THREE MILE LAKE

Sewage System Re-inspection Program

By Sandy Bos B.Sc.

Township of Muskoka Lakes

News Headline - September 29, 2005

ALGAE RENDERS WATER UNSAFE

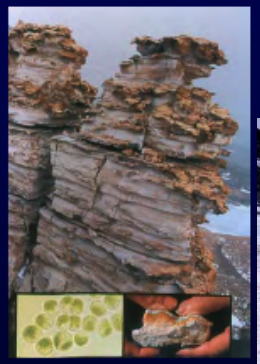
FOR IMMEDIATE RELEASE
Friday, September 23, 2005

Health unit issues water caution as result of blue-green algae at Three Mile Lake

- A water advisory was issued following September 23 test results showing that the blue-green algae bloom in the lake was toxin producing.
- Residents and cottagers were advised not to use the lake water for drinking, bathing, preparing formula, cooking, dishwashing, clothes washing or for water sports.

What is Algae?

- algae exist anywhere there is moisture



Nat. Geog. Oct. 1998

Cryptoendolithic algae

"Snow" algae

kelp

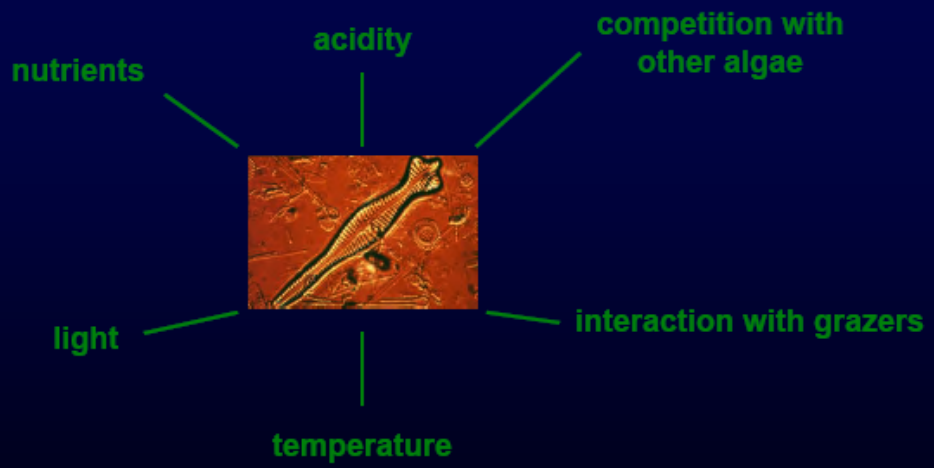
Courtesy J.P.Smol

Sheba the polar bear in Singapore

Muskoka Water Web

What is Algae?

3) The growth of algae is controlled by many factors



Muskoka Water Web

- each species differs in its tolerance to these factors
- growth of a species is best at “optimal” conditions
- in reality, optimal conditions are rarely achieved

What is Algae?

- but conditions have to be right for a bloom

1) High nutrients (phosphorus)

