

GIS USES FOR ENVIRONMENTAL GOVERNANCE

Presented to

BC Links to Learning

December 2-4, 2024



Training, Mentorship &
Professional Development



Today's Speakers



LEEANNA RHODES
Geographic Information
Systems Specialist



MATT CHARLES
Environmental &
Enforcement Advisor

Introduction

- The Framework Agreement & Land Code
- Environmental Governance for First Nations
- Geographic Information Systems (GIS) Mapping
- DEMO: Using GIS for Environmental Governance
- Other Examples of GIS Uses for Environmental Governance
- Question & Answer Discussion

FRAMEWORK AGREEMENT

- Is a government-to-government agreement between First Nations and Canada
- Recognizes First Nations power to enact land laws and grant interests and licences on First Nation land
- Expanding First Nations' control over land governance



1996

Replaces 44 land management-related sections of the Indian Act



Restores First Nations land governance.

Canada no longer has the power to manage or administer First Nations lands.



Land Code – Authorities & Responsibilities



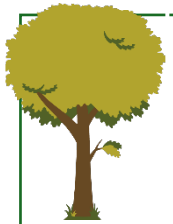
First Nation Land Governance



First Nation Laws



Community Meetings and Approvals



Protection of Land



Accountability – Conflict of Interest & Finance



Land and Natural Resources Administration



Interests and Licences in Land



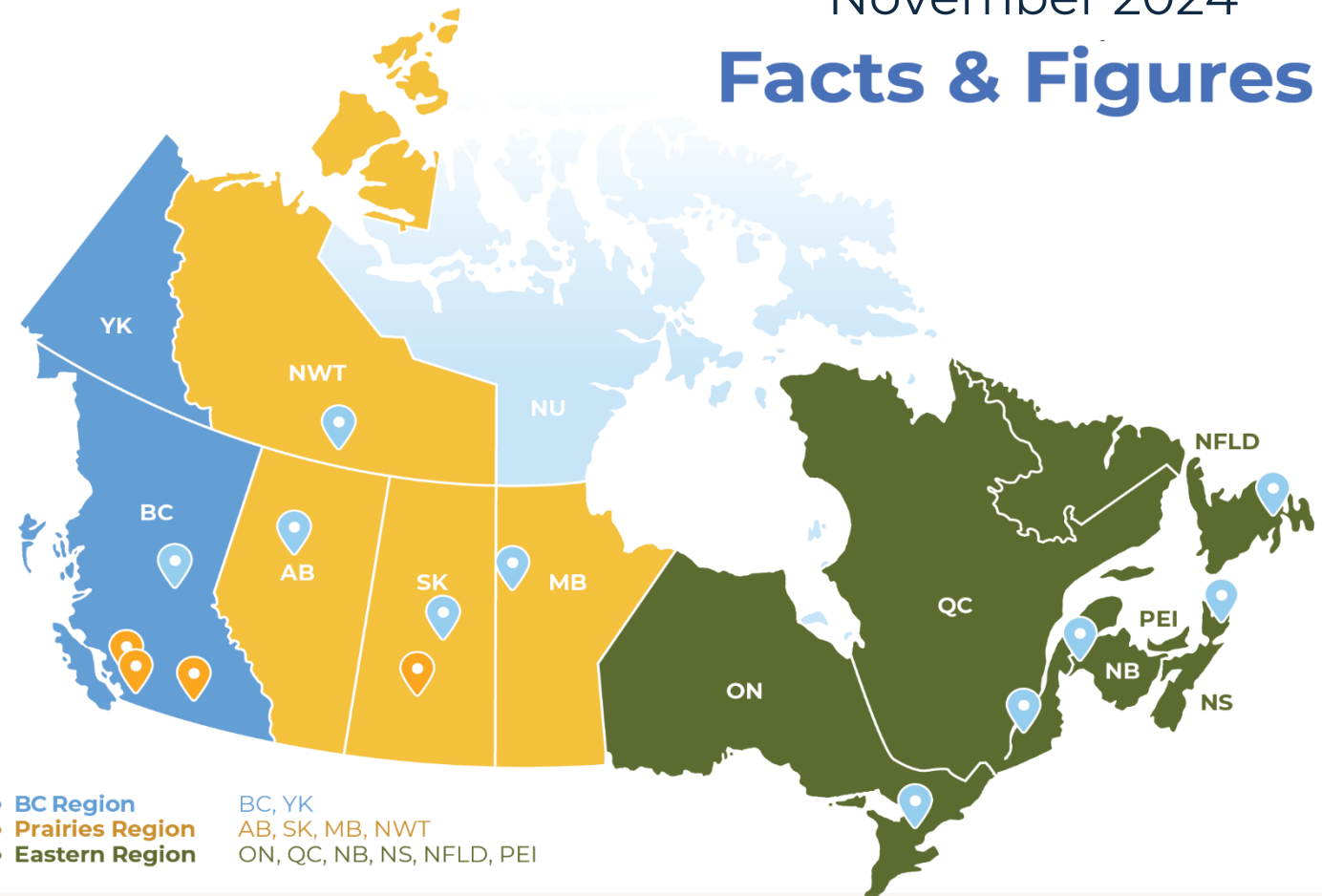
Dispute Resolution



Other Matters

November 2024

Facts & Figures



- **BC Region** BC, YK
- **Prairies Region** AB, SK, MB, NWT
- **Eastern Region** ON, QC, NB, NS, NFLD, PEI

122

Operational First Nations

have established land codes through the *Framework Agreement*

213

Signatory First Nations

across Canada are in various stages of land code development and implementation

10

Provinces / Territories

are home to operational First Nations

4

First Nations

have moved on to full self-government or treaty after ratifying their land codes

1,200,000+

Acres of First Nation Land

have been removed from the colonial *Indian Act* lands system

1 in 3

First Nations

in Canada are a signatory to the Framework Agreement or have expressed formal interest to become a signatory

Environmental Governance Under Land Code

Environmental Governance includes the conservation, protection, and management of the environment and natural resources and can be accomplished through...

- Drafting, enacting, and enforcing environmental laws
- Creating applicable policies, processes, plans, and guidelines
- Monitoring the quality and quantity of First Nations Lands & Resources

Land Code First Nations Governance Examples



Henvey Inlet First Nation

Developed Environmental Assessment and Protection laws.



Photo Credit: Henvey Inlet, 2011



Bingwi Neyashi Anishinaabek

Developed Environmental Management Plan and Environmental Protection Law.



Photo Credit: Bingwi Neyashi Anishinaabek



Tzeachten First Nation

Developed Environmental Management Plan and Implemented Recycle Zone.

