



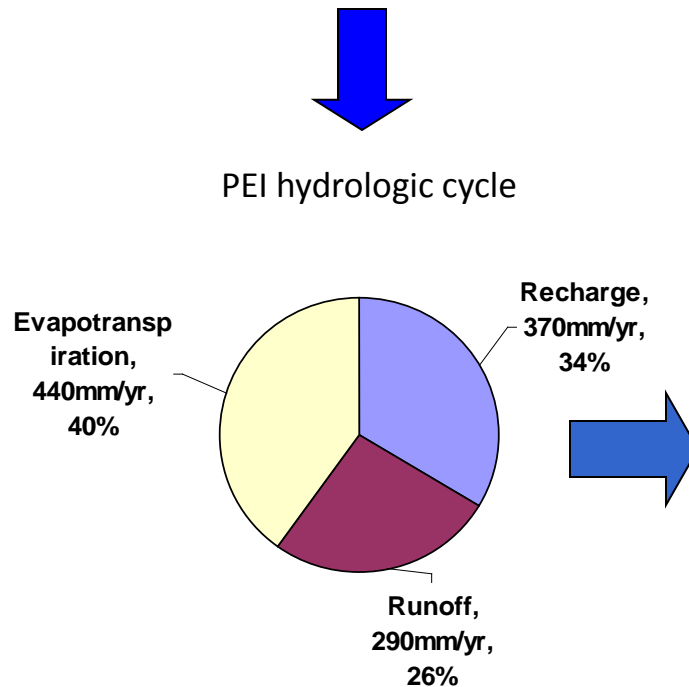
PEI Water Extraction Policy

**Department of Environment,
Labour and Justice**

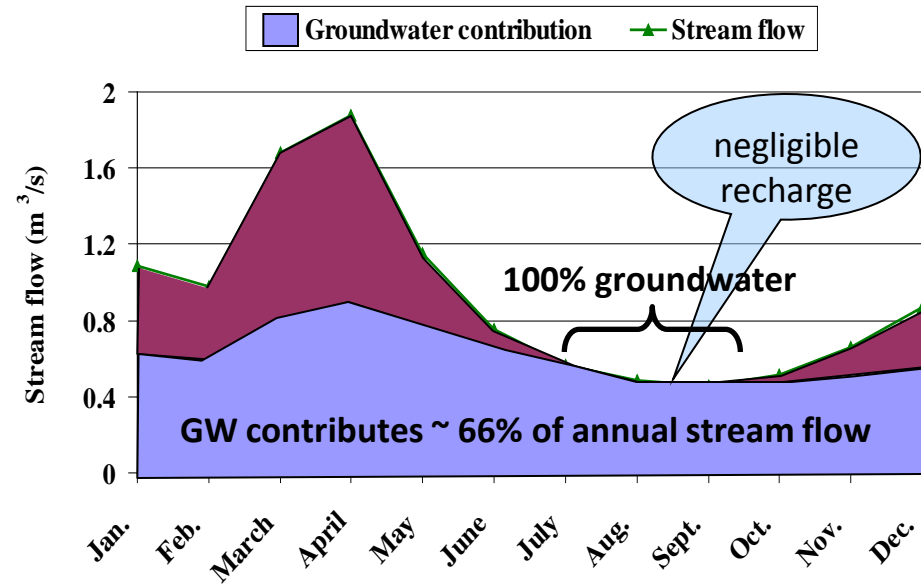
January, 2014

Hydrologic Cycle & Groundwater Resources

Precipitation: 1100 mm/yr.

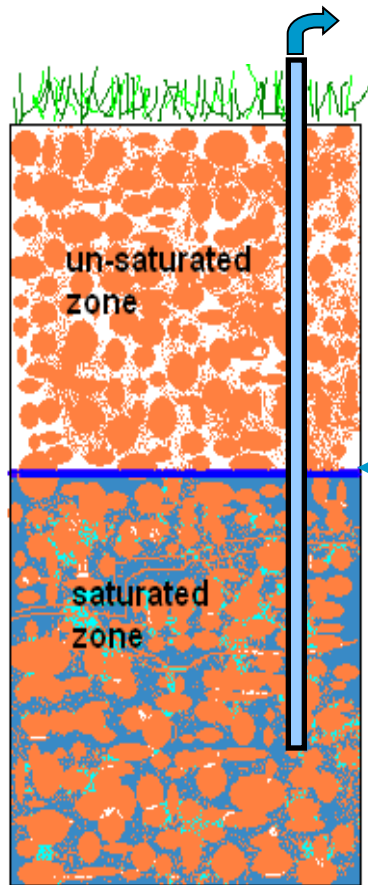


Stream flow and groundwater contribution in the Wilmot Watershed



- PEI has abundant groundwater recharge, approximately 2 billion m³ / year.
- Charlottetown uses 7 million m³ / year.

