

# Ramsey Lake Subwatershed Study And Master Plan



## Public Information Centre #2

May 18,  
2017



# Objective of Public Information Centre #2

Tonight's Public Information Centre (PIC) will:

- Introduce the study area
- Provide an overview of the Subwatershed Study purpose and objectives
- Review the Subwatershed Study process
- Provide an opportunity for the public to review the work completed to date as well as upcoming work
- Allow the public to provide input to the study, and to discuss questions and issues with staff

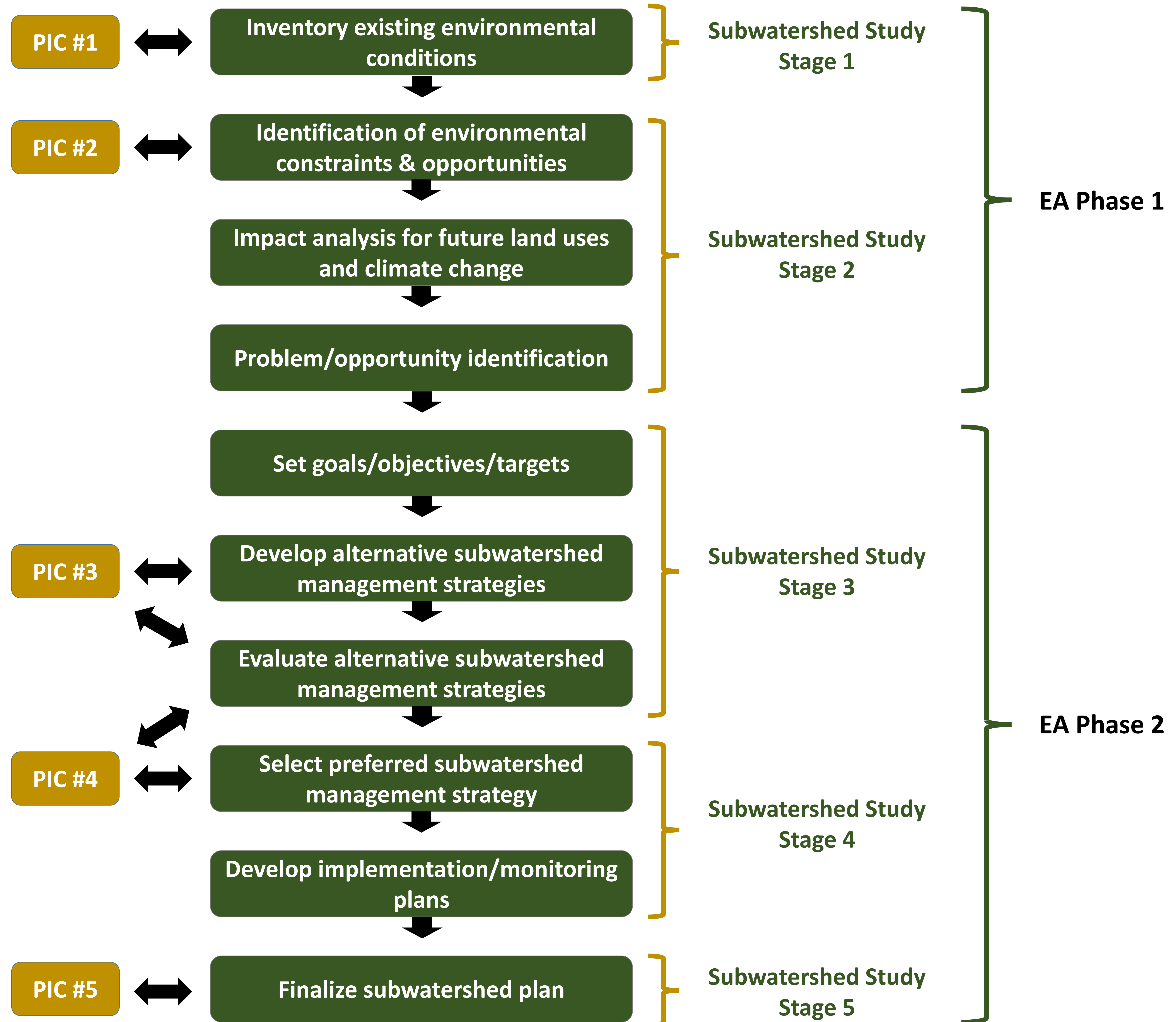


# Subwatershed Study/Environmental Assessment Process

We are here

The Subwatershed Study is being conducted as a Master Plan and is intended to satisfy Phases 1 and 2 of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment Act (Class EA) process. This will involve a process of problem/opportunity identification, evaluation of alternative solutions, and selection of a preferred solution. Stakeholder consultation is an important part of the EA process and a key component of the study.

Consultation with Stakeholders, the Public, and Agencies



# Erosion and Stream Morphology

## Objectives

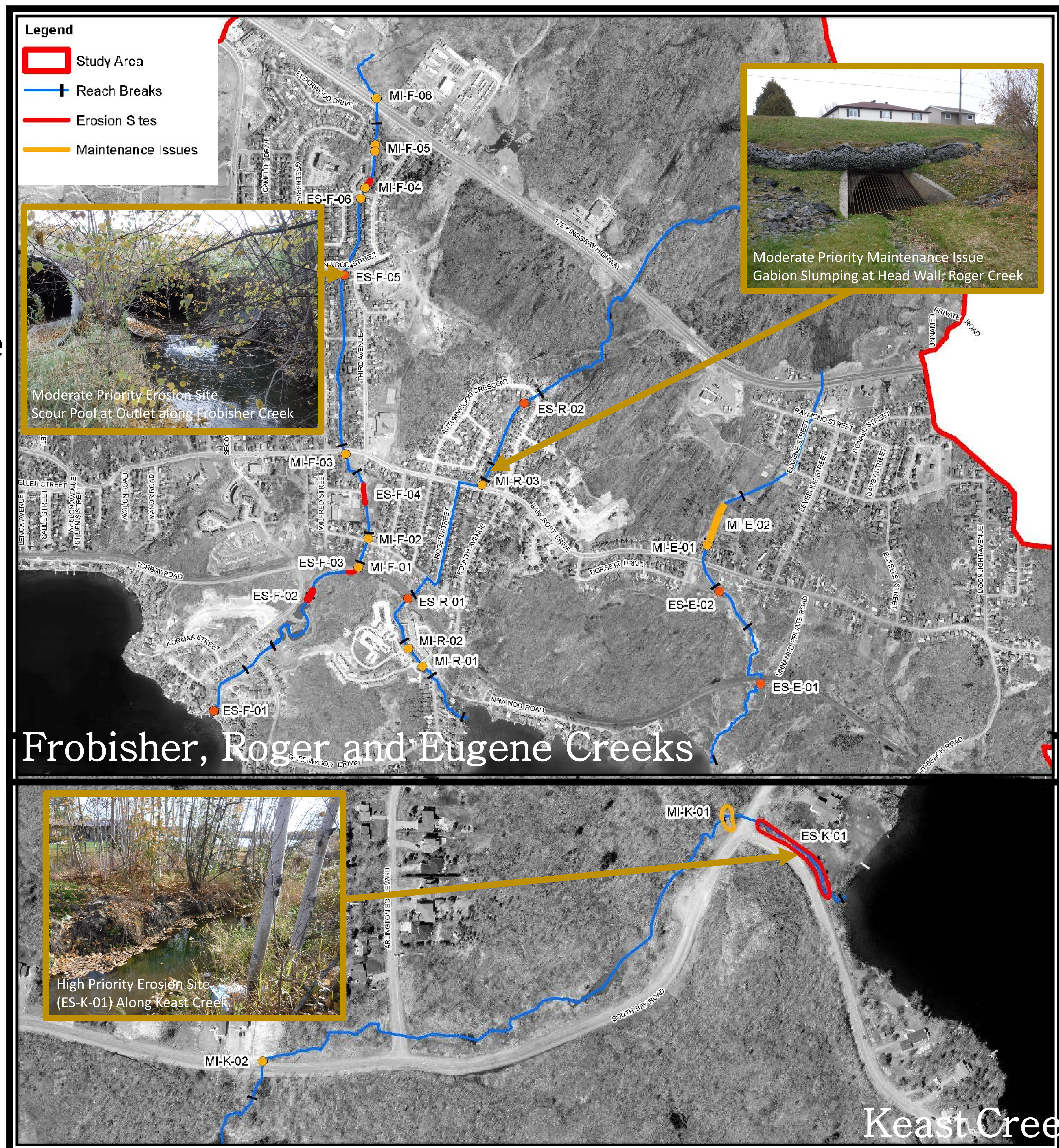
- Stream characterization
- Identify erosion issues