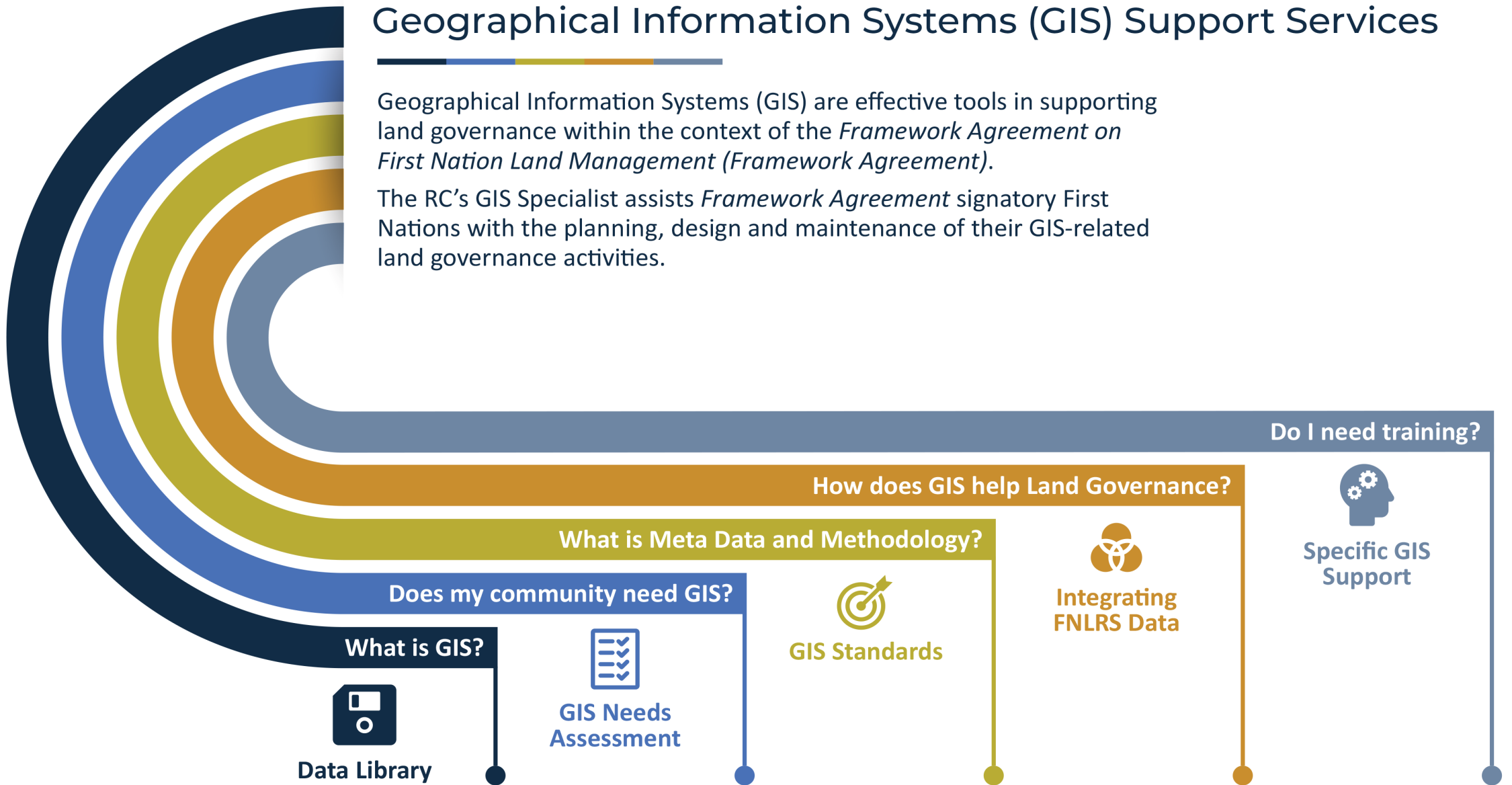


Photo Credit: Tzeachten First Nation

Geographical Information Systems (GIS) Support Services

Geographical Information Systems (GIS) are effective tools in supporting land governance within the context of the *Framework Agreement on First Nation Land Management (Framework Agreement)*.

The RC's GIS Specialist assists *Framework Agreement* signatory First Nations with the planning, design and maintenance of their GIS-related land governance activities.



GIS Working Group

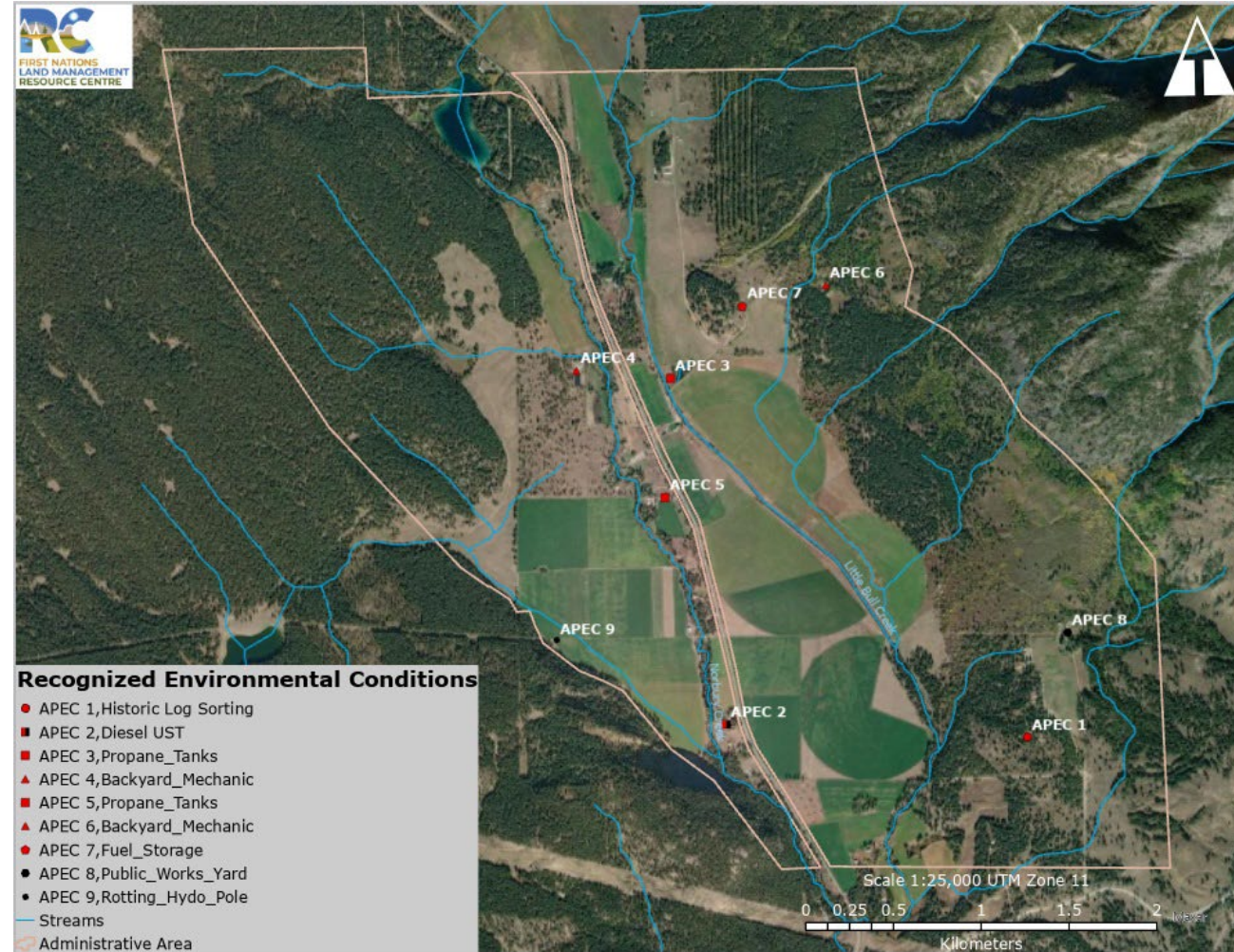
- Governing the Land with mapping software
- Discussing mapping challenges
- Collaborate on best practices
- Walk through instructions together
- Share tips, tricks and solutions
- Meetings are recorded for those who missed them or used as refresher



