PEI Water Extraction Policy

Department of Environment, Labour and Justice

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Hydrologic Cycle & Groundwater Resources

Precipitation: 1100 mm/yr.

- Runoff, 290mm/yr, 26%
- Recharge, 370mm/yr, 34%
- Evapotranspiration, 440mm/yr, 40%

- 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

- 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

Annual Water Budget (Recharge)

Constant Groundwater Storage

Productive zone for groundwater wells extends to ~200 m
Use of Water on PEI

PEI water use by sector

- Residential: 60%
- Industrial and Commercial: 30%
- Livestock: 8%
- Irrigation: 2%

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

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)
Watersheds With High Water Demand

60 – Ag. Irrigation Permits:
36 – Groundwater
24 – Surface water
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

- Extraction permitted
- Extraction prohibited

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)

<table>
<thead>
<tr>
<th>Stream Gauge Location</th>
<th>Gauge Station Watershed Area (km²)</th>
<th>Summer Baseflow Yield (m³/d/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mill R.</td>
<td>46</td>
<td>361</td>
</tr>
<tr>
<td>Wilmot R.</td>
<td>49</td>
<td>717</td>
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<tr>
<td>Dunk R.</td>
<td>114</td>
<td>849</td>
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<tr>
<td>West R.</td>
<td>70</td>
<td>903</td>
</tr>
<tr>
<td>Bear R.</td>
<td>15</td>
<td>553</td>
</tr>
</tbody>
</table>
Moratorium

- Established by Executive Council in February 2002

- Only on new high capacity wells for agricultural irrigation
The End

Questions?