## Study Tasks:

- Identified erosion sites and maintenance issues along water courses
- Identified stream restoration opportunities

## Key Findings

- 11 Erosion Sites were identified
  - Only one High Priority erosion site was identified at the downstream extent of Keast Creek (shown on map)
- 13 Maintenance Issues were identified
  - Two high priority sites
  - Most issues are associated with culvert inlets (i.e., scour, sediment/vegetation accumulation)



# Hydrology

## Objectives

- Define flows at four tributaries and overall watershed

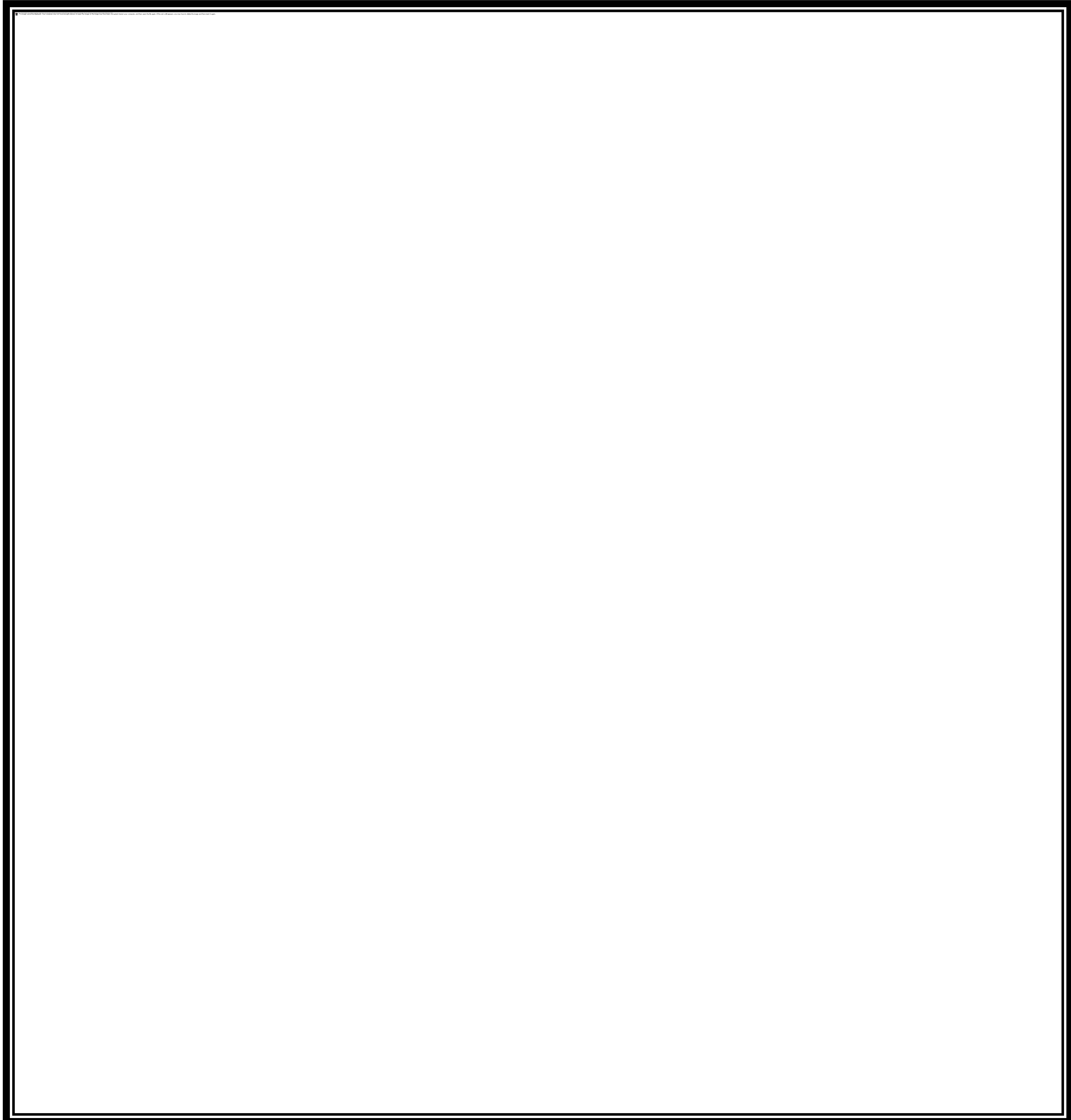
## Study Tasks:

- ✓ Hydrologic model (PCSWMM) set up
- ✓ Determined the flow rates at key locations along the creek using the hydrologic model
- ✓ Flow rates were used to establish the flood hazard maps

## Key Findings

- Flow rates were determined at key locations along the creeks

Flow Nodes	2-year	5-year	10-year	20-year	50-year	100-year	Timmins
FrobisherNode1	1.19	1.72	2.13	2.56	3.15	3.67	6.057
FrobisherNode2	4.06	5.97	7.42	8.93	10.95	12.66	10.57
FrobisherNode3	5.09	7.39	10.25	12.82	15.77	18.23	13.84
FrobisherNode4	5.96	7.75	11.42	14.59	17.17	20.34	14.98
FrobisherNode5	7.30	9.53	13.49	16.90	20.57	24.00	17.64
FrobisherNode6	8.25	10.97	17.68	24.25	25.85	26.88	33.65
RogersNode1	0.18	0.28	0.38	0.50	0.71	0.96	3.27
RogersNode2	0.17	0.26	0.34	0.47	0.70	0.95	3.32
RogersNode3	0.94	1.41	1.78	2.17	2.72	3.21	4.65
RogersNode4	1.68	2.56	3.24	3.94	4.92	5.78	6.41
RogersNode5	2.15	3.29	4.20	5.11	6.40	7.52	8.35
EugeneNode1	0.35	0.51	0.65	0.80	1.02	1.24	2.25
EugeneNode2	0.26	0.42	0.54	0.65	0.79	1.01	2.24
EugeneNode3	0.68	1.33	1.91	2.58	3.65	5.46	9.34
EugeneNode4	0.73	1.54	2.29	3.15	4.53	8.65	11.53
Keast1	0.88	1.29	1.67	2.09	2.76	3.43	4.58
Keast2	1.44	2.10	2.68	3.32	4.29	5.27	7.26



# Hydraulics – Flooding

## Objectives

- Identify limits of Regional flood

## Study Tasks:

- ✓ Bridges/culverts surveyed
- ✓ Hydrologic/hydraulic model developed
- ✓ Mapped flood hazard lands

## Key Findings

### Frobisher Creek:

- A total of 13 buildings are within the flood limits
- Under the Regional flood conditions three roads (Bancroft Road, Rita Street and Greenwood Drive) are overtopped.