Environmental Site Assessment (ESA) Mapping

Mapping Results from Phase I ESAs

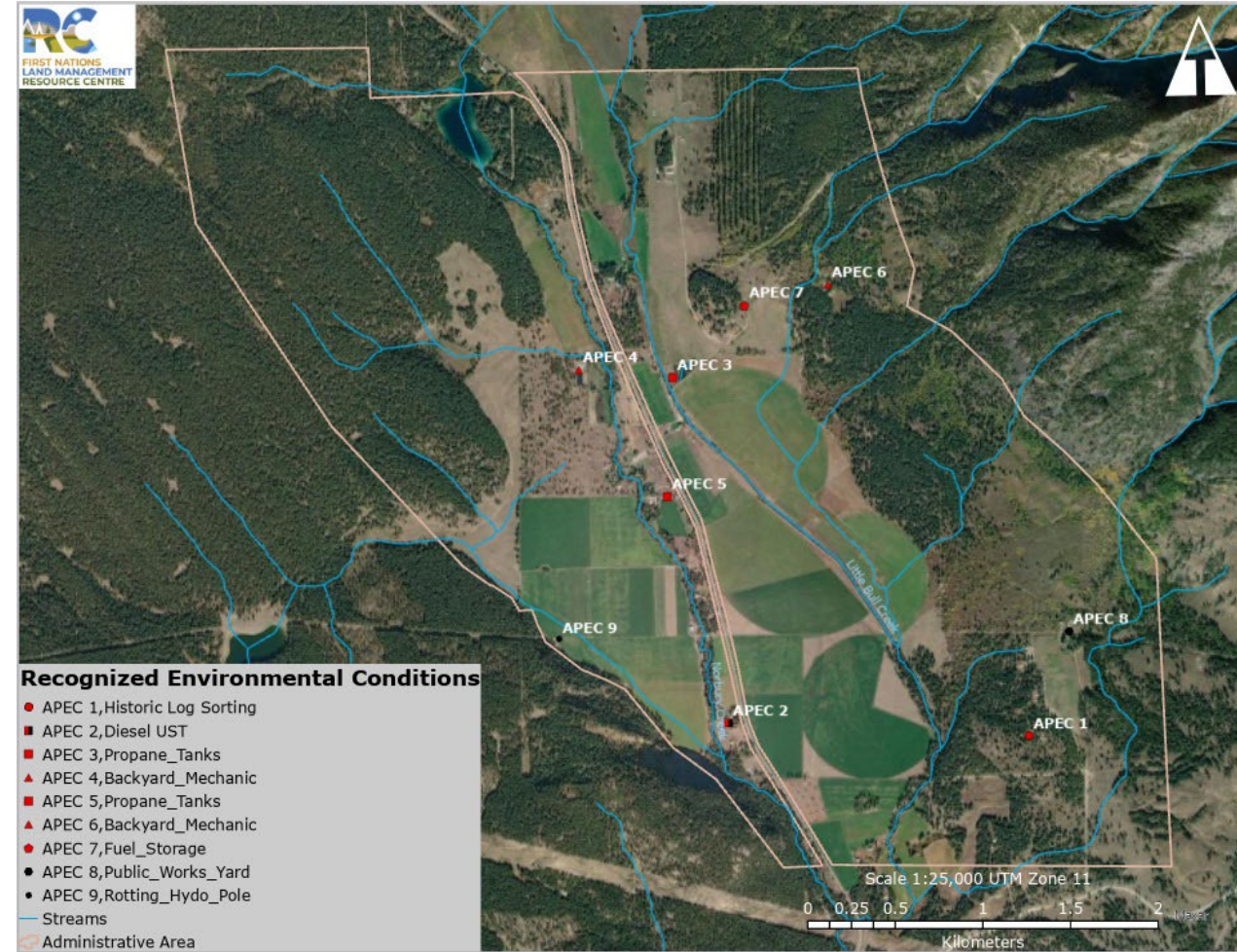
- Identifying and mapping areas of environmental concern (AEC) and areas of potential environmental concern (APECs)
- Location of regulatory concerns and violations
- Location of areas recommended for further environmental investigations
- GIS links maps to environmental datasets



Additional Sources of Information

Research and acquire existing data

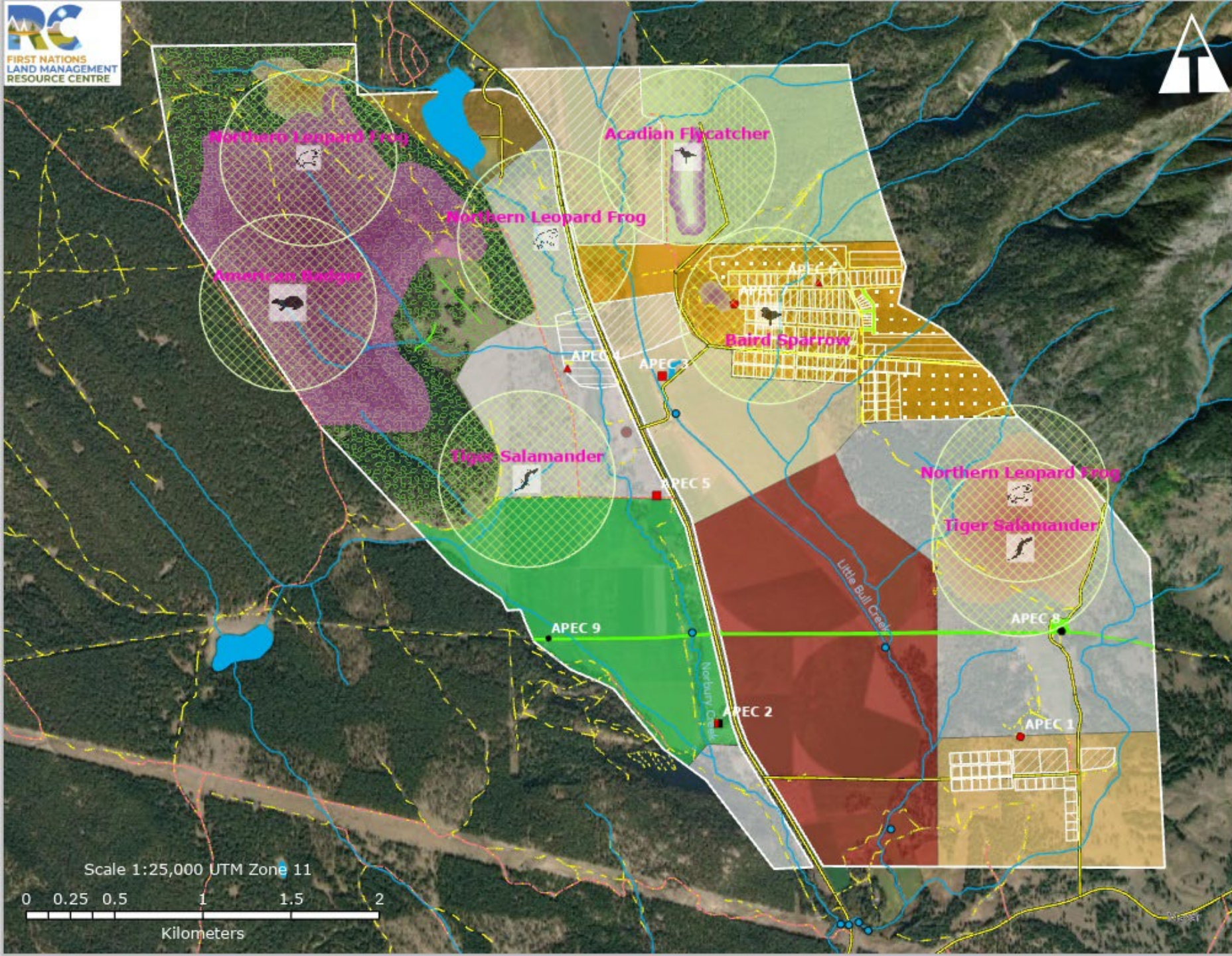
- Digitize from hardcopy maps
- Field data collection
- Open-source data
- Local data e.g. First Nation, Regional
- Natural areas & parks
- Traditional knowledge study results
- Soil and Water Quality
- Species at Risk (SAR)



Examples of Map Legend

Environmental Management Map

● APEC 1, Historic Log Sorting	● Endangered Species	— Paved Roads	Cultural Heritage Type
■ APEC 2, Diesel UST	 Acadian Flycatcher	- - Gravel Roads	✳ Burial Grounds
■ APEC 3, Propane_Tanks	 Baird Sparrow	- · - · Rough Roads	👤 Culturally Sensitive
▲ APEC 4, Backyard_Mechanic	 Northern Leopard Frog	— Surface Unknown	🦌 Elk Habitat
■ APEC 5, Propane_Tanks	 Tiger Salamander	⋯ Alternate Routes (911)	🍄 Food Gathering
▲ APEC 6, Backyard_Mechanic	 American Badger	☐ Band Land	🍷 Material Gathering
● APEC 7, Fuel_Storage	SARA Status	☐ Permit	🌿 Medicinal Gathering
● APEC 8, Public_Works_Yard	☐ Endangered	☐ Lease	👤 Powwow Grounds
● APEC 9, Rotting_Hydo_Pole	☐ Threatened	☐ Sub Lease	🗺 Administrative Area
🔷 Remediation Sites		🟢 Easement	— Streams
		📄 Road (ROW)	💧 Waterbodies TRIM 1996
		☐ Lawful Possession	🟡 Endangered Species Buffer (500m)

