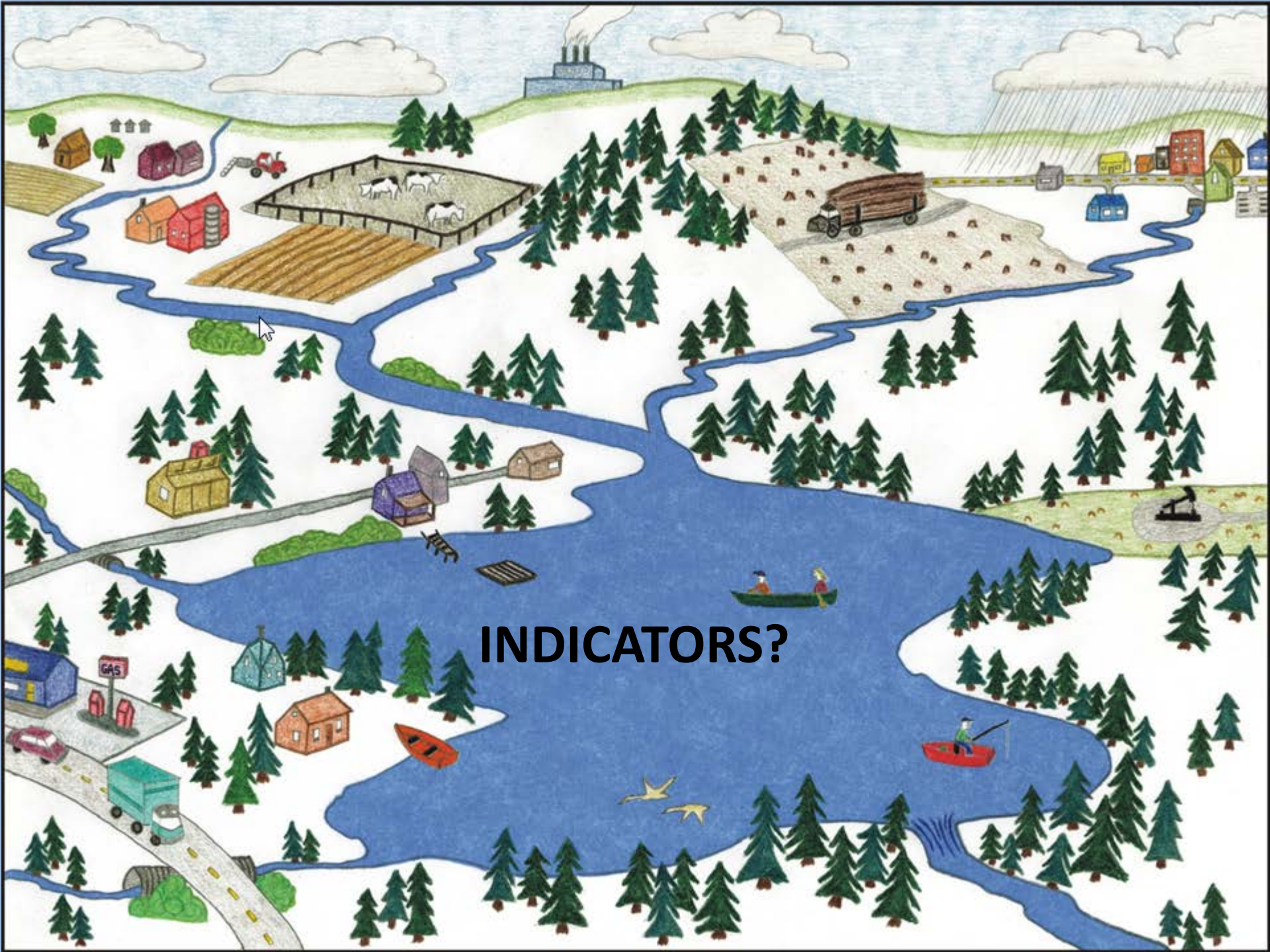
57 Test Lakes

- spatial distribution across the Peace Region
- diverse recreational opportunities and pressures
- core fishery and ecological values
- various lake sizes and morphological attributes



