



Western
Health

Bacteriological Testing

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Outline

- Small Drinking Water Systems
- Standards
- Responsibilities
- Bacteriological quality

NCCEH – Disease Outbreaks in Small Drinking Water Systems Nov 2011

- This project's aim was to improve the safety of SDWS by providing public health authorities with the necessary evidence to inform practice and policy.
- Commissioned a retrospective investigation of drinking water-related illnesses in Canada over the past decade
- Trends suggest that small and private drinking water systems, serving populations of 5,000 or less, are more vulnerable to water-borne disease outbreaks.

NCCEH – Disease Outbreaks in Small Drinking Water Systems Nov 2011

Factors shown to contribute to water-borne disease outbreaks;

- Lack of source water protection
- Inadequacy or failure of water treatment
- Malfunction water distribution systems
- Precipitation, spring thaw/run-off and high turbidity

Contributing Factors

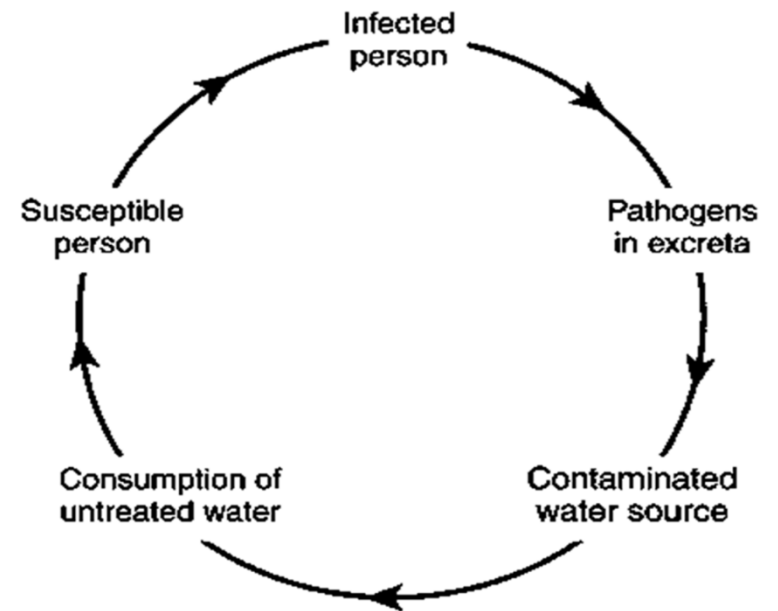
Contributing Factors		Frequency (%) of Response	
Contamination of Water Source	Precipitation	14	(13.8)
	Spring thaw / run off	7	(15.9)
	Flooding	3	(6.8)
	Lack of source protection	17	(38.6)
	Animals in the watershed	16	(36.4)
	Other	7	(15.9)
Water Treatment Deficiencies	Treatment failure	7	(15.9)
	Inadequate treatment	28	(63.6)
	Other	5	(11.40)
Contamination in Water Distribution	Broken pipes	3	(6.8)
	Post treatment contamination	5	(11.4)
	Cross connection	0	(0.0)
Other	Turbidity	10	(22.7)

Public Water Distribution Systems in Newfoundland and Labrador

Scale of System	Population Served	# of Systems
Large	15,000 +	3
Medium	1501 -15,000	41
Small	501-1500	82
Very Small	≤ 500	358

Disease Outbreaks Newfoundland and Labrador

- Botwood
- Deer Lake
- Pasadena
- Corner Brook
- Glenwood/Appleton
- Roberts's Arm
- Bird Cove
- St. Carol's
- Port Saunders



Microbiological Threats

Bacteria	Viruses	Protozoa
E. Coli	Hepatitis A	Giardia
Salmonella	Norovirus	Cryptosporidium
Vibrio cholerae	Enteroviruses	Entamoeba
Campylobacter		Toxoplasma

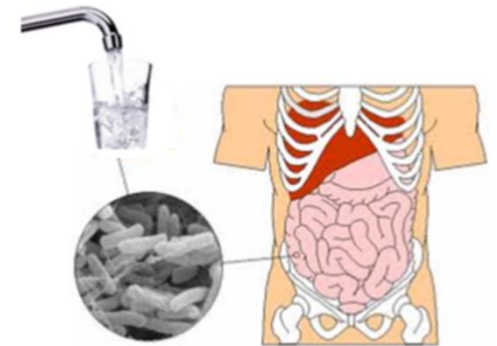
E. coli O157:H7

Cause a range of symptoms from mild diarrhea or bloody diarrhea and haemolytic uraemic syndrome (HUS).

