Drinking Water, Source Protection and Public Health

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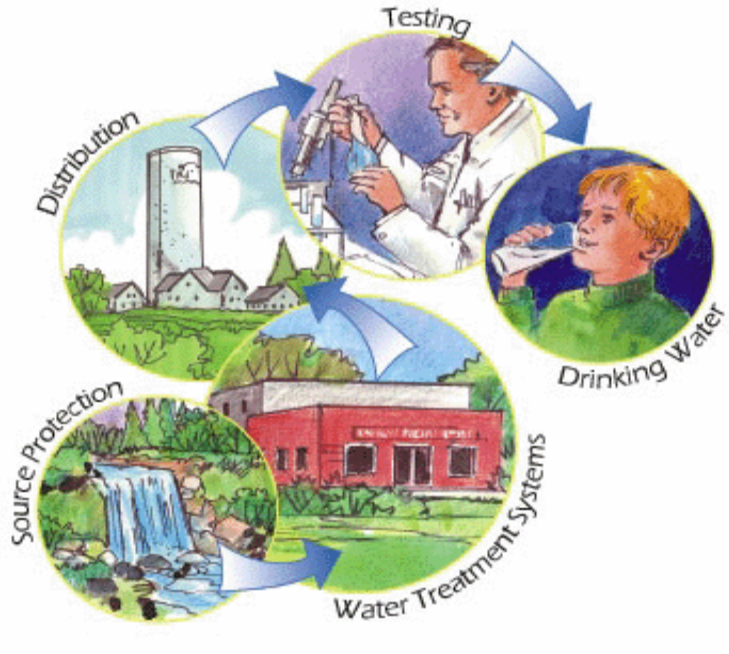
Multi-Barrier Principle



- Prevent contamination of source waters:

  Surface Water (Watershed Protection)

  Ground Water (Aquifer Protection)
- Adequate Water Treatment
- Distribution System Integrity
- Testing/Monitoring Water Quality
- Response Plan for adverse water quality results

Source Water Protection

- Maintain source water quality from potential degradation through industrial, agricultural, recreational activities, land development
- Complex: relies on federal, provincial, local government agencies; political leaders; NGOs; special interest groups; general public.

Source Water Protection

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- Necessary, but may not be sufficient.
- Banning all human activity in a watershed does not guarantee safe water.
- Inevitable presence of pathogens in surface water such as *Cryptosporidium* and Giardia, and Turbidity events during high rainfall and spring snowmelt.
- GVWD and CRD watershed control.
- 1995 Victoria outbreak of Toxoplasmosis attributed to feral cats or cougars

Sources of Drinking Water

- 75% from Surface Water.
- 25% from Ground Water.

Potential Sources of Contaminants:

Surface Water:

- Agricultural runoff
- Pesticides and Fertilizers
- Livestock Grazing
- Forestry Activities
- Recreation
- Roads
- Urban development
- Discharge of municipal / industrial waste water
- Resident Wildlife Population

Potential Sources of Contaminants

Ground Water:

- Improperly functioning Septic Systems
- Improper well construction, abandoned wells
- Chemical spills
- Pesticide / Herbicide over-use.
- Natural mineral contaminants: Arsenic
- Uncovered Manure pile leachate
- Over-fertilization of crops


KIRK ©93
THESE DAYS, WE JUST SPRAY WITH CONTAMI-NATED GROUNDWATER... IT'S CHEAPER THAN FARM CHEMICALS.