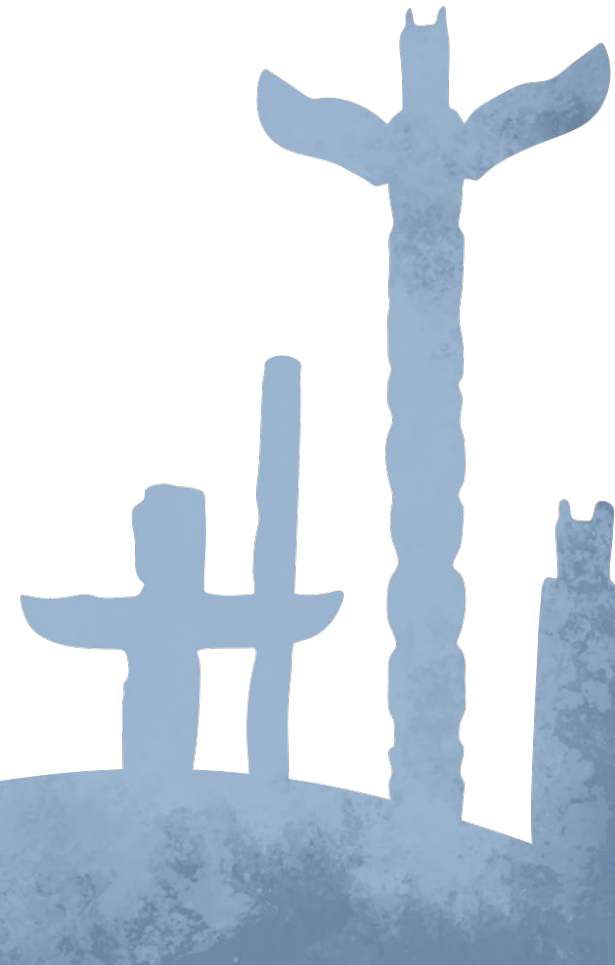


GIS DATA

DEMO

Deep Dive into Mapping Examples

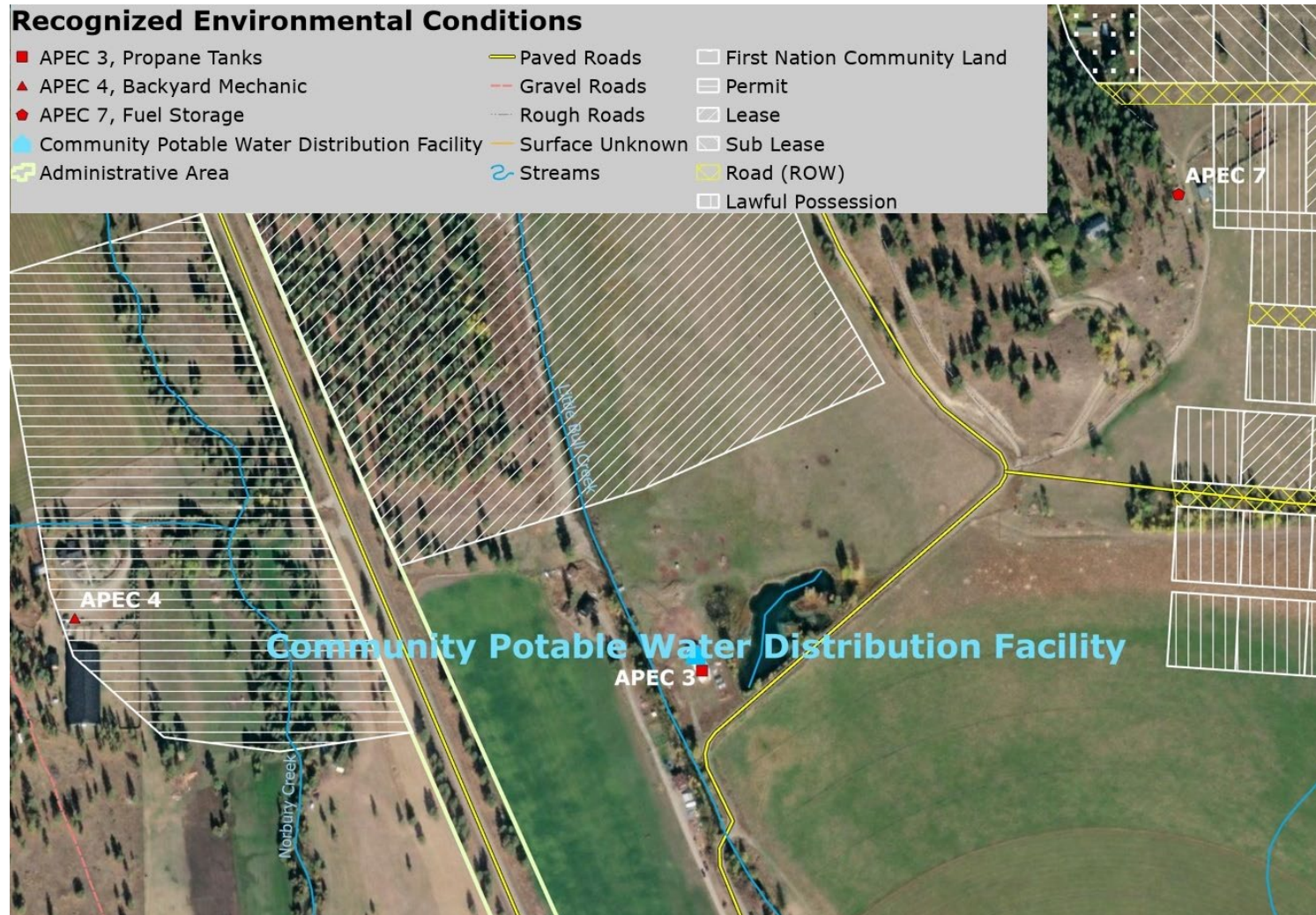
- Phase I & Phase II Environmental Site Assessments (ESAs)
 - Phase I ESAs – APEC and AEC Data Mapping
 - Phase II ESAs – Soil & Groundwater Investigation Mapping
- Contaminated Sites Management
- Environmental Management and Land Use Planning
- Habitat Conservation, Species at Risk, and Invasive Species
- Climate Change & Emergency Response Planning
- Environmental Law Making



Phase I Environmental Site Assessments (ESAs)

Recognized Environmental Conditions

■ APEC 3, Propane Tanks	— Paved Roads	□ First Nation Community Land
▲ APEC 4, Backyard Mechanic	— Gravel Roads	□ Permit
● APEC 7, Fuel Storage	— Rough Roads	□ Lease
Community Potable Water Distribution Facility	— Surface Unknown	□ Sub Lease
Administrative Area	Stream	□ Road (ROW)
		□ Lawful Possession



- Community Consultation and Knowledge Sharing (maps)
- Regulatory Record Searches
- Historical Information Review
- Site Visit(s) and Investigating areas of interest of concern
- Mapping Lands, Structures and Areas of Potential Concern
- Report Preparation

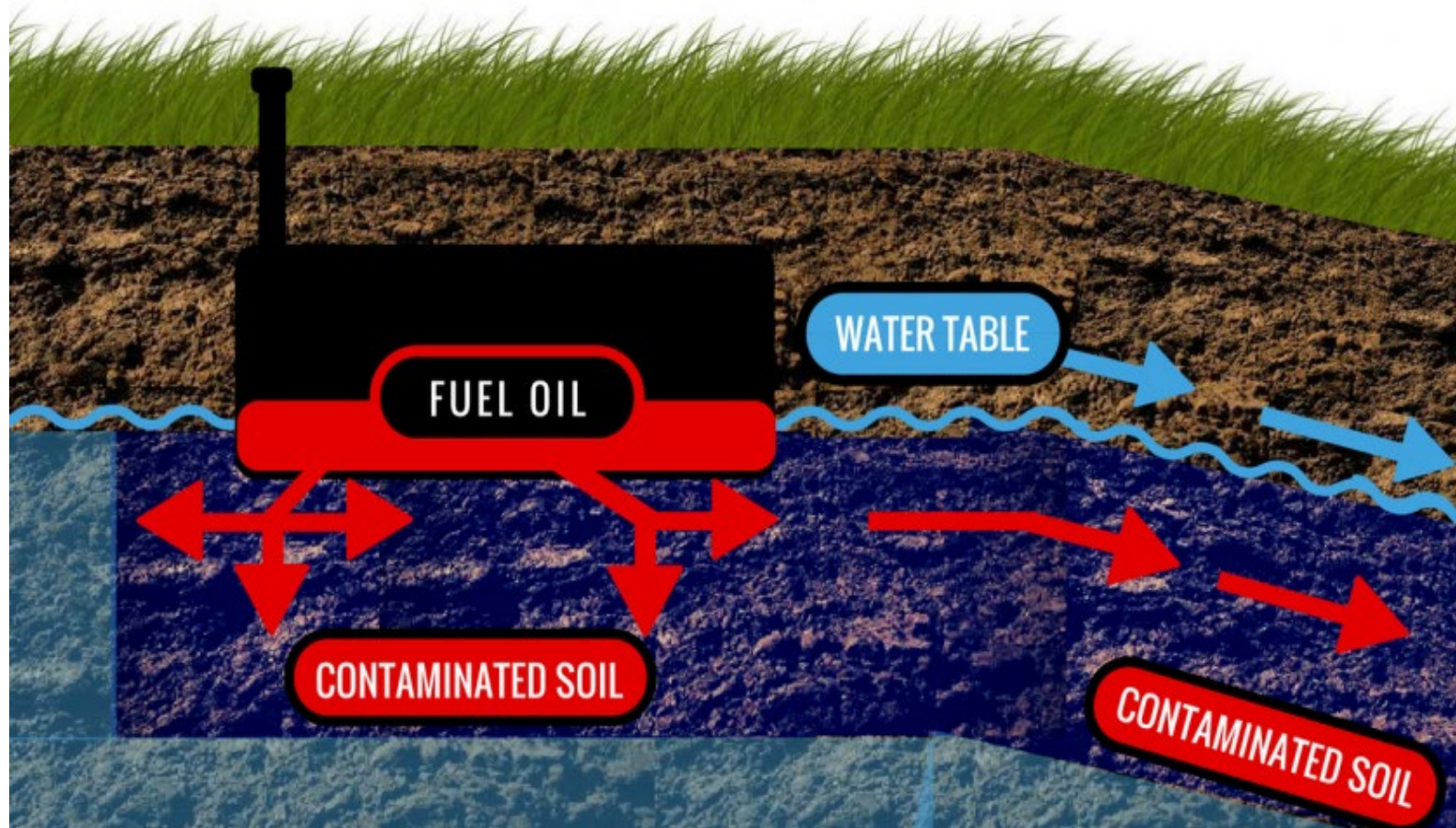
Phase II Environmental Site Assessments (ESAs)