3) Warm temperatures/ high sunlight

2) Water column with low turbulence

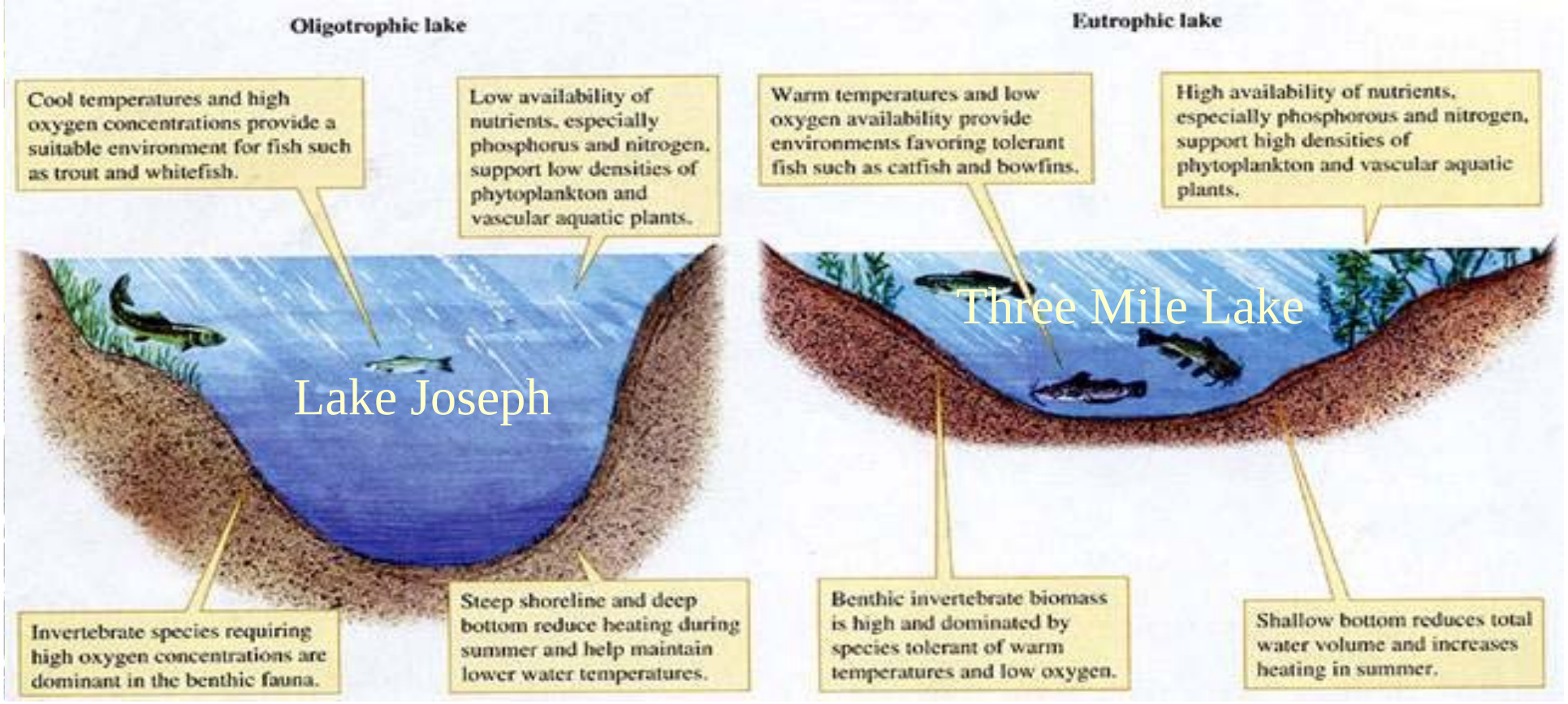
4) Biological factors

Muskoka Water Web

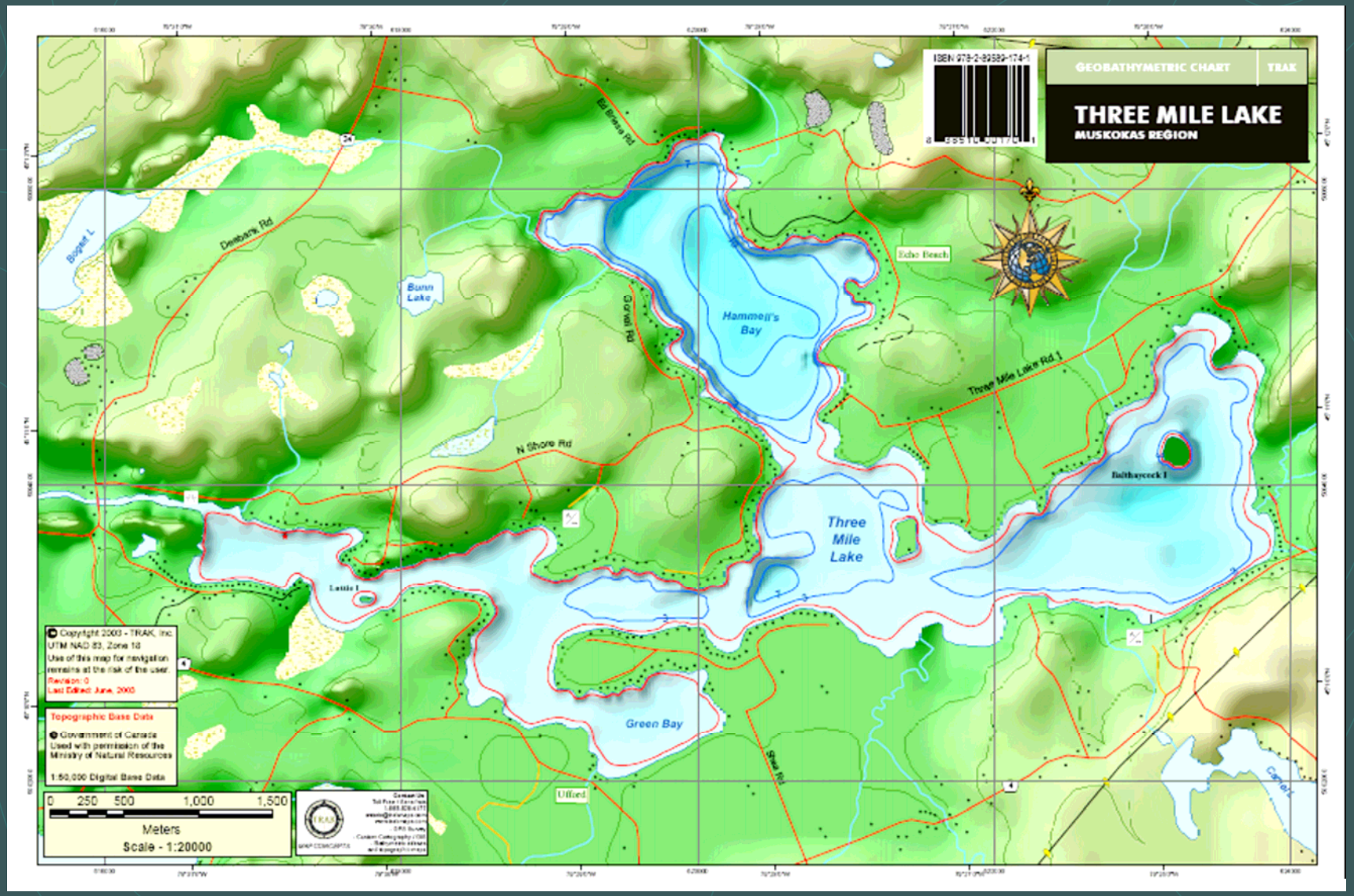
Lake Characteristics

The current chemical and biological conditions of a lake depend on many factors, including:

- The size and shape of the lake
- Shallow lakes tend to be very warm allowing for the entire water column to be productive with weed and algae