Groundwater: Some Terms



- The area below the ground surface can be divided into two zones:
 - **Un-saturated** zone where pore spaces and fractures in rocks and soil are partially filled with air, and partially filled with water.
 - **Saturated zone** where these void spaces are completely filled with water...what we call groundwater.
- The “**water table**” is simply the boundary between the un-saturated zone and the saturated zone.
- The geological formation containing this groundwater is called an “**aquifer**”. We tap the groundwater contained in an aquifer by wells...simply conduits into the “**saturated zone**”

Typical Groundwater Flow System

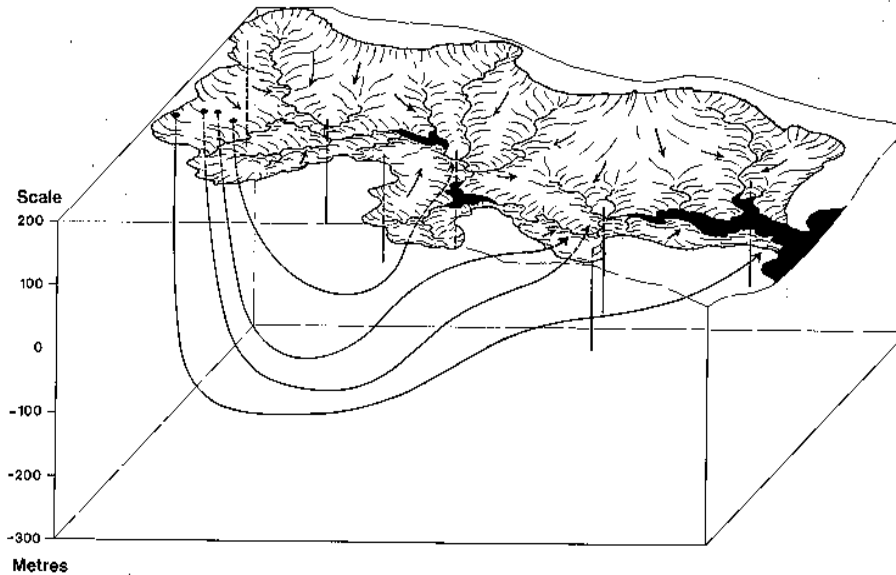
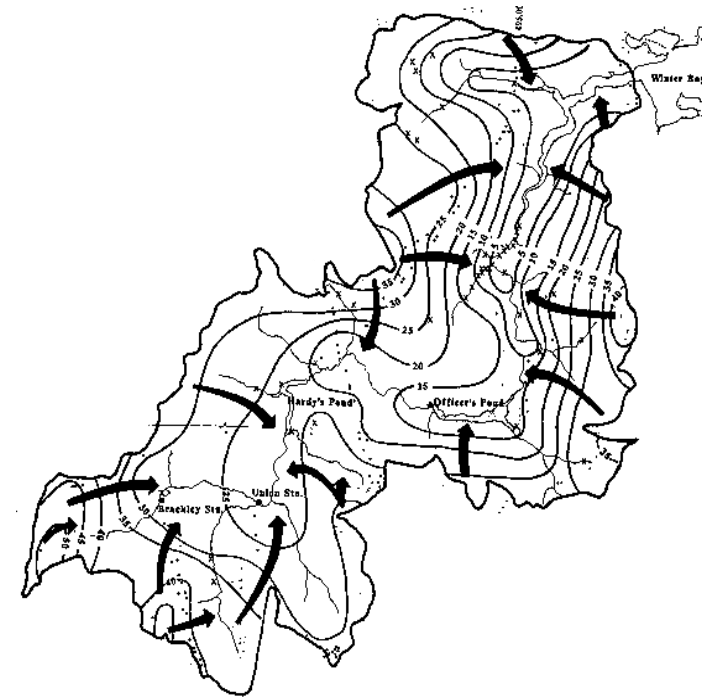
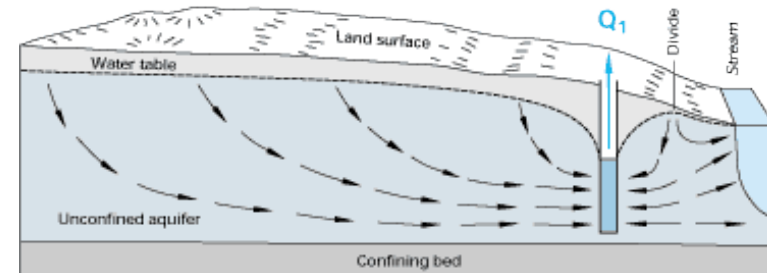