### Roger Creek:

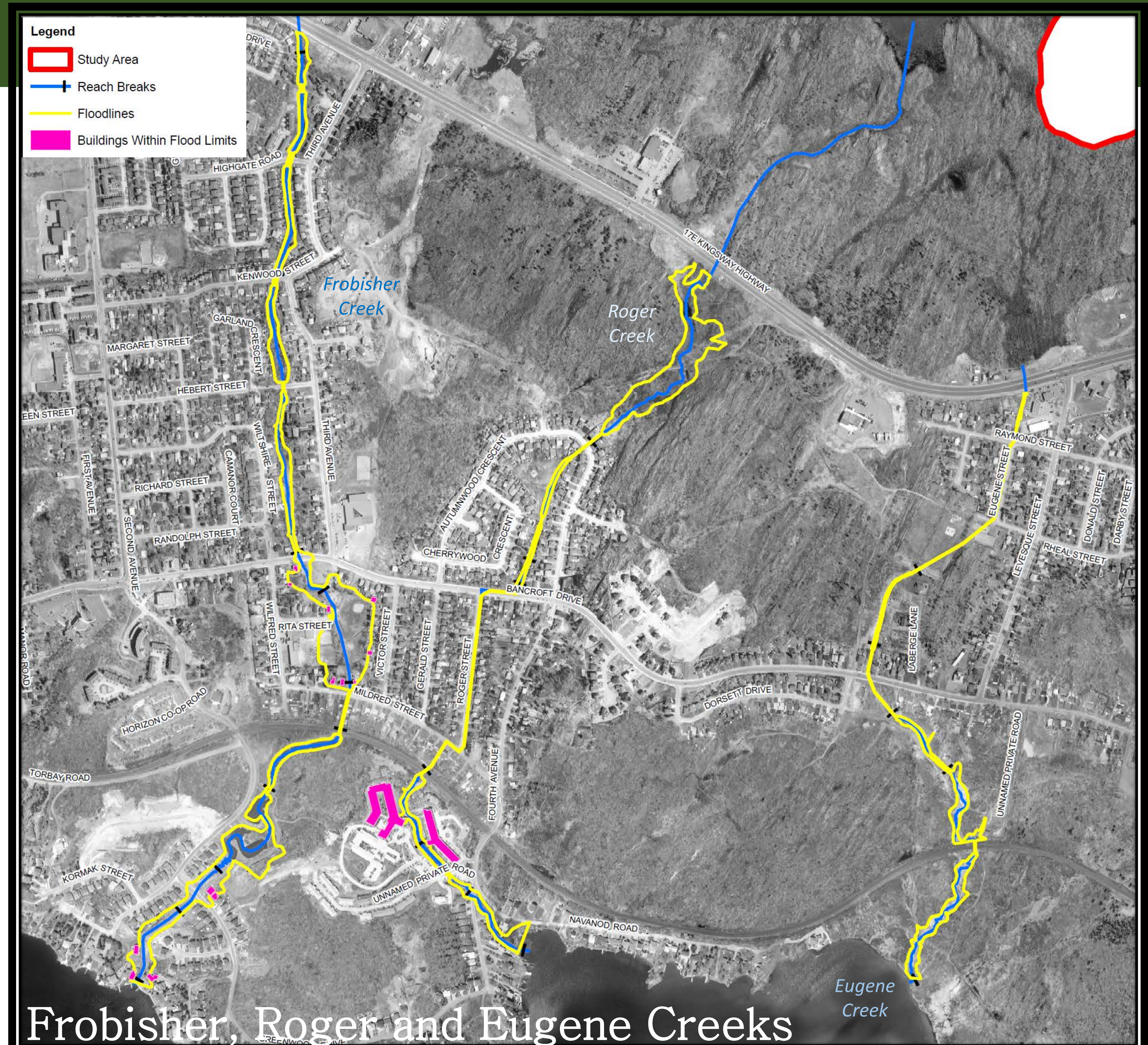
- Only two (2) buildings are within the flood limits, both within the Finlandia Retirement Community
- Under the Regional flood conditions 1 road (4th Avenue) is overtopped and 1 culvert and 1 bridge within the Finlandia Retirement Community are also overtopped

### Eugene Creek:

- No buildings are within the flood limits and no roads are overtopped
- The Bancroft Road culvert is close to capacity under the Regional conditions, but is not overtopped

### Keast Creek

- No buildings are within the flood limits
- Under the Regional flood conditions all three roads (South Bay Road, Arlington Boulevard and Keast Road) are overtopped.
- Some spilling is anticipated along South Bay Road and Keast Road.



# Hydrogeology: Objectives and Data Compilation

## Overall Objectives

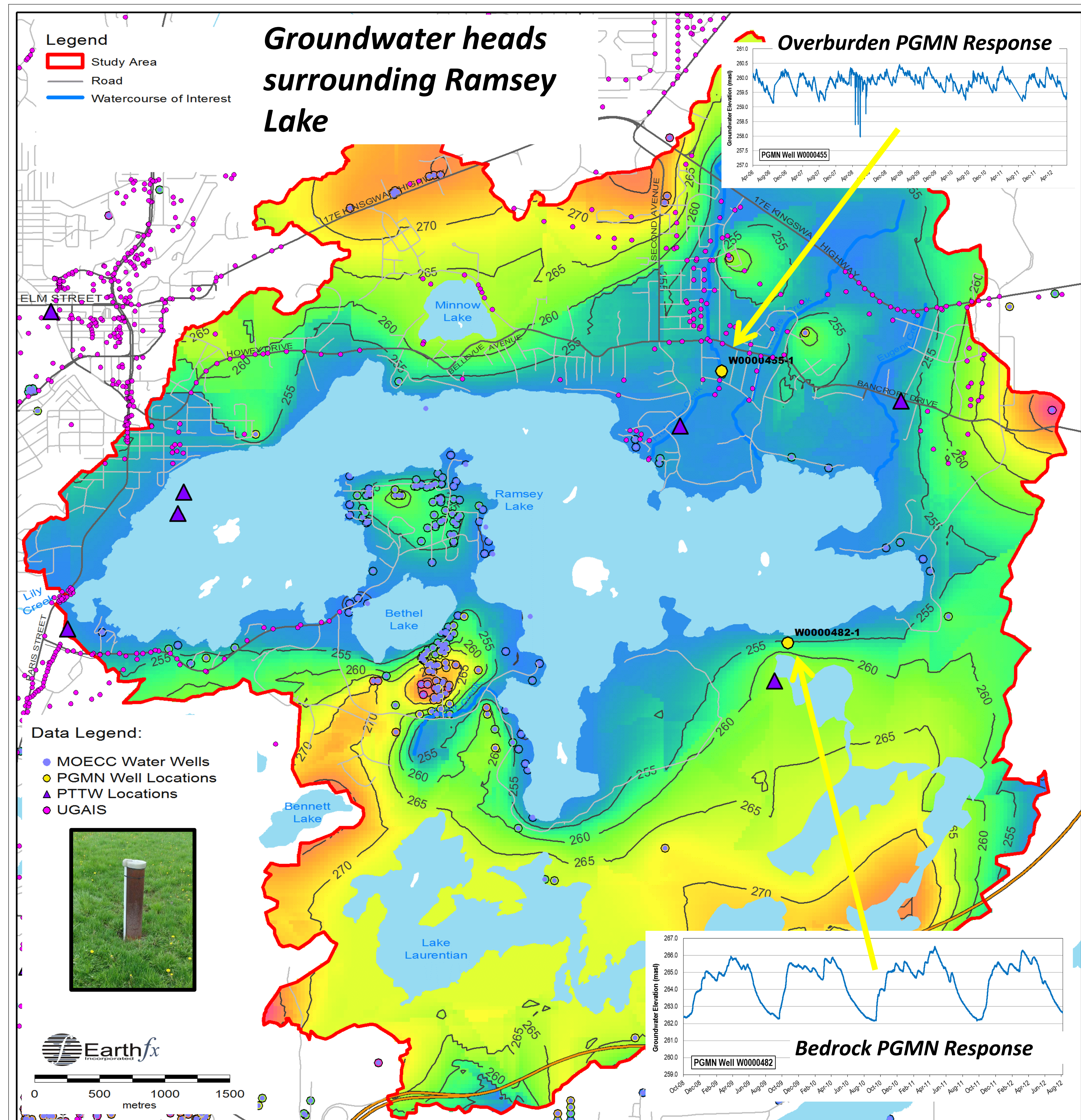
- Characterize hydrogeologic conditions and identify system components that may be sensitive to future land use changes
- Identify opportunities for mitigating negative long-term impacts to groundwater resources

## Study Task 1:

- ✓ Compilation and review of existing information and datasets related to regional geologic and hydrogeologic conditions