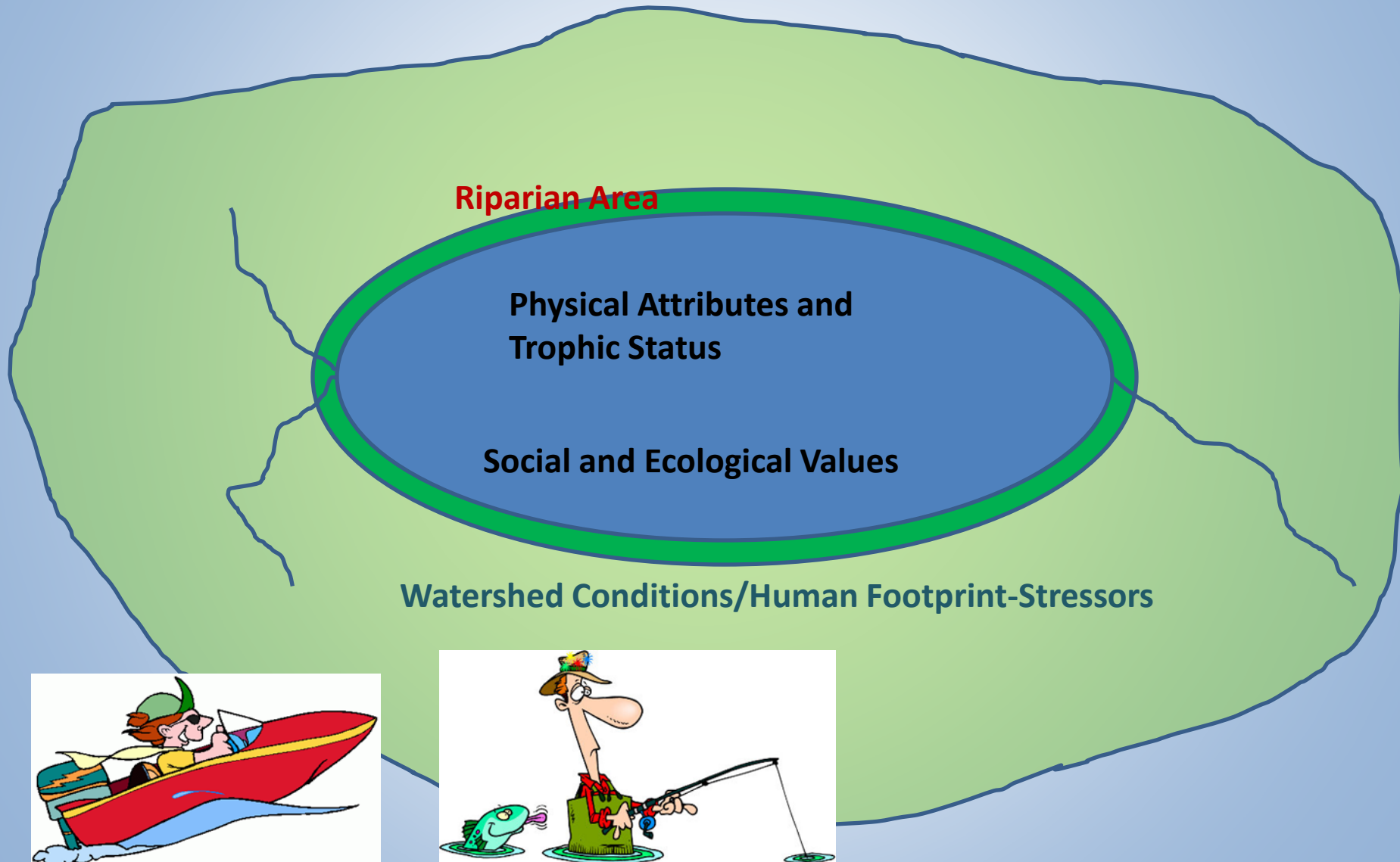
Lake Index Development





INDICATORS?