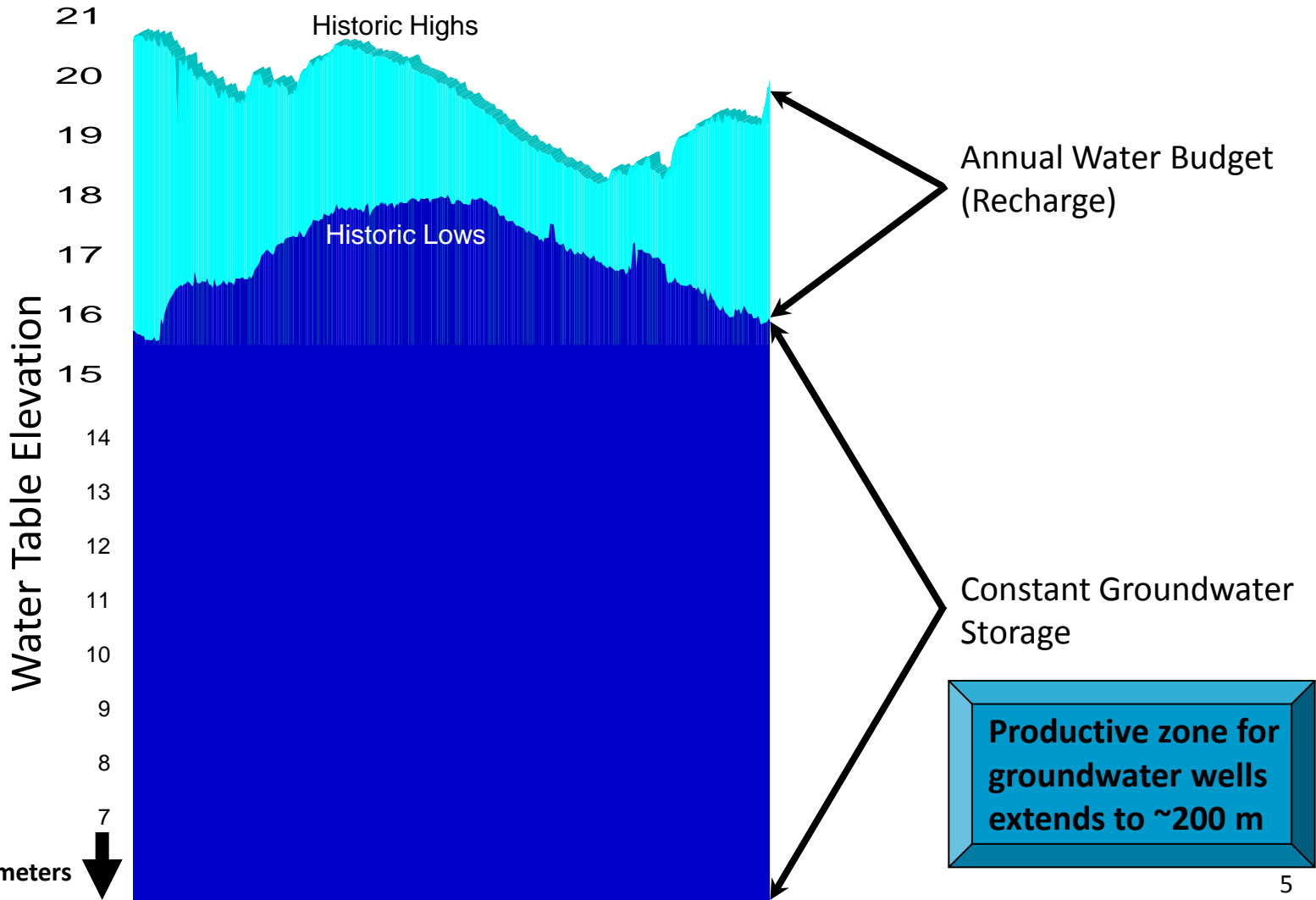
Figure 66. Three dimensional schematic of groundwater flow, Winter River basin.