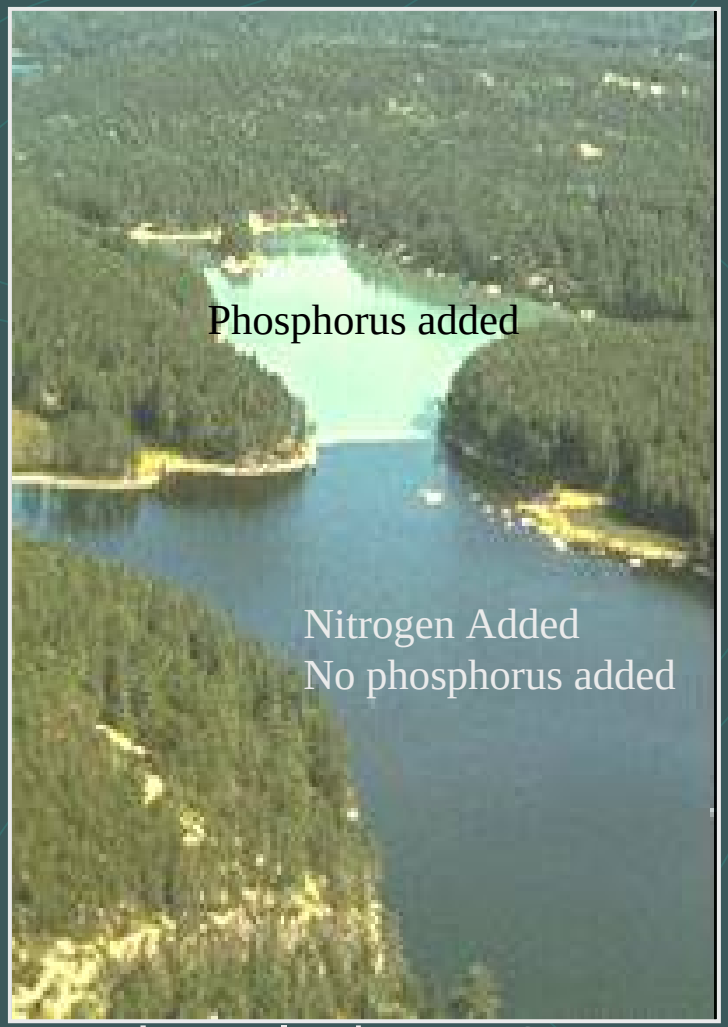
Three Mile Lake Bathymetric Chart



Courtesy of TRAKmap

Nutrients: Limiting Factor

- **There is a direct correlation in the level of available nutrients and the populations of algae and aquatic weeds.**
- **Phosphorous is an essential nutrient for living organisms and exists in water bodies as dissolved and particulate matter.**
- **In natural waters, it occurs mostly as dissolved orthophosphates and polyphosphates and organically bound phosphates.**
- **In majority of lakes, availability of phosphorous is the limiting factor, which controls the rate at which plants (algae) grow.**



Experimental Lake, NW ONT.

Phosphorus Sources

Wastewater and Septic System Effluent

- Organic phosphates are formed primarily by biological processes. They are contributed to sewage by body waste and food residues.
- Phosphorus is essential in metabolism so is always present in human waste.
- The use of phosphates in detergents was banned with the exception of automatic dishwasher detergent.

Fertilizers

- Fertilizers generally contain phosphorus in the form of orthophosphate.

Animal Waste

- Phosphorus is essential in metabolism, so is present in animal waste. Therefore, phosphates in runoff can be an issue in waters near farms.

Development

- Phosphorus binds with soil particles. Development can cause soil erosion, which will release phosphorus.
- Phosphorus concentrations in stormwater can increase when natural filters such as the soils, trees, shrubs, and puddles are removed.

Why Algal Blooms in 2005

Identify sources of phosphorus coming into lake

Watershed includes:

Heavily developed shoreline

large agricultural portion

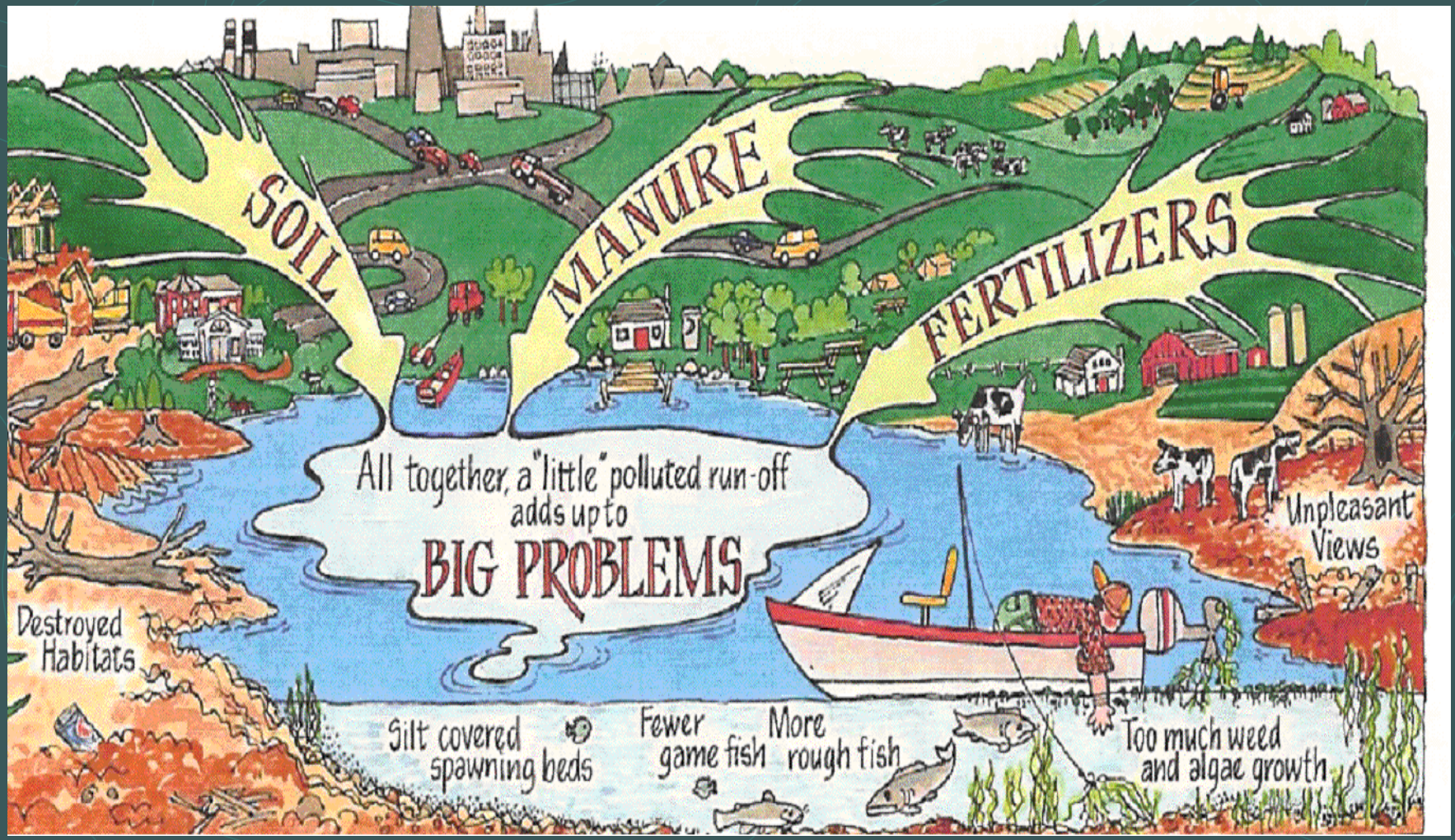
Why Algal Blooms in 2005

Mixed with:

- Long sunny days raised water temperatures
- Minor rainfall events
- Very little wind

BLOOM

But what is the contribution from septic systems?
In reality:

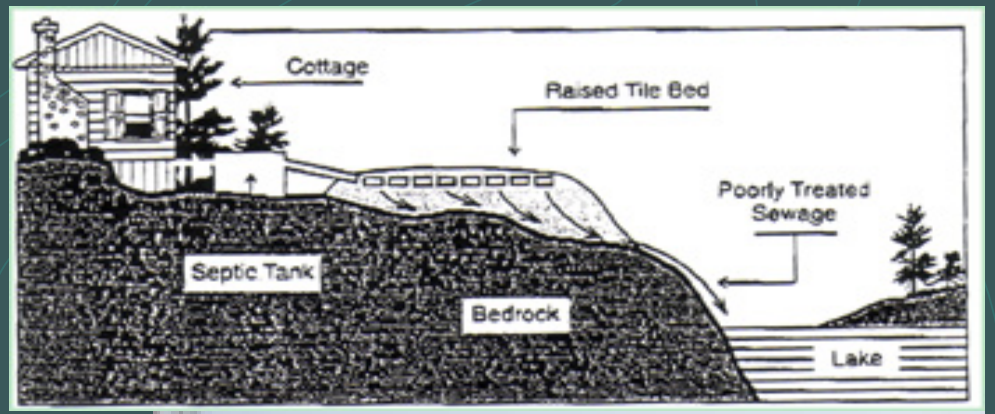


Minimizing Phosphorus Inputs from Developed Areas

646 Shoreline properties

Approximately 550 Dwellings/Seasonal Residences

- All serviced by onsite sewage systems potentially contributing phosphorus to the lake.



- Increased runoff from poorly designed development, significant amounts of impervious cover, roads, parking lots, cottages or removal of trees for grass.

Removal of shoreline vegetation that absorb the impact of waves, help prevent erosion, and absorb nutrients.

What can the Township of Muskoka Lakes do?

Legal Authority of an Inspector!

- Inspection at any reasonable time without warrant to determine if building (sewage system) unsafe 15.9-(1) Ontario Building Code Act.

- The sewage system is unsafe if not maintained or operated in accordance with the Act and the Building Code 15.9 (3)BCA.

The Purpose of the Re-inspection Program Was to Be Three-fold.