- Collect soil and/or groundwater samples from APEC locations
- Samples analyzed for contaminants of concern
- Results are compared to applicable human and ecological standards
- Soil and GW contamination is overlaid on community lands
- GIS is crucial in identifying impacts and risk to human or ecological health



Contaminated Site Management

TRI CITY TANK TECH LTD OILTANK.CA



- Accurate data helps identify the extent and nature of soil, water, and air impacts
- Risk Management is used when determining, monitoring, and reducing potential impacts to human and ecological health
- Remediation is the removal or treatment of known contaminants

Environmental Management Planning



Environmental Management Planning Example

Land and Water Contamination

Description of issue

- Contaminated runoff from automotive mechanics

Potential Responses

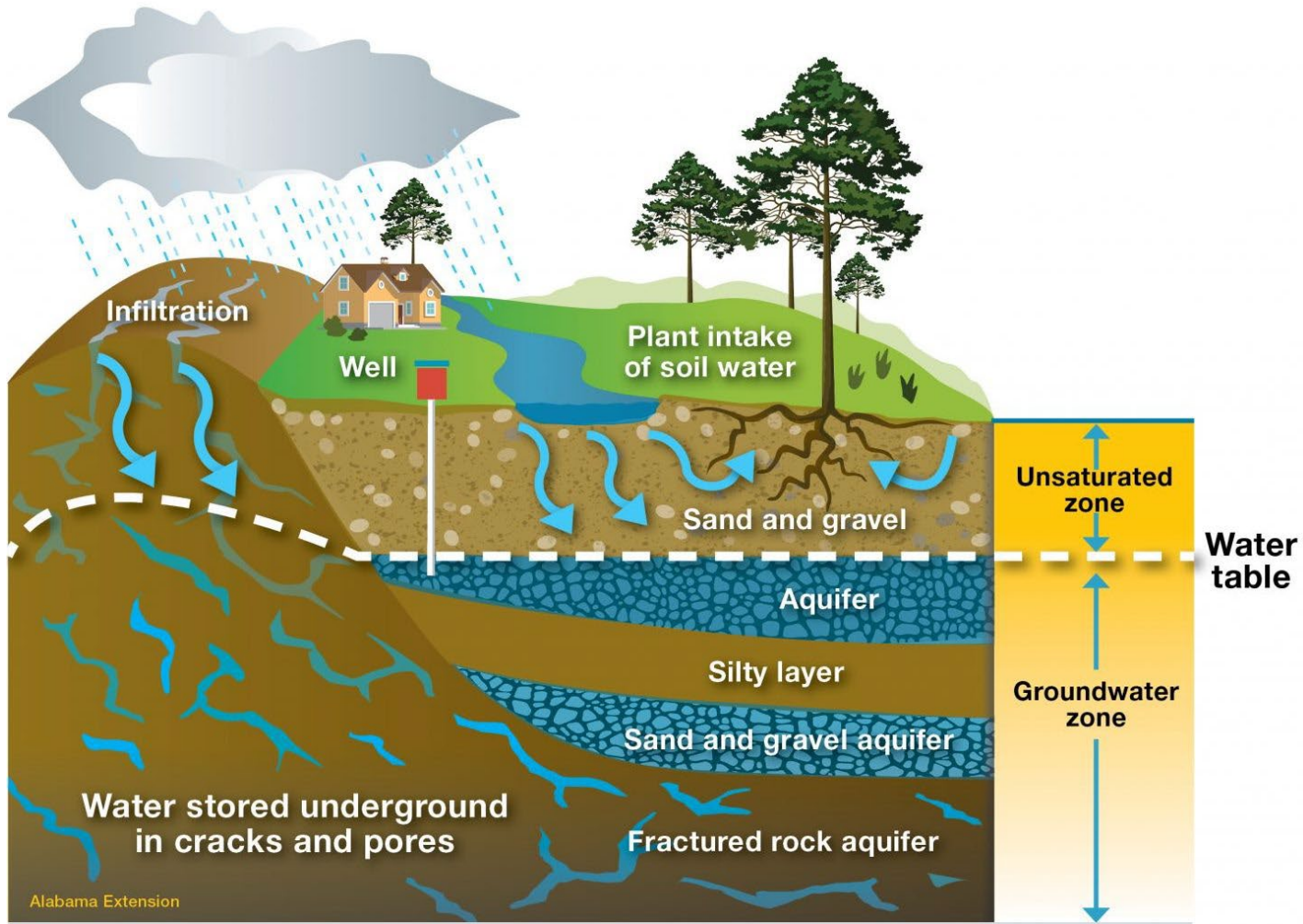
Laws and Regulations

Develop an Environmental Protection law to outline enforceable rules to prevent and respond to contamination

Engagement and Education

Use outreach to explain the new law and methods of reducing contaminated runoff

Groundwater Protection



DESCRIPTION OF LAYERS IN AN AQUIFER

Confining Layer – a layer of material with low permeability that bounds an aquifer and limits flow of water

Unconfined Aquifer – an aquifer that is connected to the surface so its upper surface can rise and fall

Unsaturated Zone – the portion of the subsurface above the groundwater table.

Saturated Zone – encompasses the area below ground

Confined Aquifer – aquifers in which an impermeable dirt/rock layer exists that prevents water from seeping into the aquifer from the ground surface located directly above

Artesian Well – a well from which water flows under natural pressure without pumping