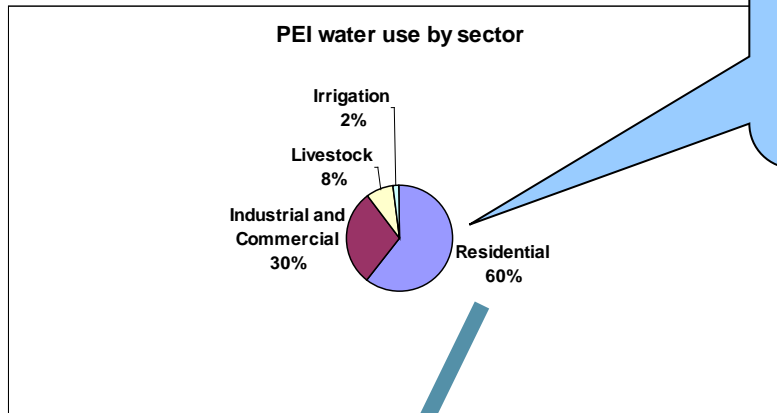
- Pumping intercepts groundwater discharge that would otherwise feed surface water
- Intensive pumping can have impacts on nearby streams and environment.



Groundwater Storage And Annual Fluctuations



Use of Water on PEI



Municipal / Residential water use: 189 L/day/pp
(national average 274 L/d/pp)

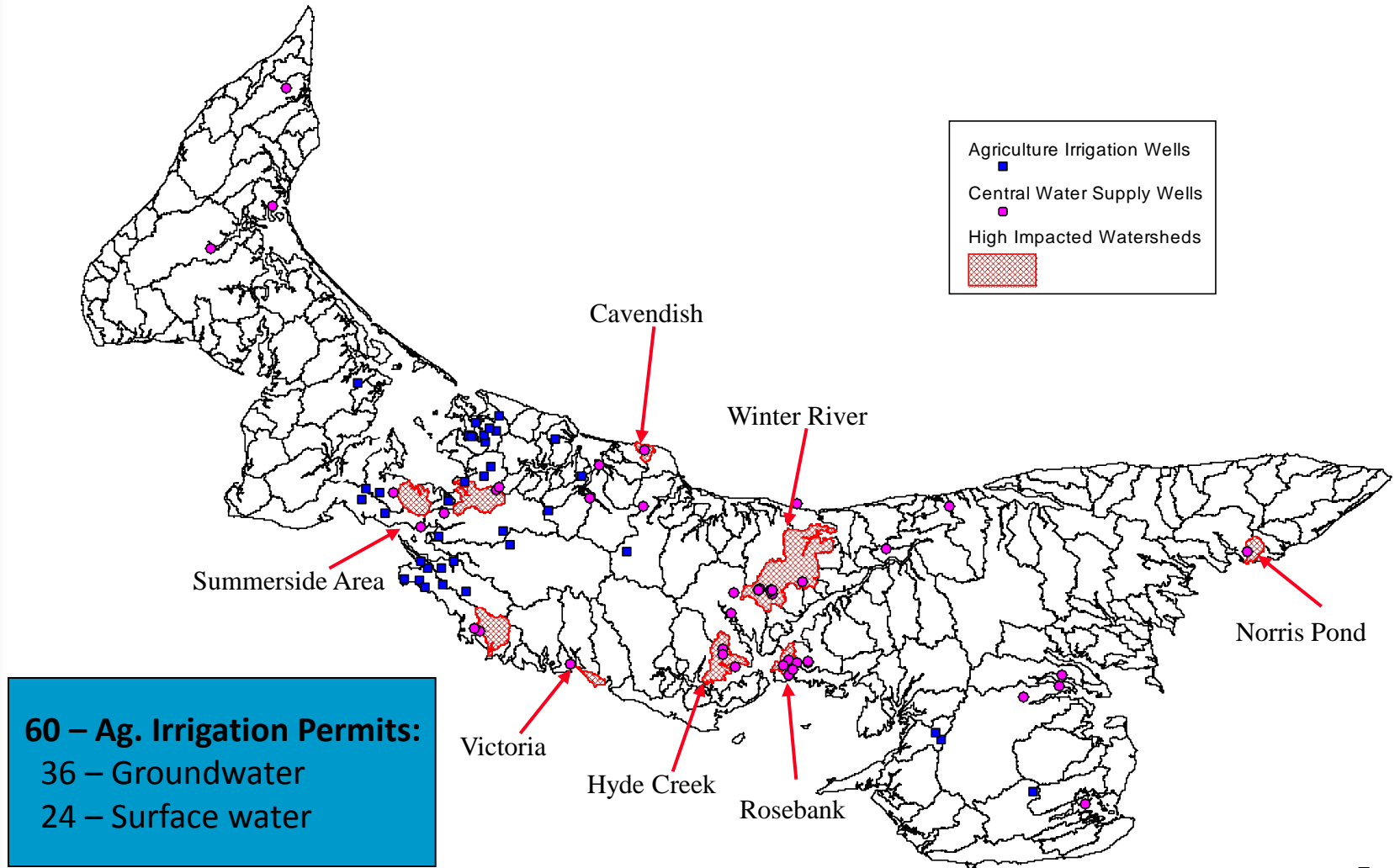
Non-residential water use: 316 L/day/pp
(national average 236 L/day/pp)