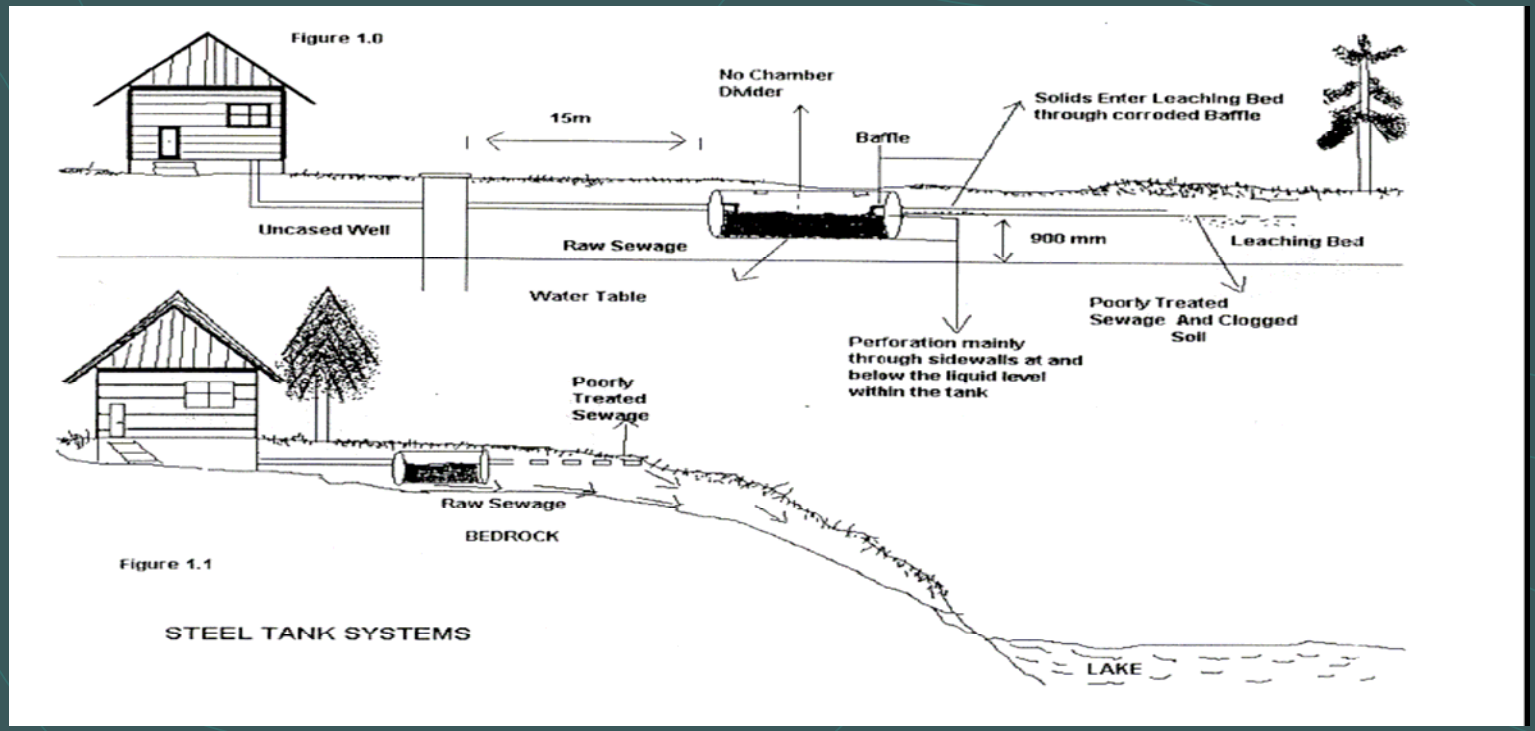
1. “Evaluation of the septic system” to provide the owner with information regarding the “do’s and don’ts”, performance, operation and maintenance of the septic system (educational talk and material handouts).

2. Enforce OBC Re: replace sewage systems that do not meet the operation and maintenance requirements (letters, orders).

3. Education regarding Shoreline Development and ecology (pamphlets, verbal education)

Sewage System Evaluation Procedure

- Evaluation is limited to surface visual inspection
- Subsurface operating conditions cannot be determined without extensive research, which means monitoring wells and testing.



Onsite Investigations: locating the sewage system

Introduction to owner (provide identification, educational materials)

- **Check the approval (if no approval details must be provided) Ask the owner (if present).**
- **Check for any exiting pipe(s) from the building**
- **Information from the existing homeowner (neighbours) regarding any problems with the septic system.**
- **Check number of buildings and bedrooms and compare to approval, building permits**
- **“Probe area” to determine fill area (level area), greener grass**
- **Striping in the lawn, sponginess when walked on**

Inspecting The Tank

- Inspect septic tank determine type, steel, concrete, etc (metal detector or probe bar), when last pumped.
- Obtain owners approval to remove lid of tank
- Check the liquid level in relation to outlet.
- Check the scum and sludge depth for accumulation
- Check interior of tank (inlet and outlet baffles, separator)

No additives

Three Mile Lake Results

- Township carried out 521 inspections (under 10000 litre/day)
- MOE inspected 5 properties (trailer parks or cottage resorts over 10000 litres/day)

Three Mile Lake Results

- 48 Orders (Order to Remedy an Unsafe Building) as permitted under 15.9 (4) of BCA (corroded steel tanks, sewages systems not maintained or operated in accordance with the Act or Building Code)

- 66 letters (minor issues, tree growth on bed area, erosion)

Common Problems Encountered

- 24 steel tanks (replacement required)

Firefighters rescue Warwick man from messy predicament

WARWICK: Police and firefighters plucked a 67-year-old man from his septic tank.