Waterborne transmission occurs through swimming in or consuming contaminated water.

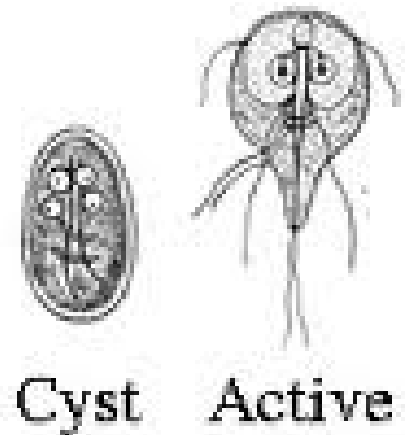
Prevention by following appropriate water treatment and disinfection protocols:

- Continuous disinfection
- CT – 0.3 mg/L after 20 minutes
- Detectable free available chlorine residual in distribution system.



Giardia

- Common in communities which use unfiltered surface water
- Cysts are highly resistant to disinfection
- Testing methodologies are cumbersome, costly, inconsistent and lack specificity and sensitivity
- Turbidity increases risk



Water Quality Regulation / Guidelines

- No national regulation of drinking water quality
- Guidelines for Canadian Drinking Water Quality



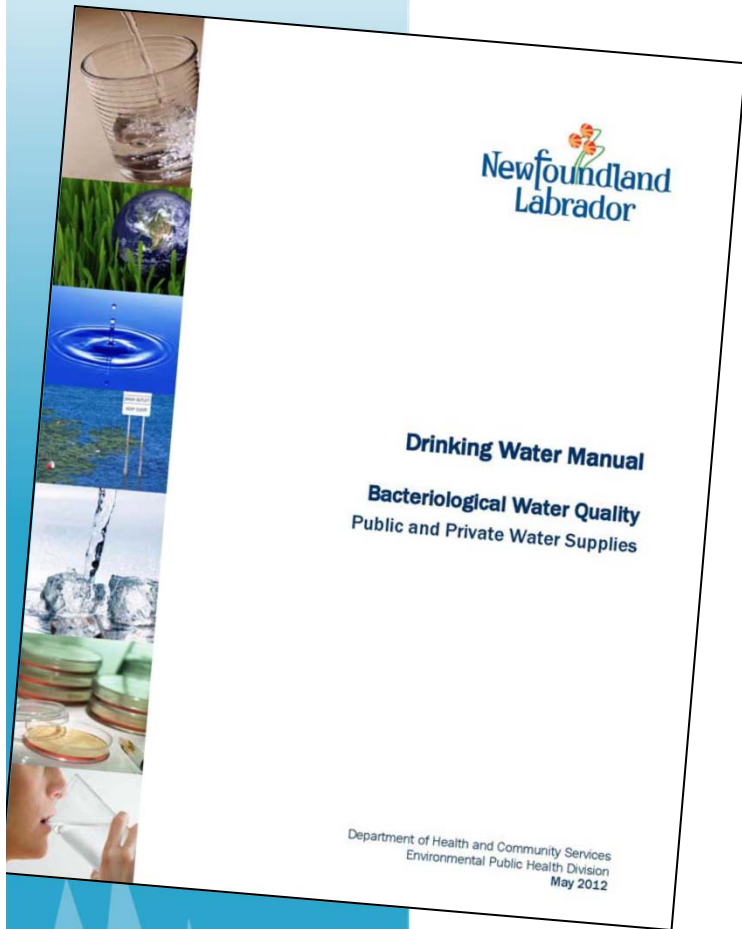
Microbiological Guidelines

- Not practical or technically feasible to monitor for all microbial pathogens
- Microbiological safety of water and guidelines are based on **indicator organisms** and effective treatment

Water Quality Monitoring

- Test for indicators of fecal contamination
 - *Escherichia coli* (*E. coli*)
- Test for indicator of effective disinfection
 - Total coliforms

NL Standards



- Bacteriological standards for public and private water supplies
- Sample site selection and sampling procedures
- Chlorine residual testing
- Results reporting and guidelines for issuing boil water advisories
- BWA tools
- Alternate water supplies
- Non-consumption advisories

Provincial Bacteriological Standard

- No sample should contain Escherichia Coli (**E.coli**)
- No consecutive sample from the same site of no more than 10% of samples from the distribution system in a set of sample should show presence of total coliforms.