- Of the groundwater we extract Island wide:
 - 2% is consumed directly by humans
 - 58% is used for other sanitary purposes required to support human health
 - 40% is used for industry, irrigation, etc.

Breakdown of residential use:

- 4% - Drinking/cooking
- 28% - Bathing and personal use
- 23% - Laundry and dishes
- 45% - Toilets

Watersheds With High Water Demand





Water Extraction Policy (2010)

■ Purpose

- Provide for orderly and sustainable* use of the Province's water resources

*Sustainable - meets ecological and human needs

■ Scope

- Criteria for acceptable withdrawal of groundwater and surface water
- Provides a process for application of the criteria
- Accounts for watershed variability by using watershed specific base flow



Water Extraction Policy Goals

■ **Science Based**

- Consistent approach across the Province
- Integrates groundwater and surface water considerations
- Addresses regional hydrologic variability

■ **Balanced**

- Reasonable balance between human needs and ecological considerations

■ **Practical Process**

- Does not place an un-reasonable burden on proponents
- Process for determination is manageable by Department
- Process allows for verification of initial estimated impacts

■ **Predictable**

- “Screens out” unrealistic expectations for water allocation at the start
- Provides water users with reasonable assurance of supply in the long term

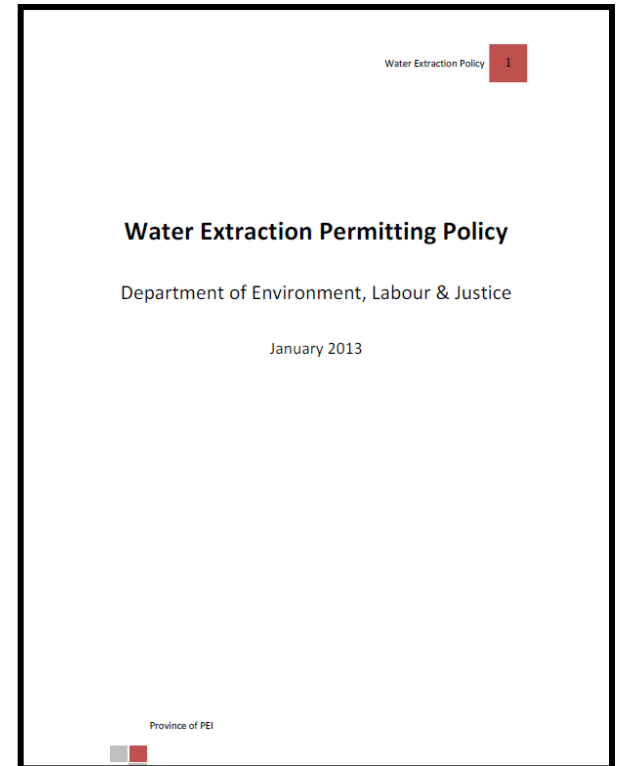
Water Extraction Policy

■ Water Use Priorities

1. Fire Protection
2. Drinking Water
3. Environment
(maintenance of ecosystems)
4. Industrial
(including agricultural irrigation)