Permeability – a measure of the degree to which the pore spaces are connected

Porosity – measured as a fraction of the volume of voids over the total volume

Consolidated Rock – rock that is firm and coherent, solidified, or cemented

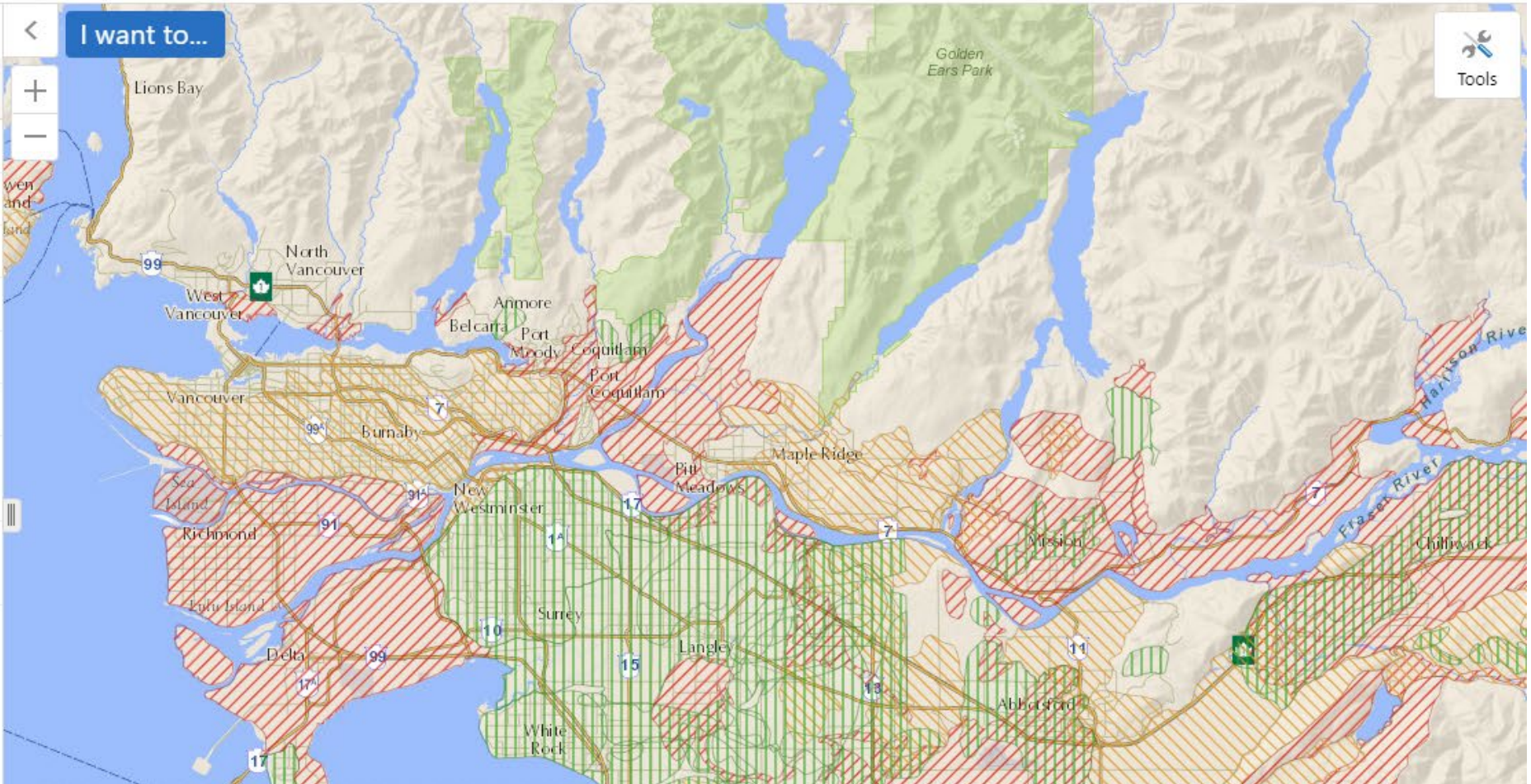
My Layers Add Provincial Layers Upload Data Add External Layers

Layers

Layers

Filter Layers... Filter

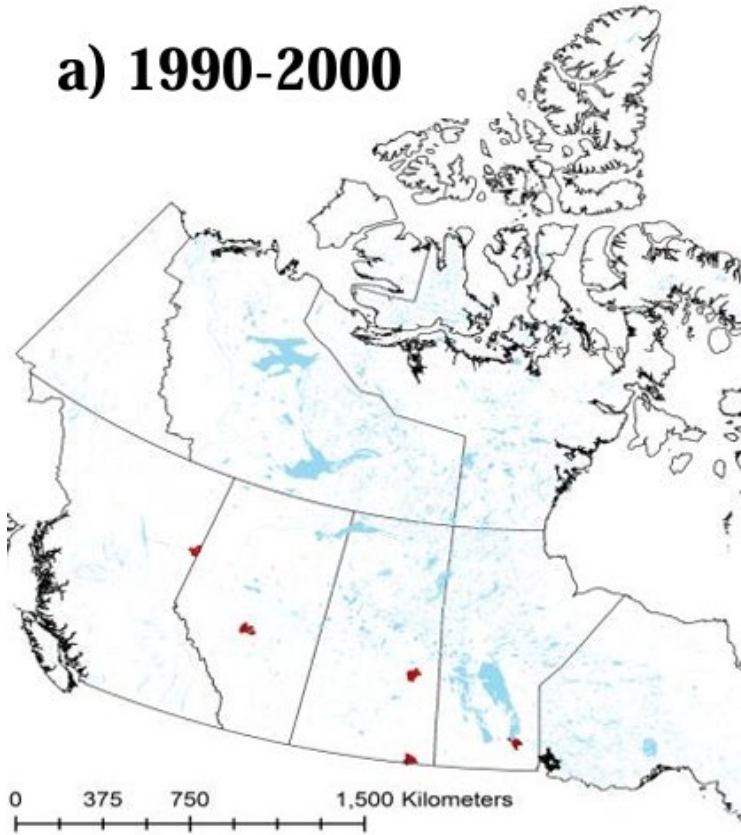
- Protected Rivers - Streams
- Groundwater Wells - All
- Aquifers - Subtype
- Aquifers - Vulnerability
- Sensitive Streams - Streams
- Aquifers - All
- Aquifer Intrinsic Vulnerability Reports Index - DRASTIC
- Aquifer Intrinsic Vulnerability - DRASTIC