## Key Findings

- Compiled water well records, permits, geologic and Source Water Protection mapping
- Supplemented water well data with 4000 Urban Geotechnical boreholes (UGAIS)
- Well coverage, even with UGAIS boreholes, is very sparse
- Provincial GW Monitoring Network (PGMN) wells show a more prominent summer recession in bedrock than overburden



# Hydrogeology: Resource Assessment

## Objectives

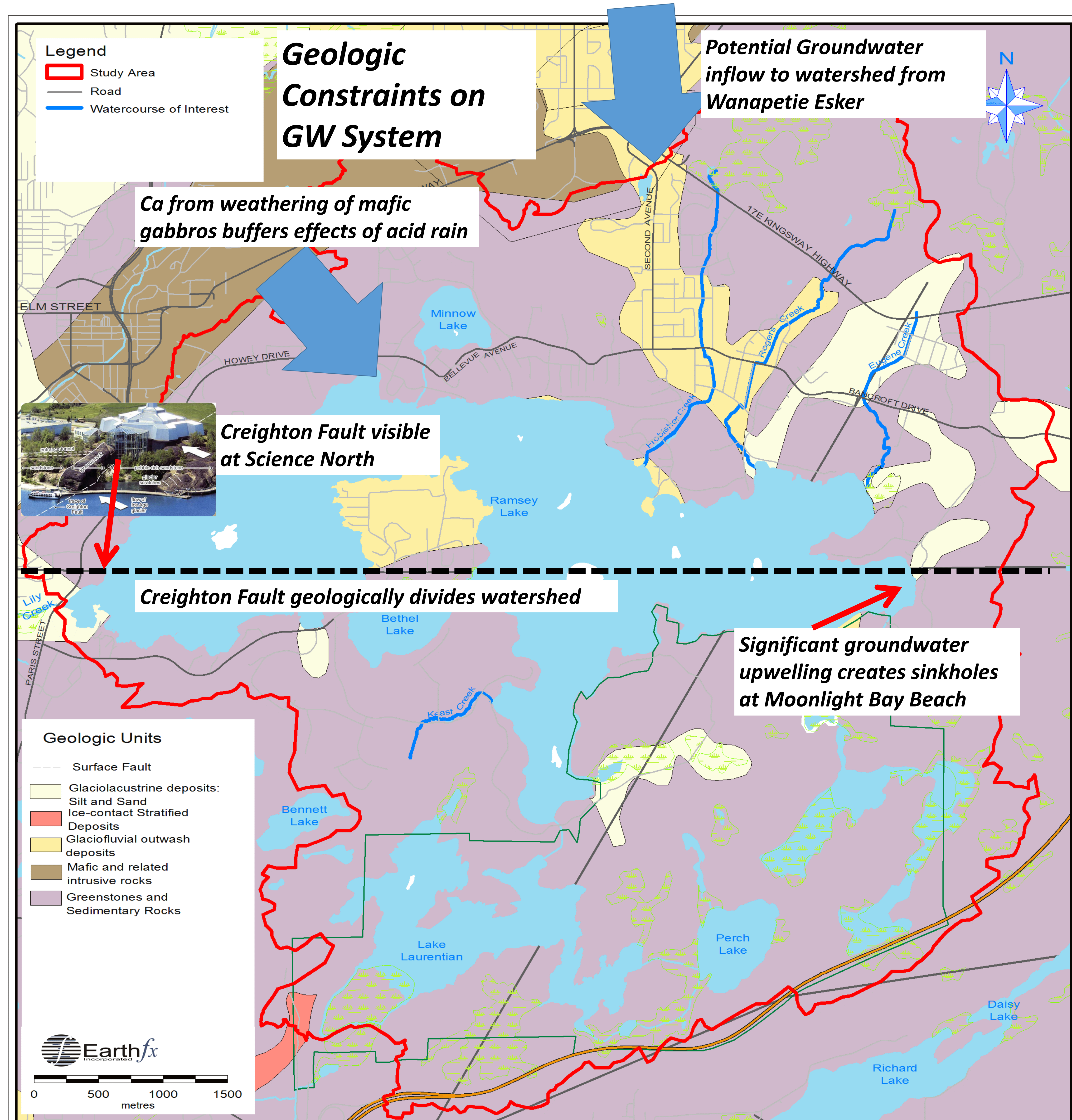
- Characterize hydrogeologic conditions

## Study Tasks:

- Groundwater resource assessment

## Key Findings

- Weathering of mafic gabbros in northwestern portion of the study area is thought to have buffered effects of acid rain – may be influencing water quality in the lake
- The Creighton Fault, extending from Science North to Moonlight Bay, illustrates how faulting and fracturing creates localized but highly irregular groundwater flow conditions. Surrounding local topography can generate potentially significant artesian upwelling conditions through the fractured bedrock.
- The surficial sand and gravel deposits in the northeast of the watershed may be connected into the regional groundwater flow system and, potentially, the Wanapetie Esker. Lateral groundwater inflows likely support the wetlands and headwaters of Frobisher, Rogers and Eugene Creek.



# Hydrogeology: Mitigation, Management and Monitoring

## Management/Monitoring

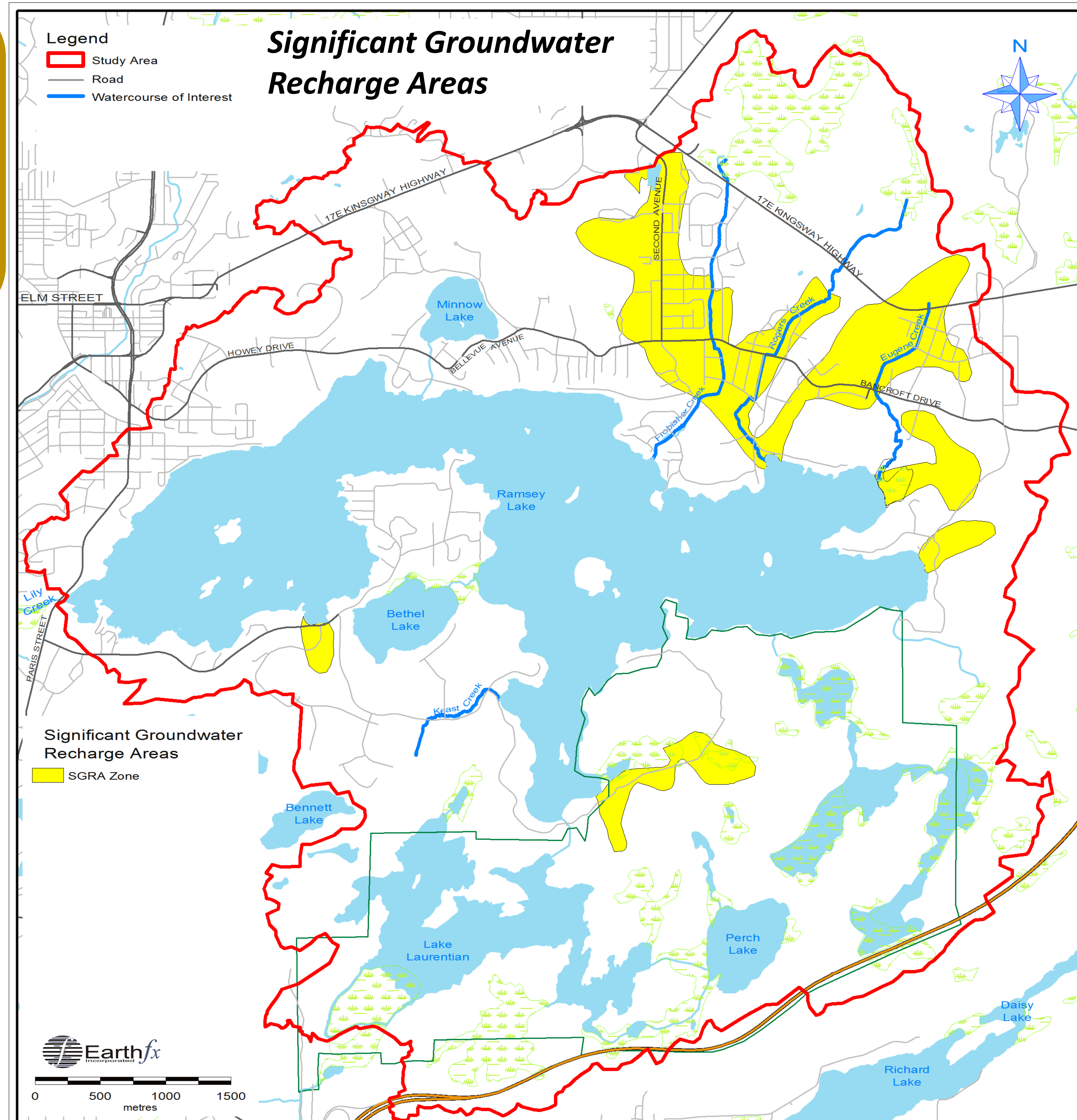
- Identify opportunities for mitigating negative long-term impacts to groundwater resources
- Identify Monitoring Locations