INDICATORS



3 Types of Lake Indexes

- Lake Index – a combination of social and environmental vulnerability sub-indices:

Higher management priority and precautionary planning/monitoring status

- Lake Social Values Index – based on social value indicators

Low Index - Relatively Low Social Status

High Index - Relatively High Social Status

- Lake Environmental Vulnerability Index – based on environmental conditions and anthropogenic pressure indicators

Low Index - Relatively Low Vulnerability

High Index - Relatively High Vulnerability

Social Values

**Source Water (potable water
and for industrial activities)**

**Important Fishery Resources
(sport and aboriginal fisheries)**

**Important Recreational
Resources**

HUMAN HEALTH	Potable Water Source
RECREATON	Relative Status (based on lake surface area)
	Regional Importance
	Recreation on Lake Waterfront
	Fishing Pressure
	Presence of Preferred Fish Species
ECOLOGICAL	Presence of Aquatic Sensitive Species
INDIGENOUS	Indigenous Food Fishery

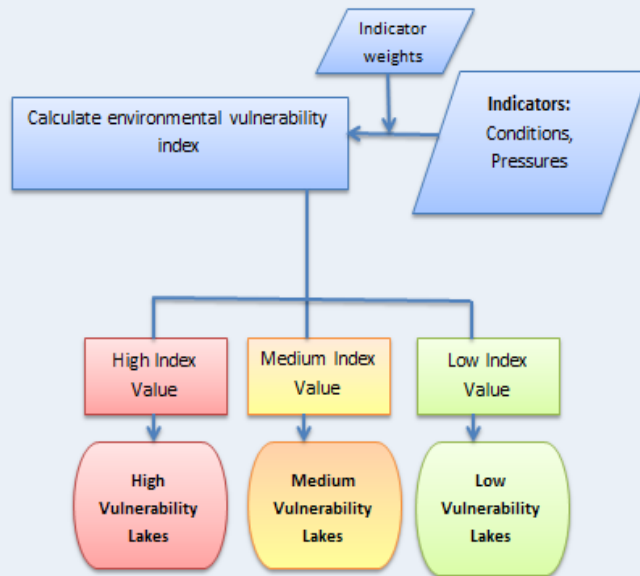
Ecologically Important

ENVIRONMENTAL VULNERABILITY

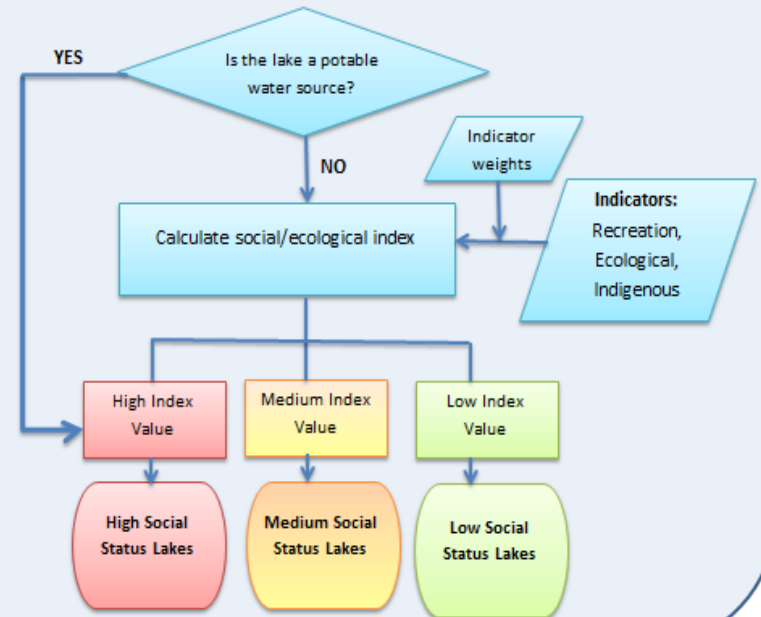
Vulnerability = inherent characteristics + anthropogenic pressures