Monitoring Responsibility

Service NL (SNL)

- Bacteriological water quality monitoring
 - *Sample collection
 - *Disinfection residual testing
 - *Interpretation of results
 - *Issuing and rescinding boil water advisories
- Illness investigations

38 Environmental Health Offices and 6 Technicians throughout NL.

Responsibilities

Department of Health and Community Services (HCS/Public Health Laboratory (PHL))

- Bacteriological water quality monitoring program standards and guidance documents for SNL.
- Bacteriological water quality testing services and results reporting to Service NL.
- Illness surveillance and outbreak investigation coordination.

Testing

- Performed at Public Health Laboratory and 6 regional testing sites
- Presence/absence test methodology (Colitag)
- Quick simple method
- Results available within 16 hours
- Easy to interpret results

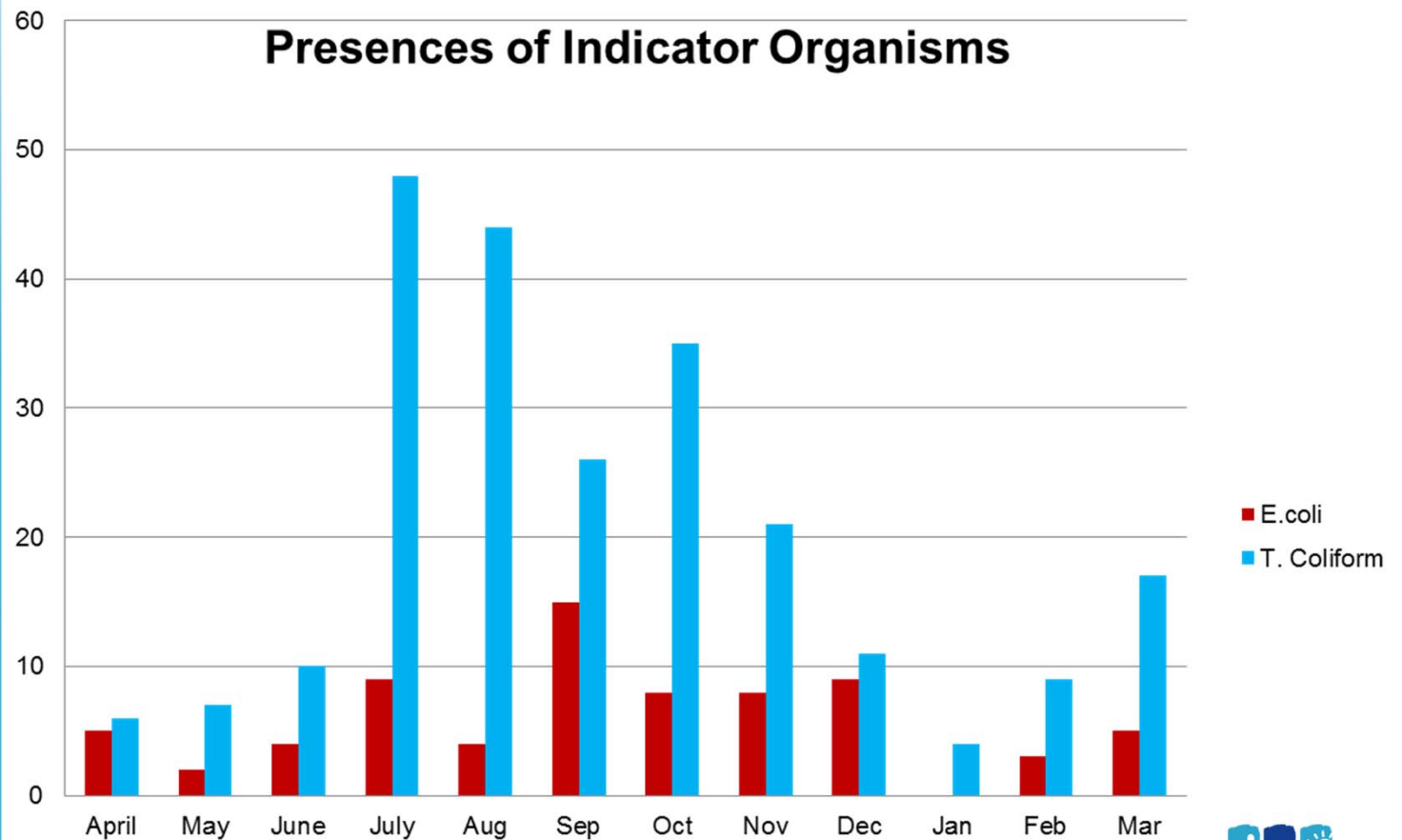
Test Methodology (Colitag)