## Study Tasks:

- ✓ Mitigation and management strategies
- ✓ Long-term GW monitoring program

## Key Findings

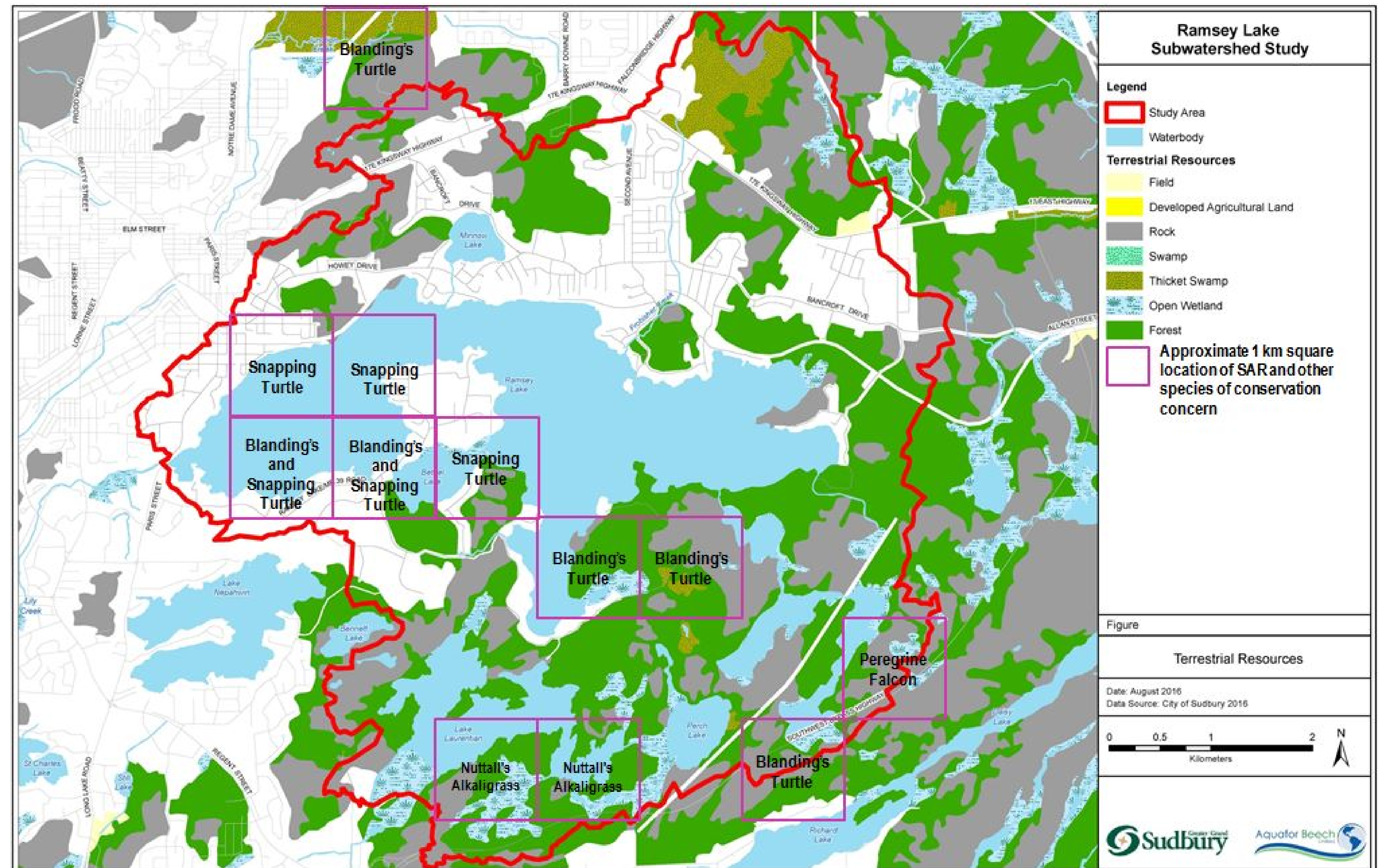
- SWP map of Significant Groundwater Recharge Areas (SGRA) identifies sensitive local shallow overburden aquifers
- Local topographic depressions also potentially important to support fracture flow systems
- Further investigation of water quality patterns related to mafic gabbro weathering
- Recommend monitoring wells in north east of watershed to better characterize potential groundwater inflow from the north for future study



# Terrestrial Resources

## Objectives

- Identify and assess the sensitivity of terrestrial features and functions to inform the natural heritage system protection areas as well as habitat enhancement, restoration, and management opportunities. The project team will focus on areas which may be potentially impacted by proposed mitigation areas and activities



## Study Tasks:

- ✓ Consolidation of existing information
- ✓ Natural heritage assessment
- ✓ Gap analysis
- ✓ Adaptive management plan
- ✓ Identification and classification of natural heritage constraints
- ✓ Restoration/enhancement and protection measures
- ✓ Implementation and monitoring recommendations

## Key Findings:

- Vegetation communities include Birch Transition Community, Birch – Maple Community, Red Oak Community, and Poplar Lowland Community
- Sub-watershed supports a diverse arrangement of wildlife including songbirds, waterfowl, small and large mammals, fish, reptiles and amphibians, and insects
- Species at Risk include reptiles, birds, butterflies, and plants
- Fire, logging, mining, and urban development has caused widespread erosion on the thin soils, resulting in exposed rock
- Regreening Program has increased vegetative cover within watershed