CONDITIONS/RESILIENCE	Lake Trophic Status
	Watershed to Lake Surface Area Ratio
	Lake Mean Depth
	Lake Hydrologic Order
	Watershed Buffering Capacity (%Forest and Wetlands)
	Average Watershed Slope
PRESSURES	100 m Riparian Zone Development
	Wastewater Discharge
	Water Allocation
	Road Density
	Human Footprint

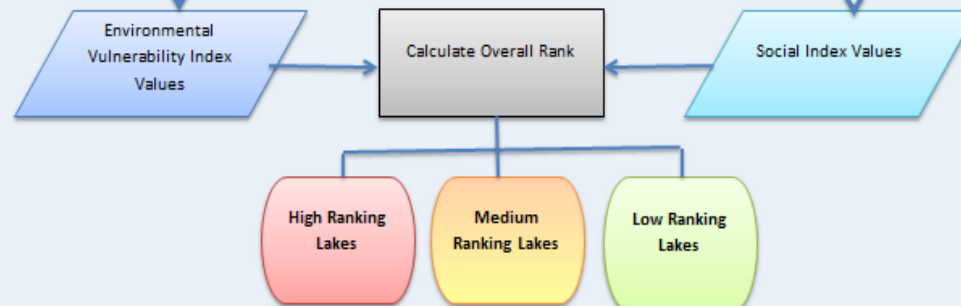
Environmental Vulnerability Assessment



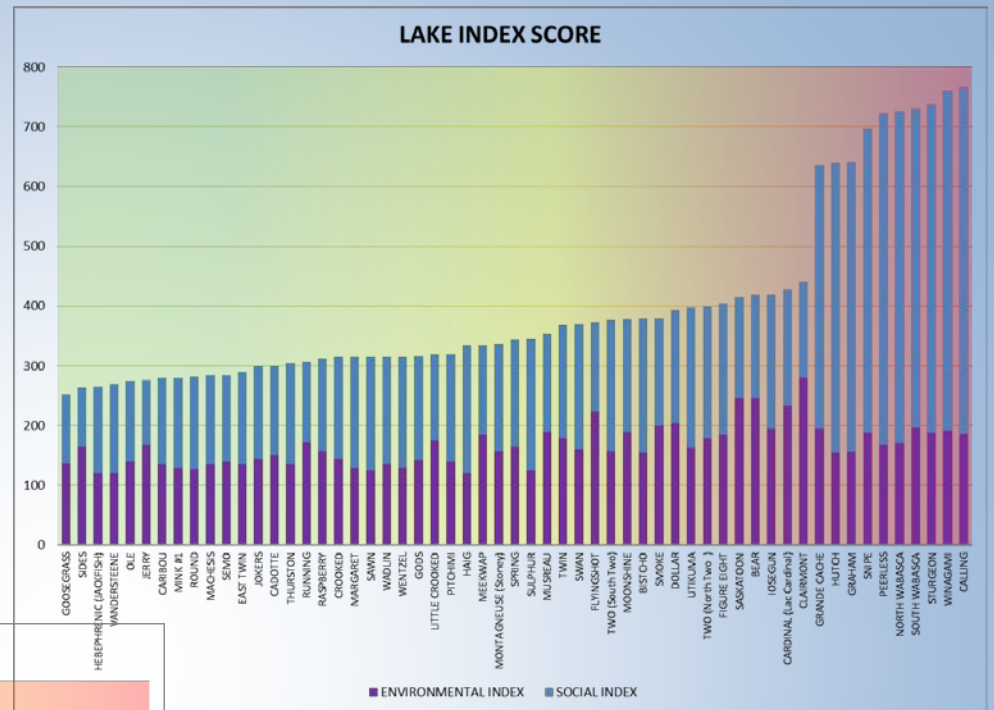
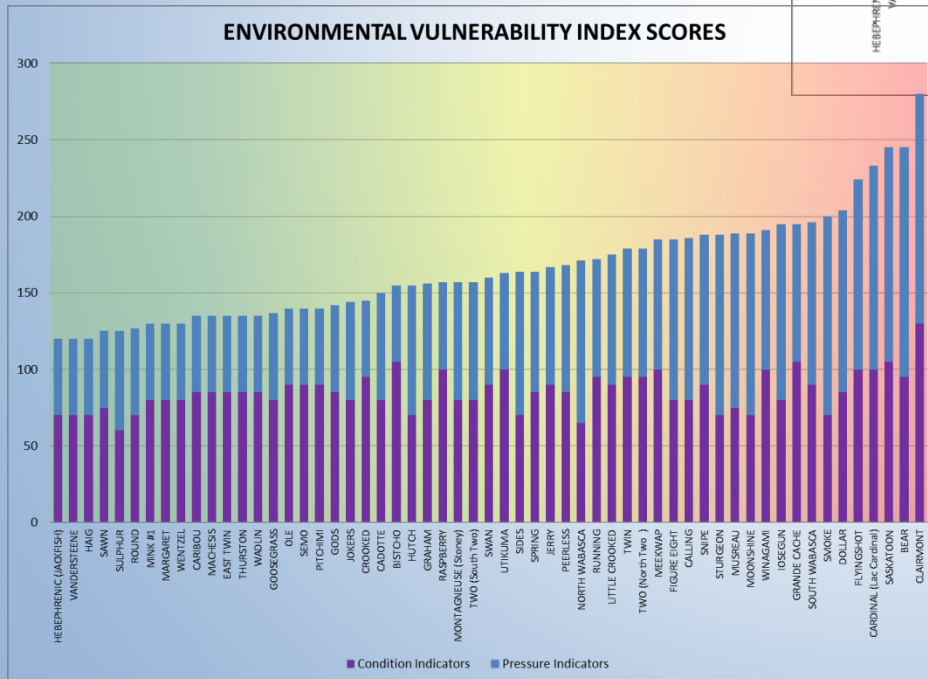
Social and Ecological Assessment