Tools

Invasive Species and Species at Risk

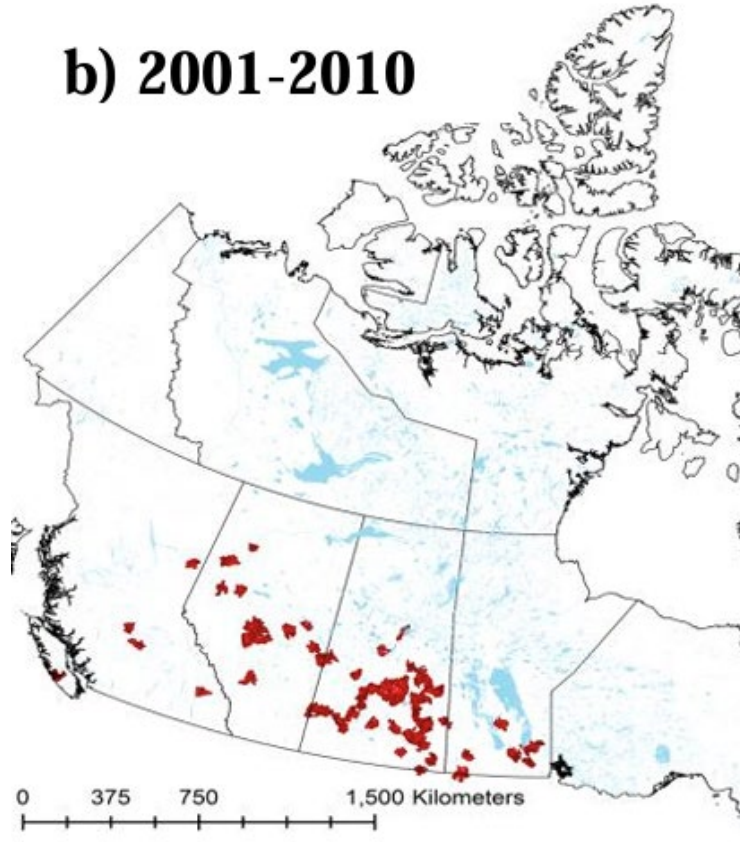
a) 1990-2000



Watersheds with Wild Pig Presence Detected

- Wild Pig Presence
- Waterbodies

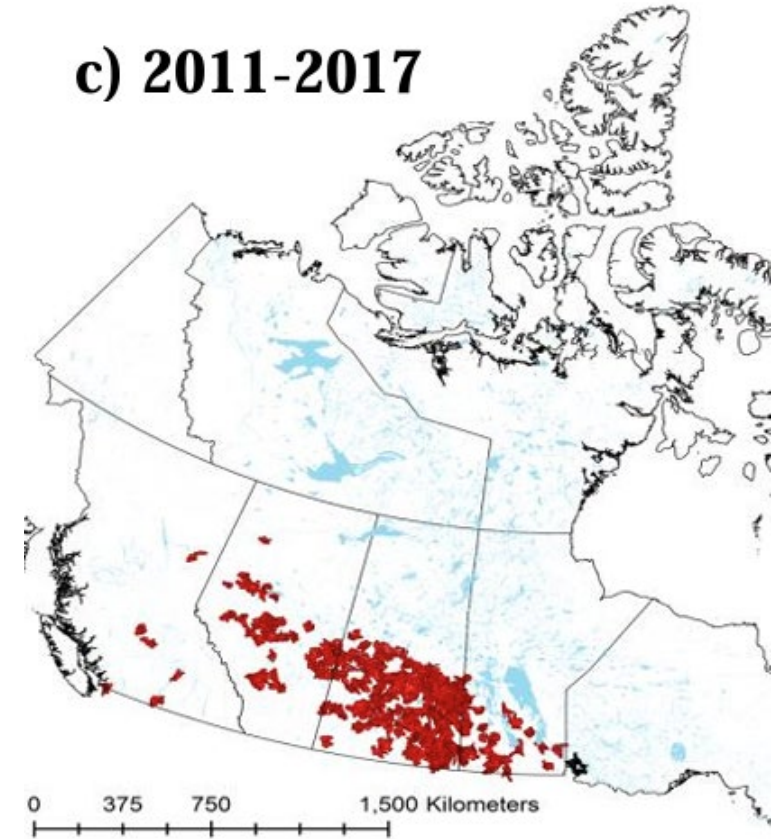
b) 2001-2010



Watersheds with Wild Pig Presence Detected

- Wild Pig Presence
- Waterbodies

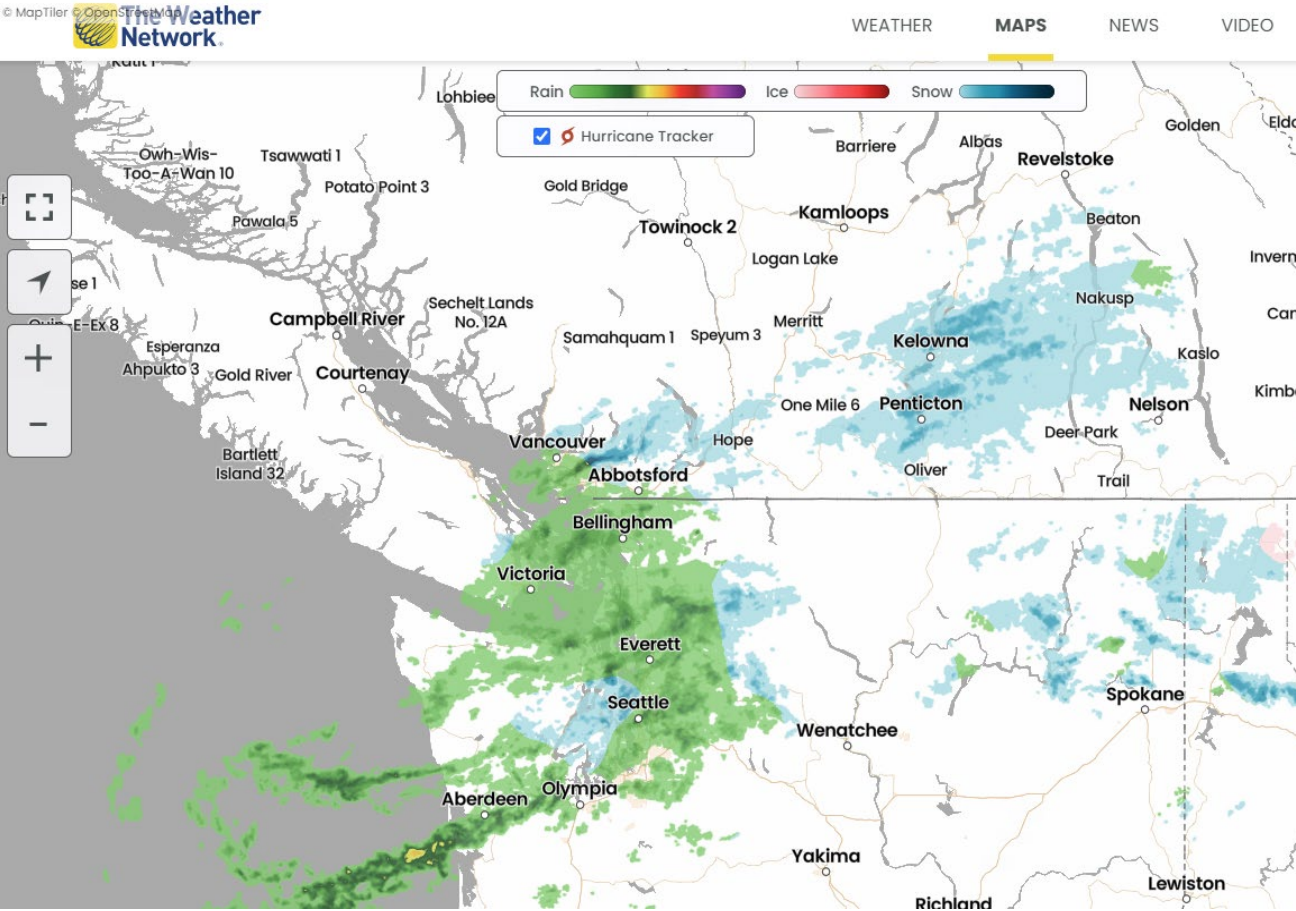
c) 2011-2017



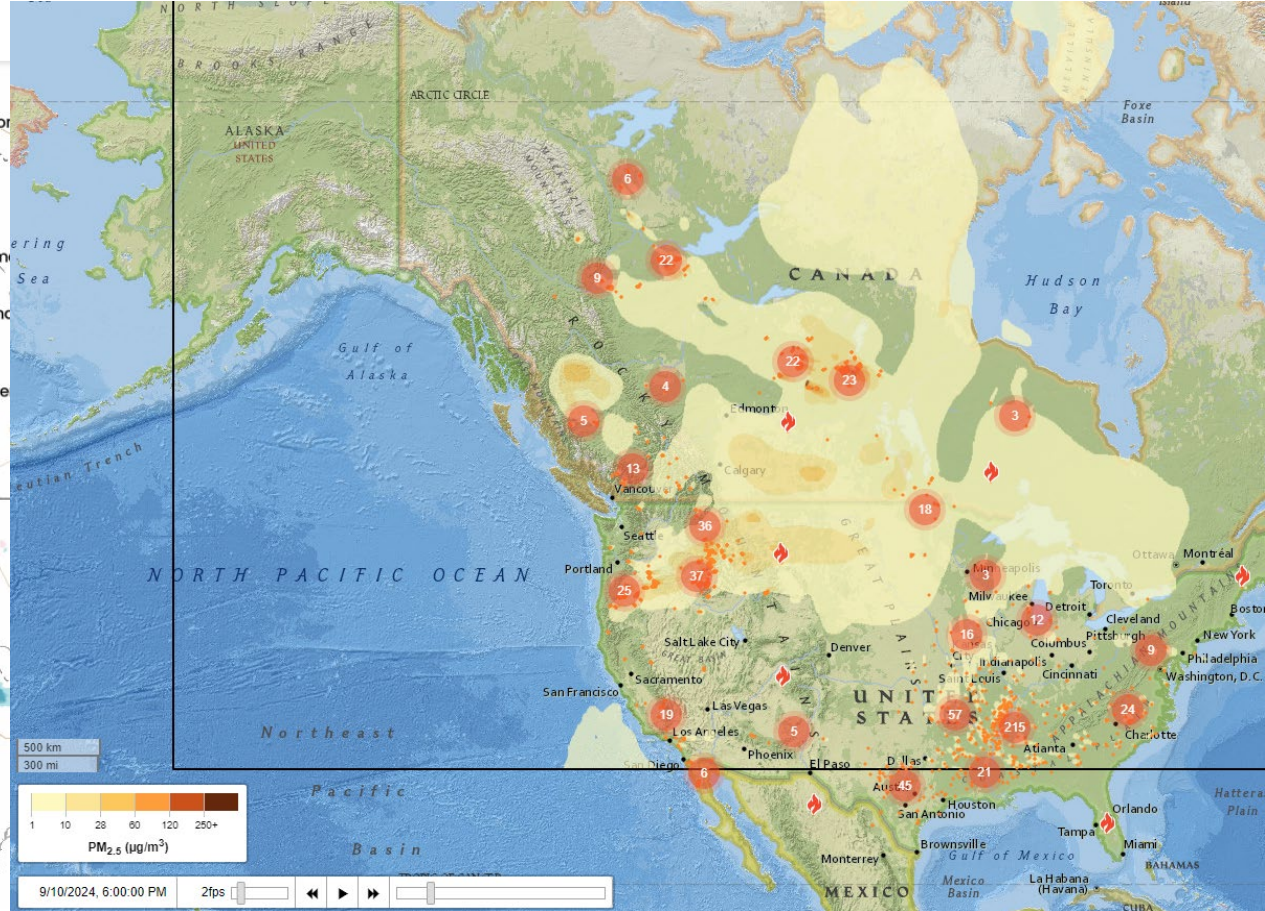
Watersheds with Wild Pig Presence Detected