# Water Quality (Ramsey Lake)

## Objectives

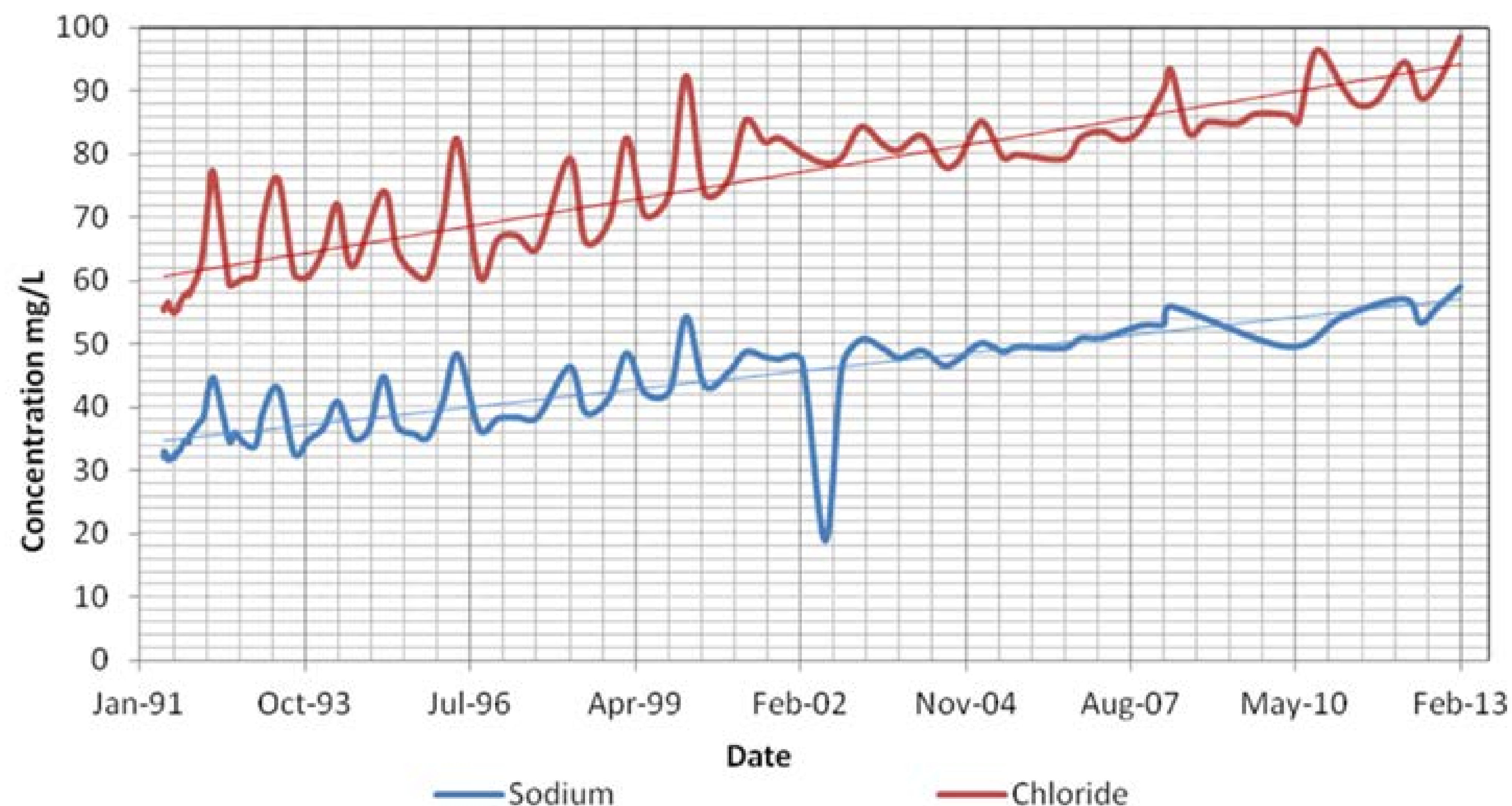
- Identify sources of pollution and water quality trends

## Study Tasks:

- ✓ Synthesized water and aquatic sediment data sets
- ✓ Identified long term trends in pollutants

## Key Findings

- Sodium and chloride concentrations in Ramsey Lake have increased since 1991
  - Sodium concentrations have been  $> 50$  mg/L since 2013. The Ontario Drinking Water Standard for sodium is 200 mg/L
  - The water quality guideline for chloride, for the protection of aquatic life, is 120 mg/L



**Sodium and Chloride Concentrations in Ramsey Lake (1991-2013).**

# Water Quality (Ramsey Lake)

## Objectives

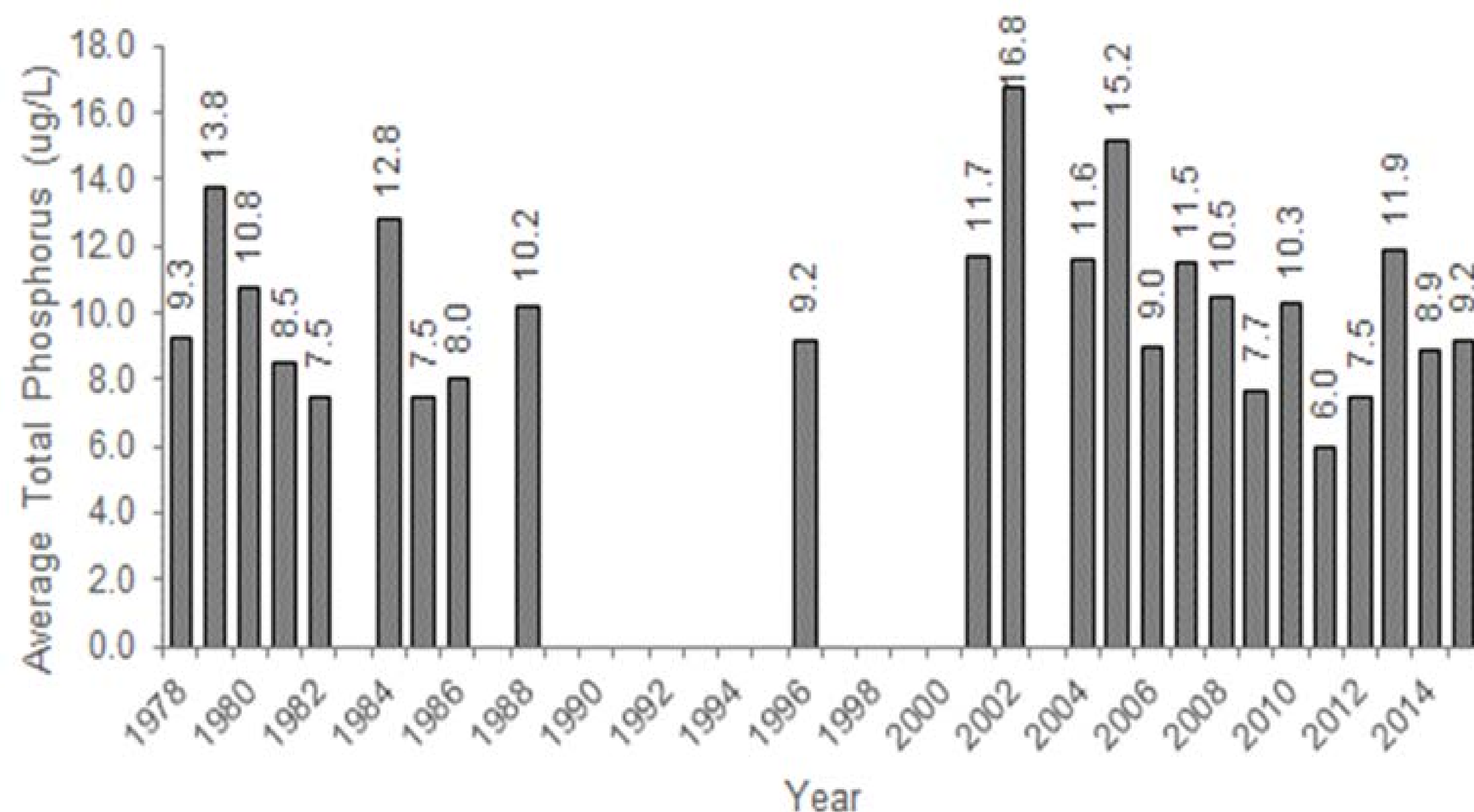
- Identify sources of pollution and water quality trends

## Study Tasks:

- ✓ Synthesized water and aquatic sediment data sets
- ✓ Identified long term trends in pollutants

## Key Findings

- Phosphorus concentrations have varied since the 1970's between about 10 and 17  $\mu\text{g/L}$ . The lake is currently classified as meso-eutrophic or moderately nutrient enriched
  - Runoff from urban land uses has resulted in an increase in phosphorus concentrations
  - Large weed beds throughout Ramsey Lake are one result of higher-than-natural phosphorus loads



**Total Phosphorus Concentrations in Ramsey Lake (1978-2014).**

# Water Quality (Ramsey Lake)

## Objectives

- **Identify sources of pollution and water quality trends**

## Study Tasks:

- ✓ Synthesized water and aquatic sediment data sets
- ✓ Identified long term trends in pollutants

## Key Findings

- **Blooms of cyanobacteria were reported from the lake in 2008, 2010, 2011 and 2012**
  - **Nuisance algal blooms are directly related to surface water runoff**
- **Eurasian water milfoil, an invasive aquatic plant is present in Ramsey Lake**



**Aquatic Plant Growth; Ramsey Lake**

# Water Quality (Ramsey Lake)

## Objectives

- **Identify sources of pollution and water quality trends**

## Study Tasks:

- ✓ Synthesized water and aquatic sediment data sets
- ✓ Identified long term trends in pollutants