Overall Ranking



57 lakes



Lake Report Card (Index Reference Card)

Page 1-Index Information

LAKE INDEX REFERENCE CARD: BEAR LAKE

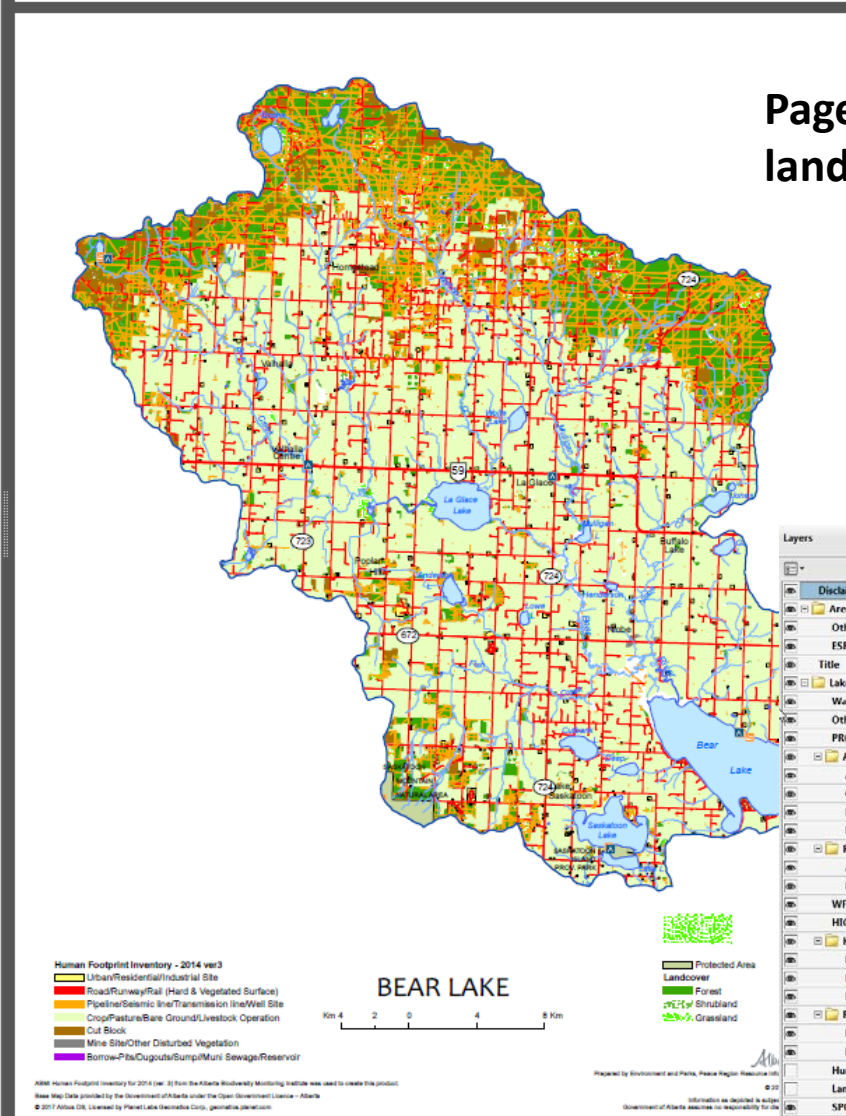
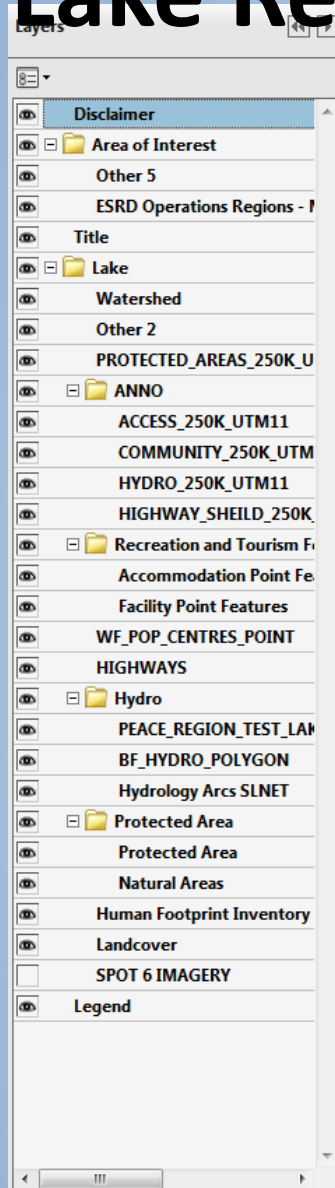