- Wild Pig Presence
- Waterbodies

Climate Change Mapping - Live Map






<https://www.theweathernetwork.com/en/maps/radar>

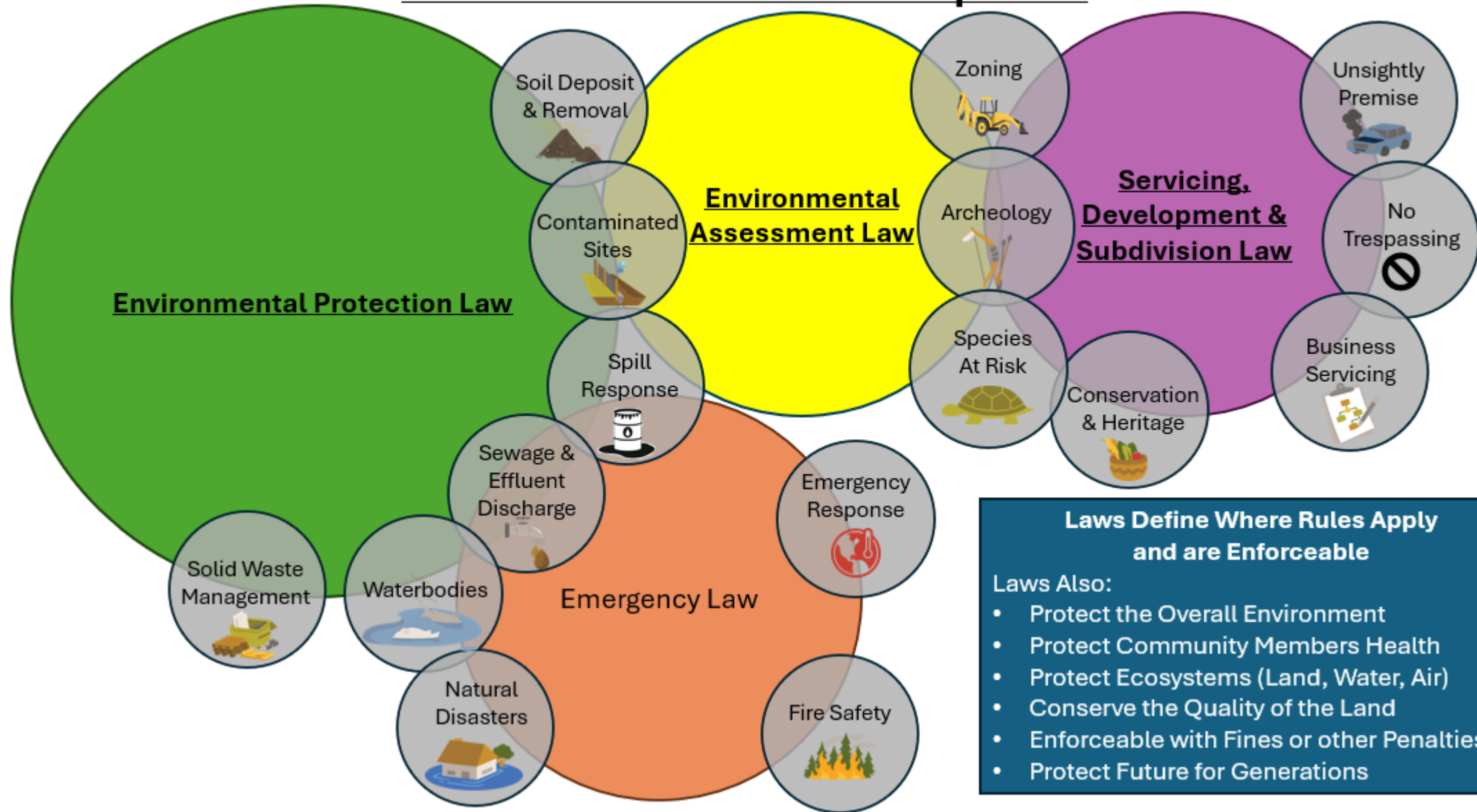


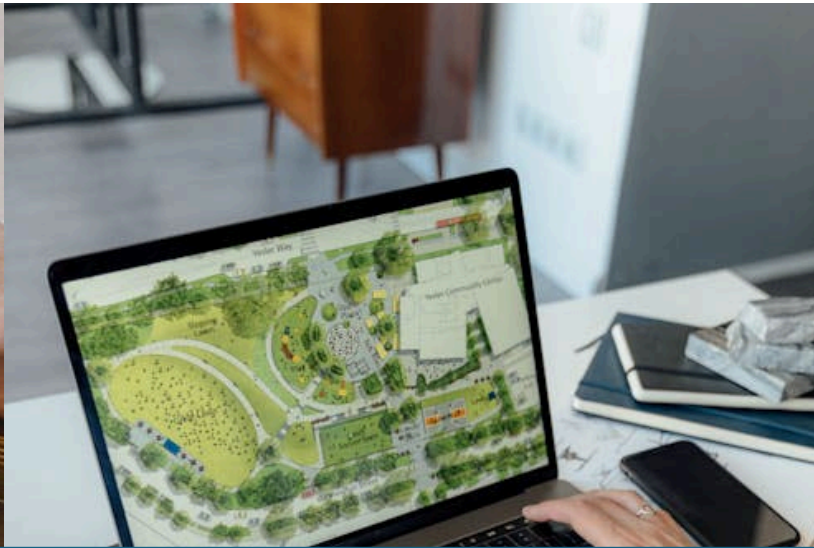
<https://firesmoke.ca/forecasts/current/>

Emergency Planning With GIS

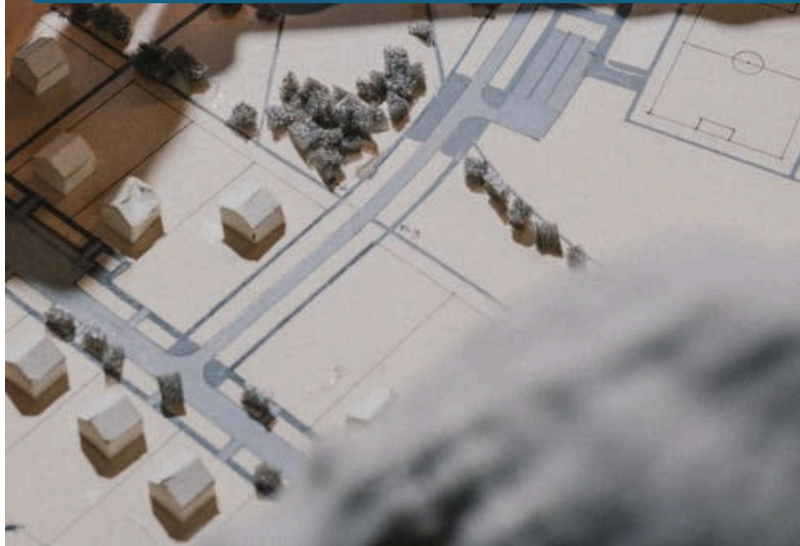
Alternate Routes	Environmental Impacts	Safety and Community Awareness
<ul style="list-style-type: none">• Display Road rights of way or unpaved hardly used roads• Collect data from previous road flooding to avoid closures 	<ul style="list-style-type: none">• Elevation Models to determine potential flood zones• High-risk areas for floods, wildfires or earthquakes 	<ul style="list-style-type: none">• Community newsletters to relay muster points and emergency routes 

Environmental Law Development





WHAT OTHER GIS APPLICATIONS & RESOURCES DO YOU USE?



Resource Centre Learning Tools, Support & Funding

Environmental Management Planning

Land Use Planning

Additions to Reserve

GIS Support

Land Code Development

Direct Community Support (1:1)

Various Funding Opportunities



RC NETWORKING

Wednesday
December
4th

15 Minute
Sessions

1-on-1
Opportunity

10:45am
until
12 pm

www.labrc.com

QUESTIONS?



**FIRST NATIONS
LAND MANAGEMENT
RESOURCE CENTRE**

Thank You

www.labrc.com

For more information about the RC's Support Programs please contact:

Leeanna Rhodes
GIS Specialist
Email: lrhodes@labrc.com

Matt Charles
Environment & Enforcement Advisor
Email: mcharles@labrc.com



**FIRST NATIONS
LAND MANAGEMENT
RESOURCE CENTRE**