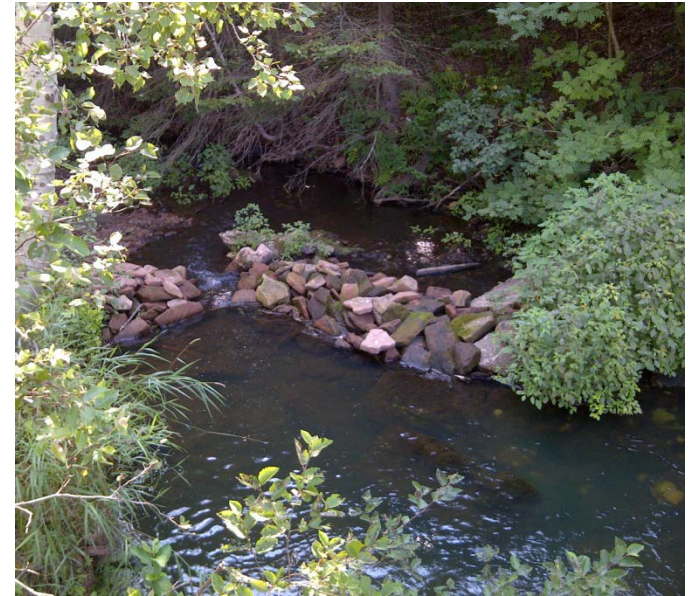
■ Permitting Criteria

- Stream flow is more sensitive than groundwater levels
- Criteria based on protecting stream habitat
- Protective of groundwater levels as well as stream habitat.