## Key Findings

- **Metals concentrations in Ramsey Lake have been elevated from natural levels as a result of exposure to past emissions from local smelter operations**
- **Metals, including copper and nickel have decreased in response to a reduction in emissions of metal particulates from smelters**



# Water Quality (Minnow and Bethel Lakes)

## Objectives

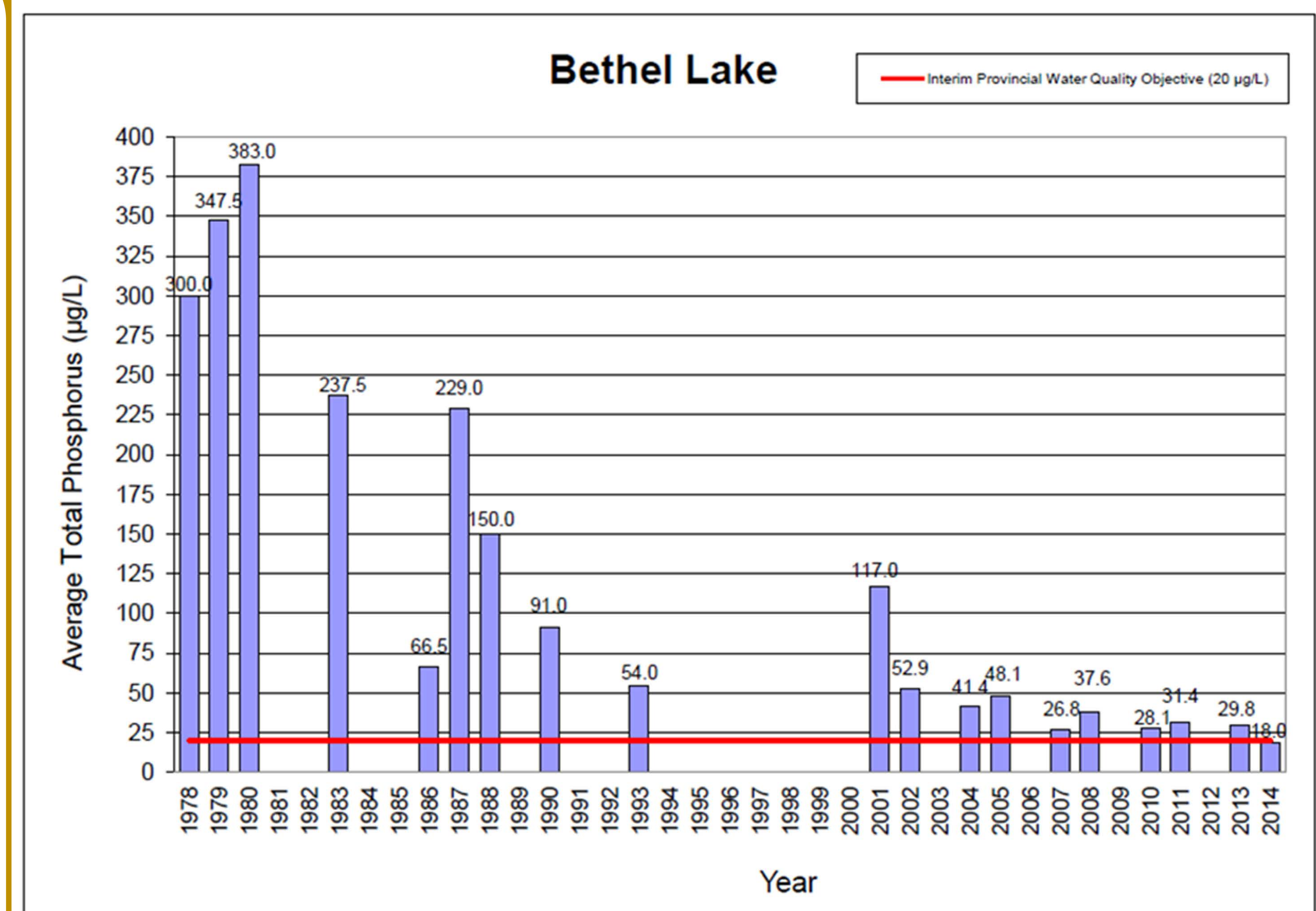
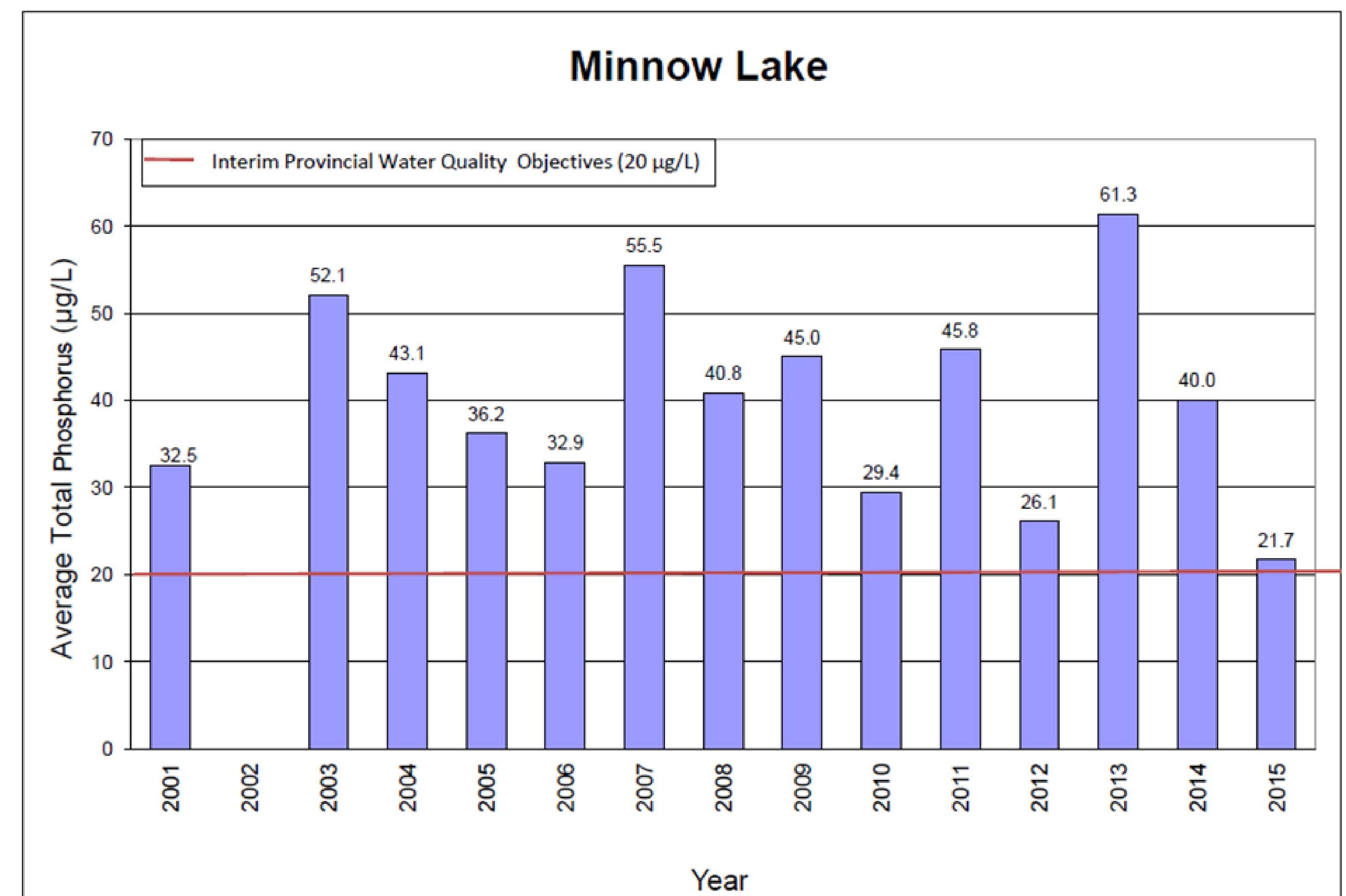
- Identify sources of pollution and water quality trends

## Study Tasks:

- ✓ Synthesized water and aquatic sediment data sets
- ✓ Identified long term trends in pollutants

## Key Findings

- The largest impact on water quality in these lakes is from surface runoff from the catchment.
- Phosphorus concentrations in Minnow Lake are high.
- Phosphorus concentrations have declined in Bethel lake since the 1980's but remain near the PWQO for phosphorus.
- Chloride levels in Minnow Lake are high. Chloride levels in 2010 varied between 110 and 169 mg/L, frequently exceeding the guideline of 120 mg/L.
- Chloride in Bethel Lake in 2010 varied between 33 and 56 mg/L; below the CCME long-term guideline for the protection of aquatic life.