Surface Water Protection

Some Steps to reduce potential for contamination:

- Land Acquisition; reservoir use restrictions; stream and reservoir buffers.
- Soil Conservation practices; grazing restrictions; animal waste management facilities.
- Forest activity buffer strips; proper design, construction, maintenance and inactivation of roads and skid trails.
- Storm water diversions; retention basins; restrictions on density and location of urban developments near surface water supplies; repair of malfunctioning septic systems

Source Water Protection Strategies

Ministry of FLNRO / Environment activities:

- monitoring and assessment of water quality data (surface and ground water);
- Water Quality Guidelines and Objectives
- designation of community watersheds under the Forest and Range Practices Act;
- Ground Water Protection Regulation
- Aquifer Mapping
- Environmental Assessments
- Water Management Plans (Twp of Langley)

Source Water Protection Strategies

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Agriculture:

- Nutrient management studies
- Manure loading advisories
- Environmental Farm Plan program
- Water Supply Expansion program
- Farm Practices Protection (Right to Farm) Act
- Sustainable Poultry Farming Activities

Health Perspective

- Microbiological pathogens are considered the most significant threat to public health related to drinking water because the effects are acute;
- Surface water is vulnerable to microbiological contamination from wildlife and a variety of human activities.

Health Perspective

- Land use activities will affect to some degree the types of pathogens present.
- Pathogenic bacteria and protozoa will occur in watersheds containing livestock and wild animals and birds.
- Watersheds containing human populations will also contain pathogenic viruses.

Health Perspective

- In general, the microbiological quality of groundwater sources is better than that of surface waters because most microorganisms are removed as the water seeps through the soil. The soil acts as a natural filter.
- Understanding the physical characteristics of a groundwater recharge area is necessary to assess the vulnerability of the aquifer to contamination.
- The land use within the watershed/aquifer can also affect the chemical quality of groundwater sources.

Health Perspective

- Chemicals and radiological compounds can threaten the quality of groundwater supplies.
- Groundwater sources may also have naturally elevated levels of elements such as fluoride, arsenic, or uranium that can pose a chronic health risk.

Health Perspective

- Surface water is also vulnerable to chemical contamination from natural sources and human activities (anthropogenic sources).
- Mining activities can cause elevated heavy metal concentrations and depressed pH; livestock or wastewater discharges can cause elevated nitrate-nitrite levels, and industrial operations can be a source of synthetic organic compounds.

Health Strategies

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- Source Protection must be a critical part of Drinking Water Protection.
- Drinking Water Protection Act Part 4 deals with source water protection, for example:
- Section 23: Prohibition against contaminating drinking water or tampering with system
- Section 24: Requirement to report threats to drinking water
- Section 25: Hazard Abatement and Prevention Orders
- Section 29: Request for Investigation

Health Strategies

- Drinking Water Protection Act Part 5 deals with drinking water protection plans, for example:
- Section 31: (Ministerial) Order designating area for planning purpose
- Section 32: Plan development process
- Section 35: Implementing the Plan