Waterbody ID: 4004

Region Code: 07GE
Watershed: Peace River
Sub-watershed: Wapiti River

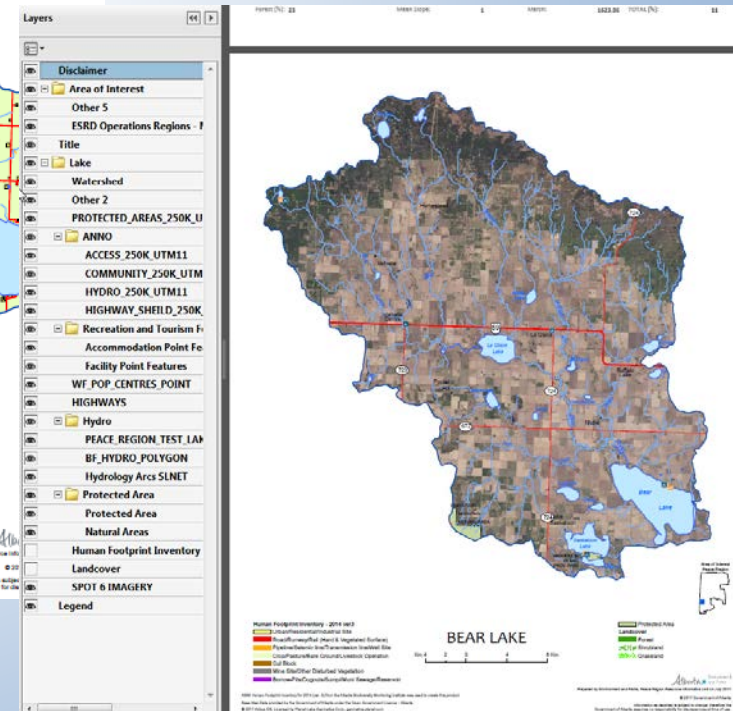
Last Updated on July 17, 2017
Twp-072 Rge-07 Mer-6
Long: 118° 59.304' W
Lat: 55° 15.318' N