Public Water Supplies Bacteriological Quality (2010-2011)

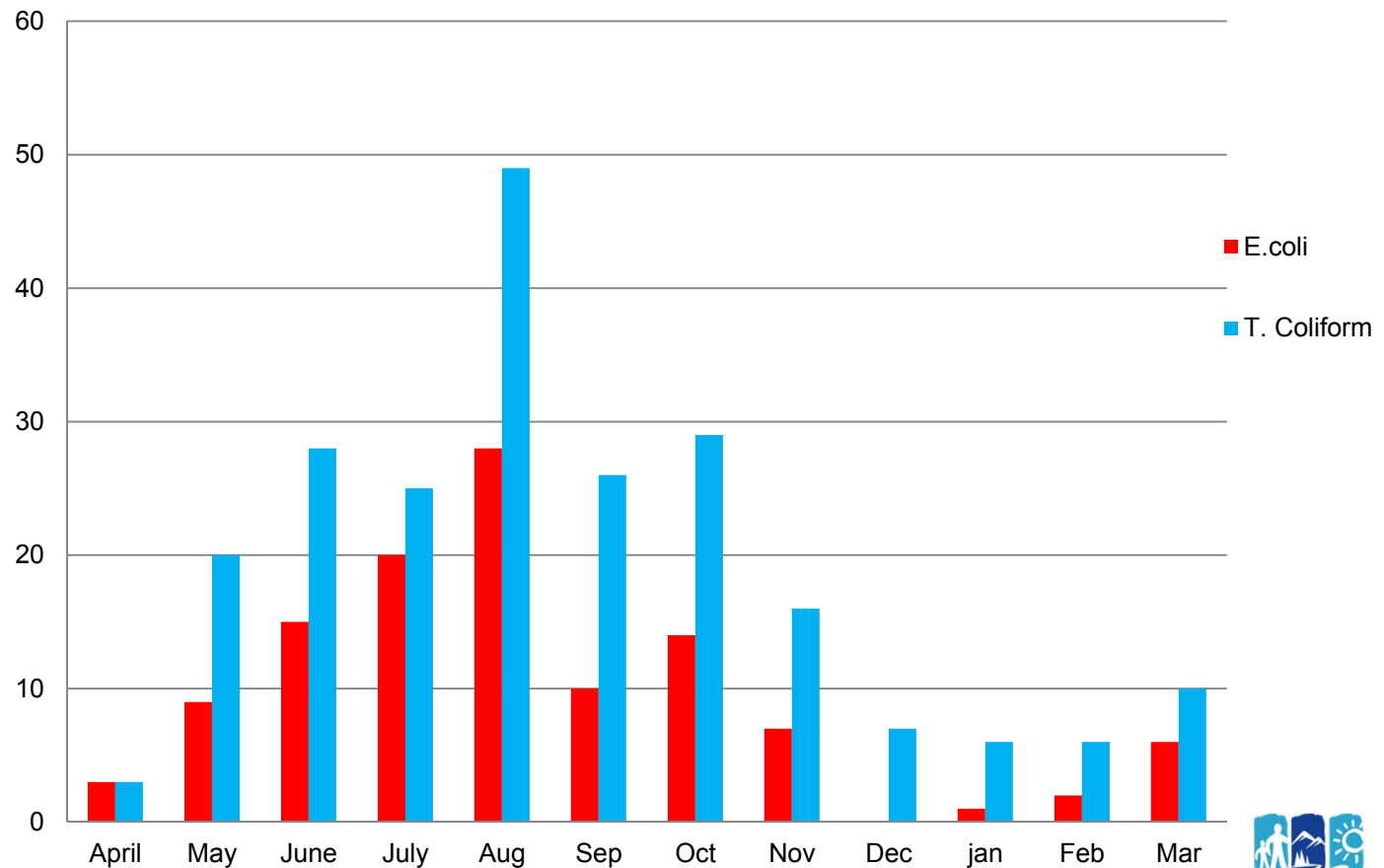
Region	# Samples Tested	# Samples with Total Coliforms	# Samples with E. coli
Avalon	7665	115	20
Central	4287	243	47
Western	4042	157	58
Northern	2575	44	22
Eastern	1342	74	20
Total	19,911	633(3.2%)	167(0.8%)

Results in Western (2010-2011)



Private Sample Results in Western (2010-2011)