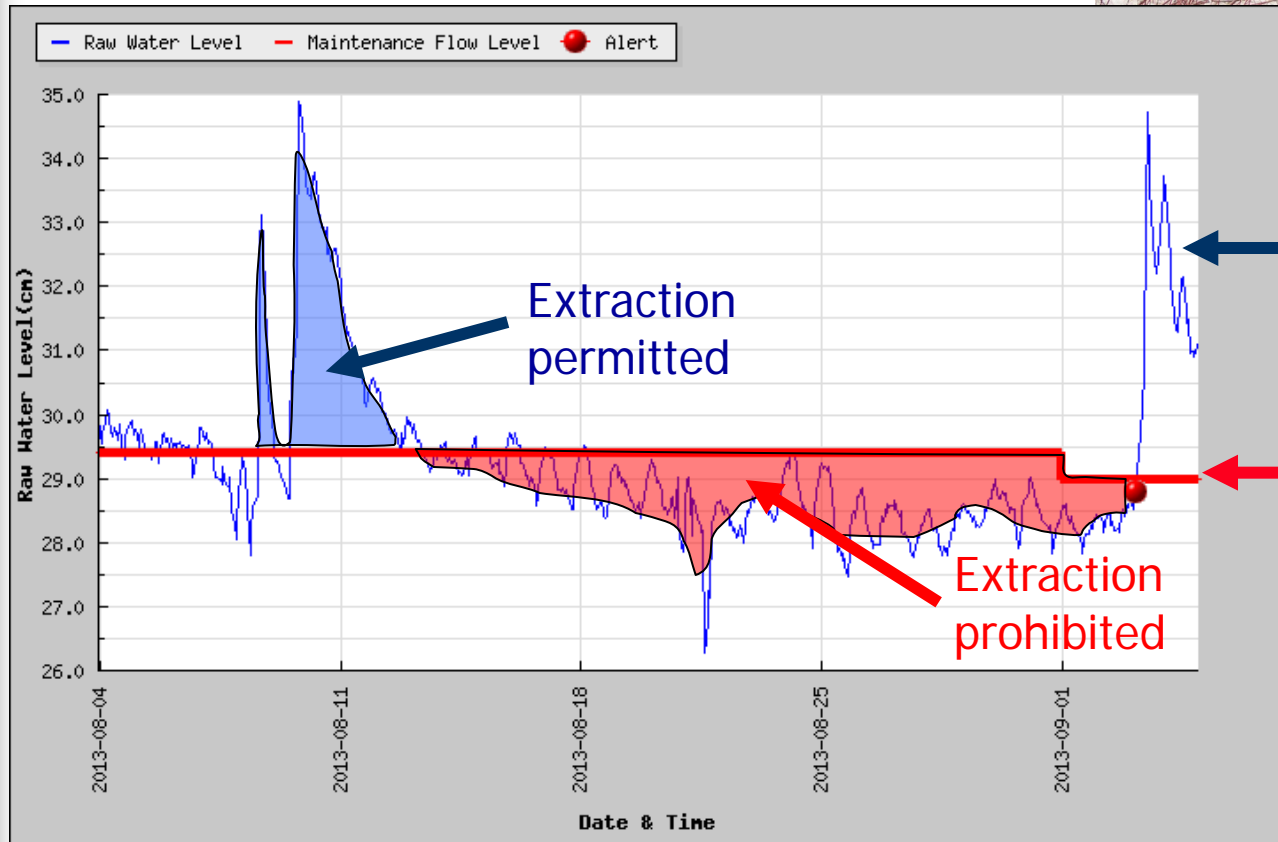


Availability of Surface Water

- Limited high volume sources of fresh water dictated by geography
- Significant variability in seasonal flow
 - Max flow available when water not needed
- Summer flows highly dependant on groundwater discharge (base-flow)
 - No flow available when needed most
- Excessive use has immediate impact on aquatic life
- Surface Water Criteria
 - Maintenance Flow – 70% of the median monthly stream flow



Managing Surface Water Withdrawals

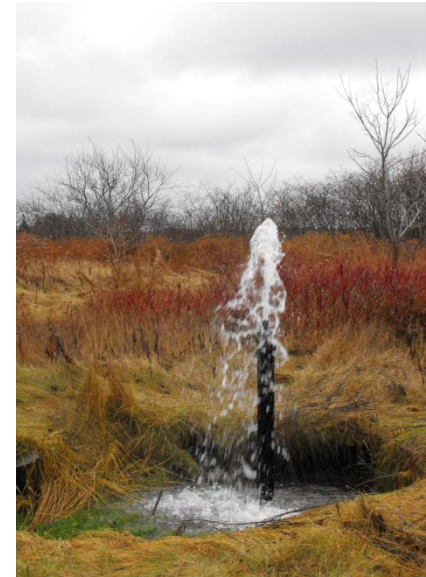


Stream Flow

Monthly Maintenance Flow

Availability of Groundwater

- Key source of water for most use in the Province
 - Stable and predictable source of water
 - Not highly sensitive to short term weather patterns
- Useable quantities of groundwater can be found virtually anywhere in the Province
- Annual recharge rates in PEI are high
 - ~ 385,000 m³ per km² /yr
 - 154 Olympic pools per km² /yr
 - Amount of used by a community of 5000 in each km²
 - 70 times higher than currently used
- Groundwater Permitting Criteria
 - Extraction not to reduce average summer stream base flow more than 35%
 - Currently use 7% of amount available by the policy
 - Watershed specific base flow utilized in permitting provides for unique number in each watershed





Regional Variability

- While the general geology, physiography and hydrology of the Province is relatively similar, there are some regional differences:
 - Stream flow in some western rivers and streams is “flashier” and on average, well yields in western PEI tend to be lower
 - Groundwater recharge rates and the nature of groundwater – surface water interaction likely differ somewhat by region
 - Even on a local scale hydrogeological conditions can vary significantly
- As a result of these factors, impact of withdrawals must be:
 - Assessed on the basis of site specific conditions
 - Verified by data



Watershed Yield (baseflow)

Stream Gauge Location	Gauge Station Watershed Area (km²)	Summer Baseflow Yield (m³/d/km²)
Mill R.	46	361
Wilmot R.	49	717
Dunk R.	114	849
West R.	70	903
Bear R.	15	553



Moratorium

- Established by Executive Council in February 2002
- Only on new high capacity wells for agricultural irrigation

The End

Questions?