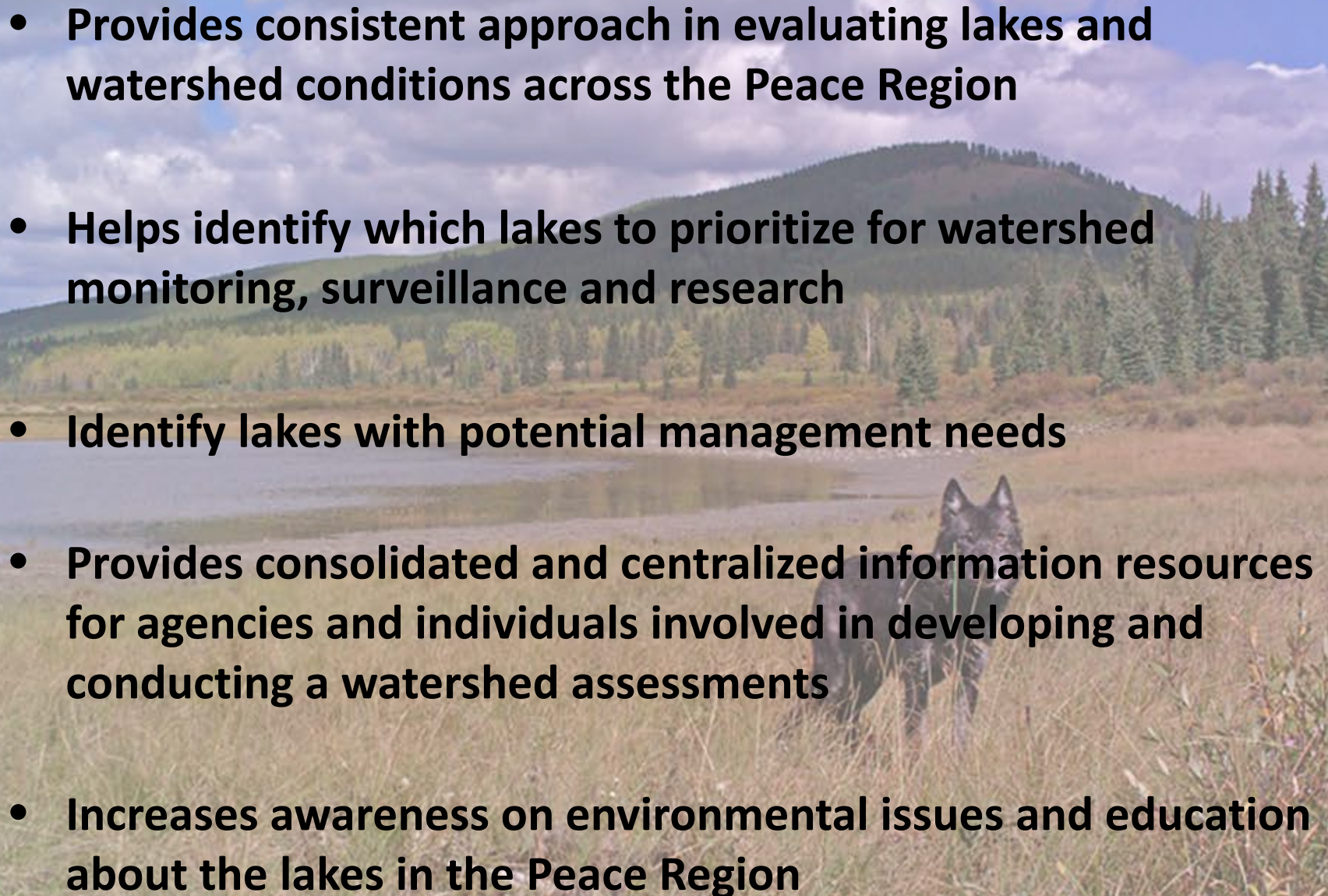
	CATEGORIES	INDICATOR	CLASSIFICATION	VALUE
SOCIAL VALUES	HUMAN HEALTH	Potable Water Source	<input type="checkbox"/> No <input type="checkbox"/> Yes	No
	RECREATION	Relative Status (based on lake surface area)	<input type="checkbox"/> < 1000 ha <input type="checkbox"/> 1000 - 3999 ha <input type="checkbox"/> ≥4000 ha	3267.30
		Regional Importance	<input type="checkbox"/> Local <input type="checkbox"/> Regional <input type="checkbox"/> Provincial	Local
		Fishing pressures	<input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High	Low
		Preferred Fish Species	<input type="checkbox"/> No <input type="checkbox"/> Yes	No
		Recreational Use based on recreational facility development	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> >1	2
	ECOLOGICAL	Aquatic Sensitive Species	<input type="checkbox"/> No <input type="checkbox"/> Yes	Yes
ENVIRONMENTAL VULNERABILITY	INDIGENOUS	Indigenous Fishery (based on issued licences)	<input type="checkbox"/> < 10 Licences <input type="checkbox"/> 10 - 49 Licences <input type="checkbox"/> ≥ 50 Licences	0
	Social Value Index			Moderate
	RESILIENCE	Trophic Status	<input type="checkbox"/> Eutrophic/Hypereutrophic <input type="checkbox"/> Mesotrophic <input type="checkbox"/> Oligotrophic	Hypereutrophic
		Watershed to Lake Ratio	<input type="checkbox"/> <10 <input type="checkbox"/> 10 - 20 <input type="checkbox"/> >20	36
		Lake Mean Depth	<input type="checkbox"/> > 5 m <input type="checkbox"/> 3 - 5 m <input type="checkbox"/> <3 m	1.6
		Lake Order base on Strahler Stream Order	<input type="checkbox"/> <2 <input type="checkbox"/> ≤2	6
		Buffering Capacity (Forest and Wetland Areas)	<input type="checkbox"/> >50 % <input type="checkbox"/> 25-50 % <input type="checkbox"/> <25 %	30
		Average Watershed Slope	<input type="checkbox"/> < 5° <input type="checkbox"/> 5° - 10° <input type="checkbox"/> >10°	1