Presence of Indicator Organisms



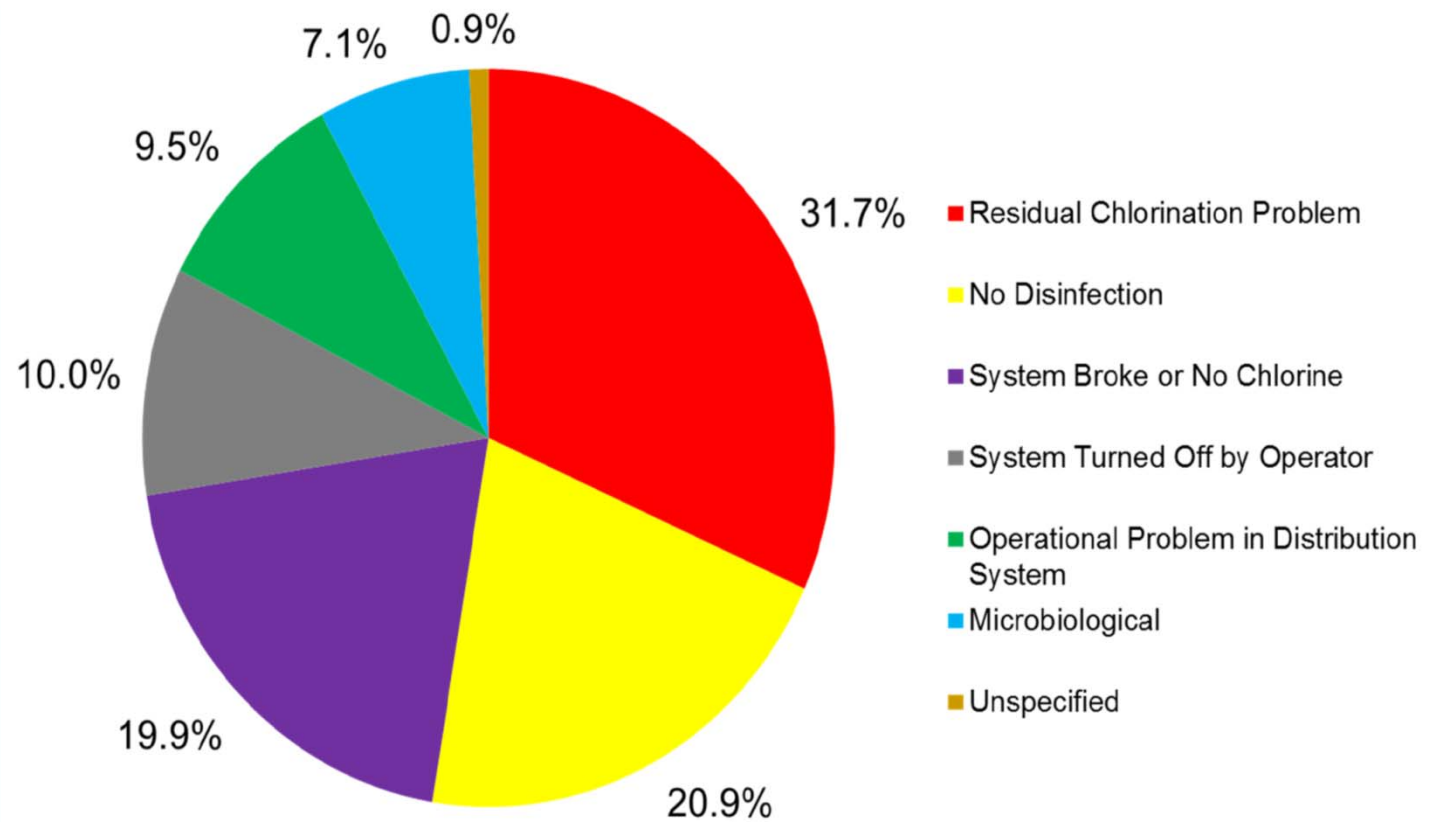
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Boil Water Advisories

March 31, 2011;

- 219 BWAs were in effect,
- 166 communities
- Impacted population of 40,218
- Long Term BWAs (>5 yrs) = 129 (59%)

Boil Water Advisories



Challenges

- Surface water systems in many small communities
- Simple disinfection is the only treatment
- Operator training and resources to operate
- Protection of supplies
- Human and animal impacts
- Disinfection By-Products
- Protozoan Risks
- Semi-public water supplies (no rules in place)

Questions?