# Water Quality and Aquatic Biota (Inflowing Creeks)

## Objectives

- Identify sources of pollution and water quality trends
- Identify aquatic features/habitats that are of high importance to aquatic communities

## Key Findings

- Very little water quality and biological information has been collected on the small creeks that drain urban areas. These creeks have been physically altered and channels are constrained by existing development.
- Urban effects have likely influenced water quality and aquatic biota communities.
- Total phosphorus, chloride and metal concentrations in Frobisher Creek are high.
- The benthic invertebrate community of Frobisher Creek consists primarily of pollution tolerant species, reflecting poor water quality.



# Aquatic Biota (Ramsey Lake)

## Objectives

- **Identify aquatic features/habitats that are of high importance to aquatic communities**

## Study Tasks:

- ✓ Review existing information related to biota (fish, invertebrates) and their habitats
- ✓ Describe habitat conditions in Ramsey Lake and its tributaries

## Key Findings

- **Development along the shoreline of the lake is extensive, including more than 800 private dwellings as well as public spaces.**
- **Much of the habitat provided by natural shoreline features has been altered.**
- **Aquatic vegetation growth is dense in shallow waters near heavily urbanized areas.**



**Altered and natural Shoreline; Ramsey Lake.**

# Aquatic Biota (Ramsey Lake)

## Objectives

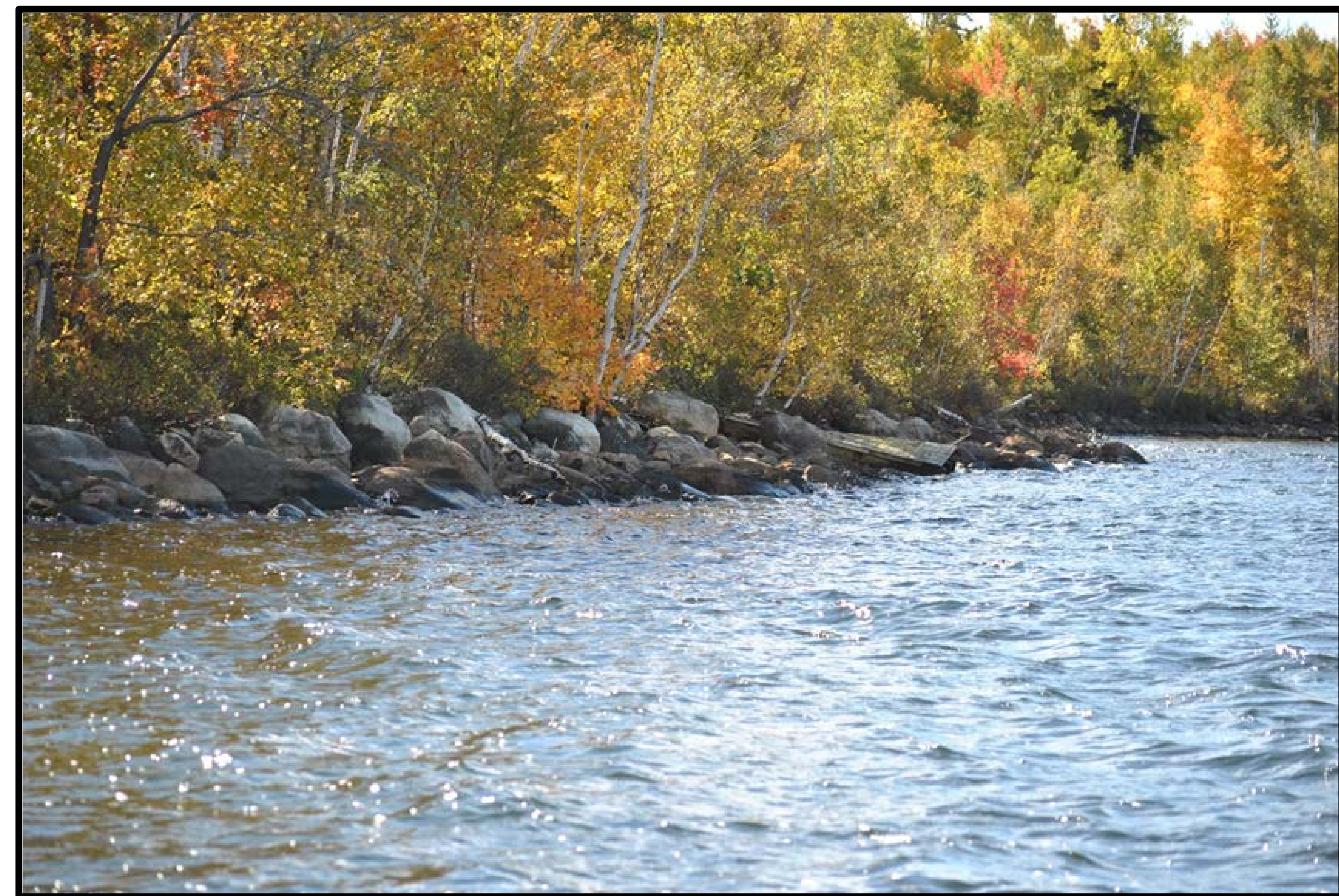
- **Identify aquatic features/habitats that are of high importance to aquatic communities**

## Study Tasks:

- ✓ Review existing information related to biota (fish, invertebrates) and their habitats
- ✓ Describe habitat conditions in Ramsey Lake and its tributaries

## Key Findings

- **Aquatic invertebrates in Ramsey Lake are comprised of the species and numbers typical of area lakes and suggest good water quality in nearshore habitats.**
- **Walleye successfully reproduce in Ramsey Lake. Abundance (population size) is low and exploitation is high.**
- **Mercury levels in fish are below the maximum level of mercury considered harmful to human consumers.**



# Aquatic Biota (Minnow and Bethel Lakes)

## Objectives

- **Identify aquatic features/habitats that are of high importance to aquatic communities**

## Study Tasks:

- ✓ Review existing information related to biota (fish, invertebrates) and their habitats.

## Key Findings

- **There is extensive aquatic vegetation growth in the southern portion of the Lake which, in addition to shoreline vegetation, provides important spawning and nursery habitats to fish.**
- **Eurasian water milfoil, an invasive aquatic plant, has proliferated in Minnow Lake.**
- **The current status of resident fish populations in these lakes is unknown.**
- **The benthic invertebrate community of Bethel Lake consists primarily of pollution tolerant species, reflecting poor water quality.**



# How You Can Help

We look forward to working through the Ramsey Lake Sub-Watershed study with residents and stakeholders. If you wish to participate, please complete our sign-in sheet at the entrance and we will send you updates on study progress and opportunities to participate.

For this first stage of the study to identify the *Existing Conditions* for the Ramsey Lake Sub-Watershed, we wanted to introduce the study and share our preliminary findings with you. We are interested to hear from you on observations and input regarding additional issue, opportunity (for enhanced of ecosystem health) and constraint (sensitive to disruption) areas within the Ramsey Lake sub-watershed.

To share you observations and ideas, or to obtain further information, please:

- Speak to any of our representatives present tonight; they will be pleased to help you
- Complete our feedback survey on paper (available at the registration desk), or online at: <http://www.greatersudbury.ca/living/lakes-facts/watershed-study-2016/>
- Contact the study project managers at any time:

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*The display boards from tonight's meeting are available online at the City website noted above.*