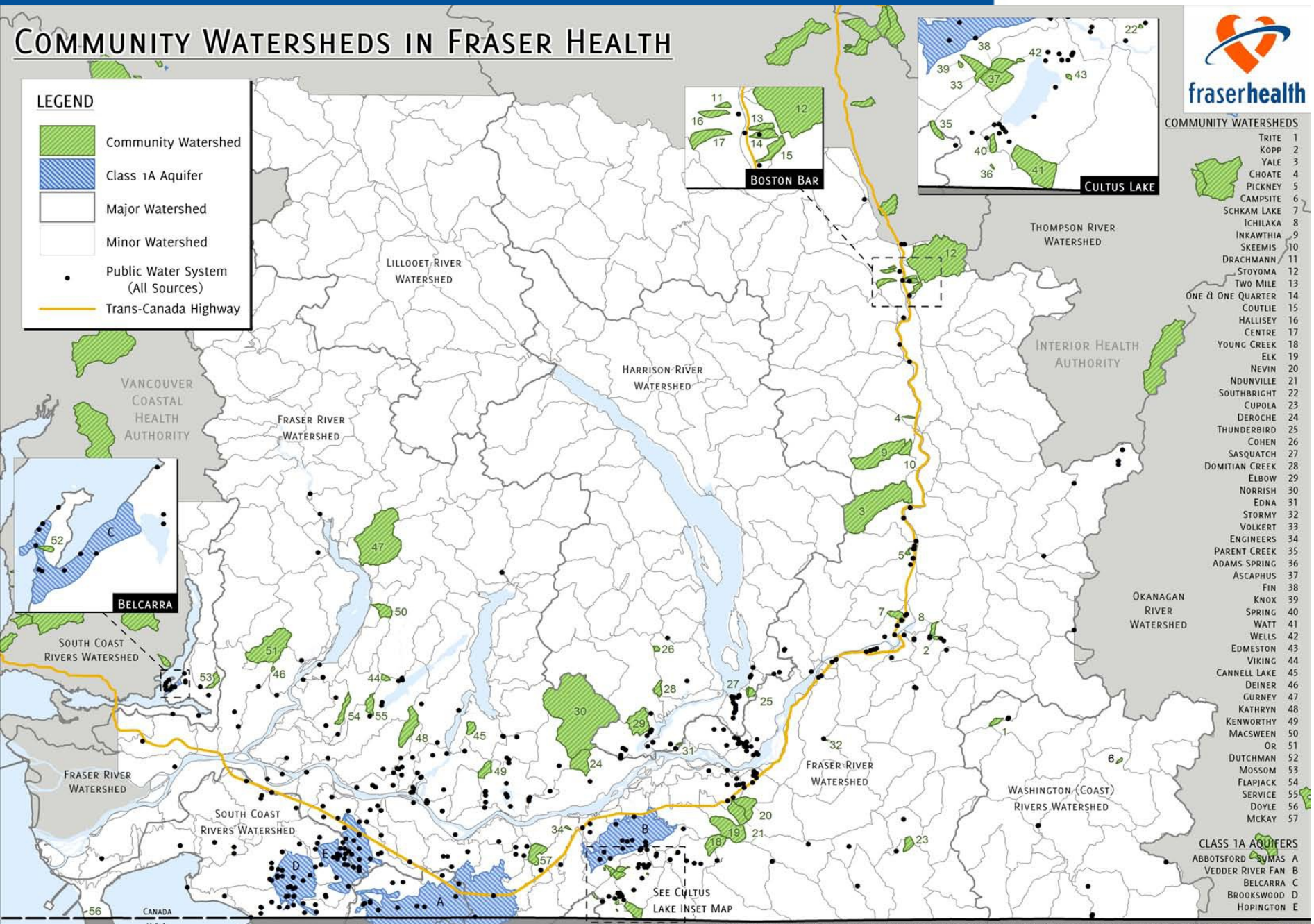
Health Strategies

- In 2002 – Province adopted Action Plan for Safe Drinking Water in BC
- Government's commitment to an integrated approach for drinking water protection
- In 2006 – MOU establishing Inter-Agency Regional Drinking Water Teams:

Health Strategies

- Ministry of Agriculture
- Ministry of Energy, Mines and Natural Gas
- Ministry of Health
- Ministry of Environment / FLNRO
- Ministry of Community, Sport and Cultural Development
- Ministry of Health
- Ministry of Transportation and Infrastructure
- The Office of the Provincial Health Officer
- Land and Water British Columbia Inc.,
- Fraser Health Authority
- Various Municipal / Regional District

Community Watersheds in Fraser Health



Map prepared April 19th, 2011, G. Ramler, Fraser Health Decision Support Services.

Sources: Community Watersheds, BCGOV ENV Water Protection and Sustainability Branch, 2009. BC Major Watersheds, BCGOV ILMB Crown Registry & Geographic Base Branch, 2003. Minor Watersheds, BCGOV ENV Water Protection and Sustainability Branch, 2009. BC Major Watersheds, BCGOV ILMB Crown Registry & Geographic Base Branch, 2009. Groundwater Aquifers, BCGOV ENV Water Protection and Sustainability Branch, 2003. Public Water Systems, Fraser Health, Health Protection, 2010.

Watershed and Aquifer Protection are vital to Drinking Water

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