By Chris McKenna
The Times Herald-Record
cmckenna@th-record.com

A 67-year-old Warwick man was rescued after an ordeal that could have resulted in one of the most horrible deaths imaginable. John Dougherty was outside his house last Friday morning when the top of his underground septic tank caved in. Dougherty spent nearly an hour up to his shoulders in raw sewage, the obnoxious stench assailing his senses as the minutes went by. "I was starting to get really, really cold," Dougherty said. "I was really just worrying that no one would hear me." He was gripping the jagged metal edges of the tank and had lost feeling in his legs when police and firefighters finally hoisted him out of the icy sludge.

The harrowing experience began when Dougherty went to the side of his house to shovel a path in the snow for the electric meter reader. Suddenly, his metal septic tank – which, unbeknownst to him, had corroded in the 35 years since his house was built – gave way under his feet, and the 270-pound man dropped into cold sewage. "It's like there was no cover on it," said the retired Ford factory worker and longtime Warwick resident. "I just went through the snow." He remained stuck there for about 45 minutes, police said, before his wife, Catherine, heard his cries for help and found him. She dialed 911 around 10:30 a.m., and police, fire and ambulance personnel arrived.

Common Problems Encountered
Root invasion

- 5 systems (sewage backup into tank)

Common Problems Encountered

- Improper installation/design (high groundwater area)
- 5 sewage systems installed into groundwater table

High Groundwater Table

- Even the best installation can’t fix poor system siting!

Sewage on the ground surface

- 1 broken forcemain
- 1 pump chamber disconnected (excrement on groundsurface)
- 1 piping visible (potential for sewage on ground surface)

Breakout at the ground surface

- 3 systems revealed breakout at the ground surface, at the waters edge and ponding.

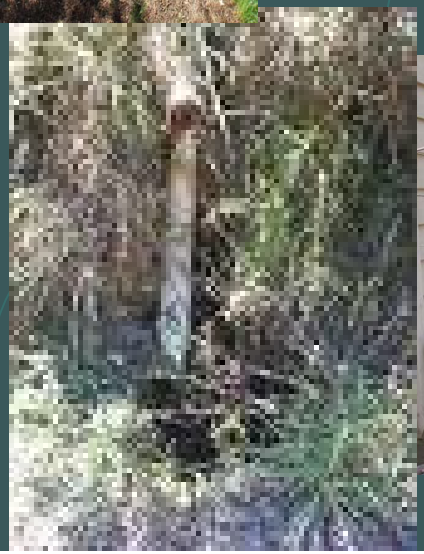
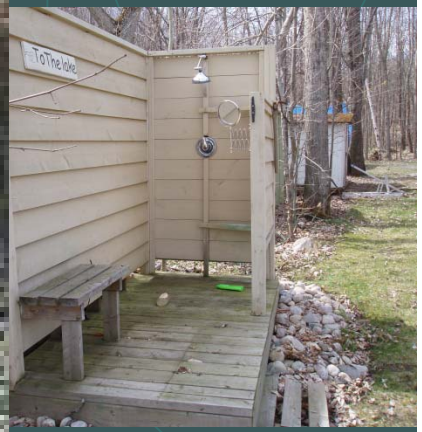
Greywater on ground surface

- 8 Sinks or outdoor showers without proper leaching pits







Results Of Program

- 27 sewage systems were replaced or upgraded
- 27 orders (remedy an unsafe building) being satisfied and lifted to date
- 8 building permits have been issued to remedy the unsafe conditions with installation pending

Follow-up Abatement

13 orders (presently no action)

- If no- action by time table allotted (failure to comply with an order)
- Issue order prohibiting occupancy of an unsafe building (sewage system) as permitted under 15.9(6) BCA
- In an emergency situation: municipality may carry out any work necessary to eliminate the unsafe condition

Last resort:

- Charges as permitted under 36.(1) of the BCA

Questions or Comments?