	PRESSURES	Human Footprint within 100m Riparian Zone	<input type="checkbox"/> ≤5 % <input type="checkbox"/> 6 - 25 % <input type="checkbox"/> >25 %	49
		Wastewater Discharge	<input type="checkbox"/> No <input type="checkbox"/> Yes	Yes
		Annual Surface Water Consumptive Use (m3)	<input type="checkbox"/> No <input type="checkbox"/> Yes	Yes
		Road Density (km/km2)	<input type="checkbox"/> 0 - 0.2 <input type="checkbox"/> 0.3 - 0.8 <input type="checkbox"/> > 0.8	1.40
		Human Footprint Disturbance	<input type="checkbox"/> <5% <input type="checkbox"/> 5 - 25% <input type="checkbox"/> >25%	71
	Environmental Vulnerability Index			High
	Total Social and Environmental Index Rating			Moderate

Lake Report Card (Index Reference Card)



Page 3 – detailed watershed land use map



- 
- A scenic landscape photograph serves as the background for the text. It depicts a calm lake in the middle ground, surrounded by a dense forest of evergreen and deciduous trees. In the background, a large, rounded mountain rises under a blue sky with scattered white clouds. In the immediate foreground, a black dog, possibly a Labrador Retriever, is standing in a field of tall, dry grass, looking towards the camera.
- **Provides consistent approach in evaluating lakes and watershed conditions across the Peace Region**
 - **Helps identify which lakes to prioritize for watershed monitoring, surveillance and research**
 - **Identify lakes with potential management needs**
 - **Provides consolidated and centralized information resources for agencies and individuals involved in developing and conducting a watershed assessments**
 - **Increases awareness on environmental issues and education about the lakes in the Peace Region**

Questions:

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Edmonton, tel. 780-427-8237