Hydrologic Function

Groundwater - High Importance for Recharge (Fonthill Kame)
Target –Hydrologic Function

This value is related to the Recharge of Groundwater in the High Importance area of the Fonthill Kame. It was felt that given the nature of the geology and soils in this area of the watershed, it contributes significantly to recharge and therefore should be treated differently than other areas.

The purpose of setting a target on this value is to ensure that appropriate features are included in the preferred scenario in order to regulate the quality and quantity of groundwater to maintain healthy watersheds.

In context to our study area, the Fonthill Kame (2% of the watershed) is significant since it is the recharge zone for the only cold water stream. It supports a self-sustaining Brook Trout population and produces some of the best water quality in the study area.

Datasets

1. NPCA NAI ELC Community Series Mapping
2. NPCA Significant Groundwater Recharge Areas

Significant Groundwater Recharge Areas (SGRAs) are a vulnerable area delineated for the Source Water Protection Assessment Report (Chapters 3 and 4 - NPCA, 2010). SGRAs are identified for priority protection of groundwater quantity under the Provincial Policy Statement (MMAH, 2005). The SGRAs are classified as “significant” when they supply more water to an aquifer than the surrounding area. SGRAs were identified where groundwater is recharged by a factor of 1.15 or more the average recharge rate for the whole watershed (average recharge rate for NPCA is 46 mm/year). This method is recommended where recharge rates are fairly homogenous such as is generally the case for NPCA. This data forms part of the local Niagara Assessment Report Database (ARDB). The Fonthill Kame-Delta Complex was given high importance because greater than 40% of the water surplus recharges.

The Niagara Watershed identifies 1.8% of its land base as high importance groundwater recharge area of which 41.2% is currently natural area.

Discussion

The Scenario Development Team (SDT) had a lengthy discussion on this value as they tried to understand how this area of the watershed was different from others. Jayme Campbell, Hydrogeologist/Engineer with the Niagara Peninsula Conservation Authority provided expert support for this value as he presented the data from the Source Water Protection – Assessment Report.

The team discussed at length the difference between various forms of natural cover and non-natural cover. Members of the SDT expressed concern over the fact that the type of cover natural or non-natural should not impact recharge especially since the current development standards state that there should be “no net loss to infiltration”.

There was also discussion about the “Precautionary Principle”:

- In the absence of a high level yard stick from the literature, we need to figure out how much we want to rely on the existing natural cover in contribution to the targets.
- 90% - 95% as a target maintains the status quo and ensures no net loss while still allowing some “wiggle room” for the model to make selections.

• Avoiding net loss until we have better data is practical and ethical.

Data Gap

From SGRA, 2009 NPCA and AquaResource Inc., these factor with soil and topography to distribute modeled recharge values.

Table 9: Cover Infiltration Values (MOE, 2003)

Description of Area	**Infiltration Factor Value**
Urban Lawns/Shallow Rooted Crops (spinach,beans,carrots)	0.05
Moderately Rooted Crops (corn and cereal grains)	0.1
Pasture and Shrubs	0.15
Mature Forests	0.2

SOLRIS Land cover infiltration values

Land Cover	**Infiltration Value**	**Land Cover**	**Infiltration Value**
Annual Crop	0.1	Mixed Agriculture	0.15
Bog	0.15	Mixed Crop	0.15
Built Up Impervious	0	Mixed Forest	0.2
Built Up Pervious	0.05	Monoculture	0.1
Coniferous Forest	0.2	Orchards	0.15
Deciduous Forest	0.2	Perennial Crop	0.15
Extraction- Rock (Sand and Gravel)	0 (0.2)	Plantations	0.2
Forest	0.2	Rural Land Use	0.15
Hedge Rows	0.2	Swamp	0.15
Idle Land	0.15	Transportation	0
Marsh	0.15	Vineyards	0.15

Decision
Date: April 7, 2011

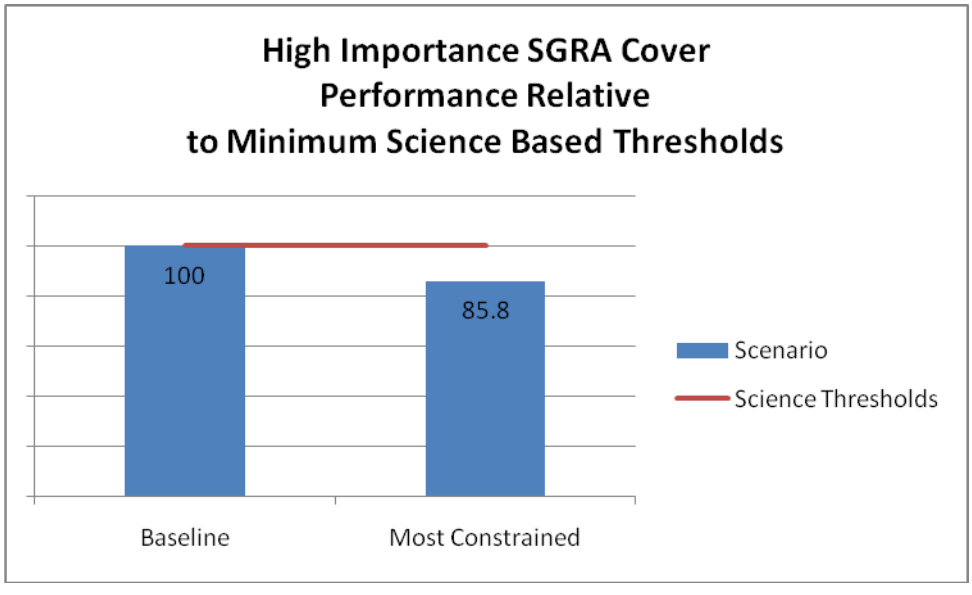
High Importance Area: 90% of existing natural cover as Baseline, 50% of existing natural cover as a What-if Scenario.

Representation in the Learning Scenarios
As it pertains to the hydrologic function, the groundwater recharge area associated with the Fonthill Kame is of great importance as this geological formation is the source of the groundwater for the Twelve Mile Creek and several other creek systems and drinking water wells. Natural cover in this area is therefore important to the maintenance of the source water.

Because of the vulnerability of groundwater to contamination in this area, a target was set of 90% of the existing natural cover. By not setting the target to 100%, the model could then some make choices about what to include given the contributions of certain features.

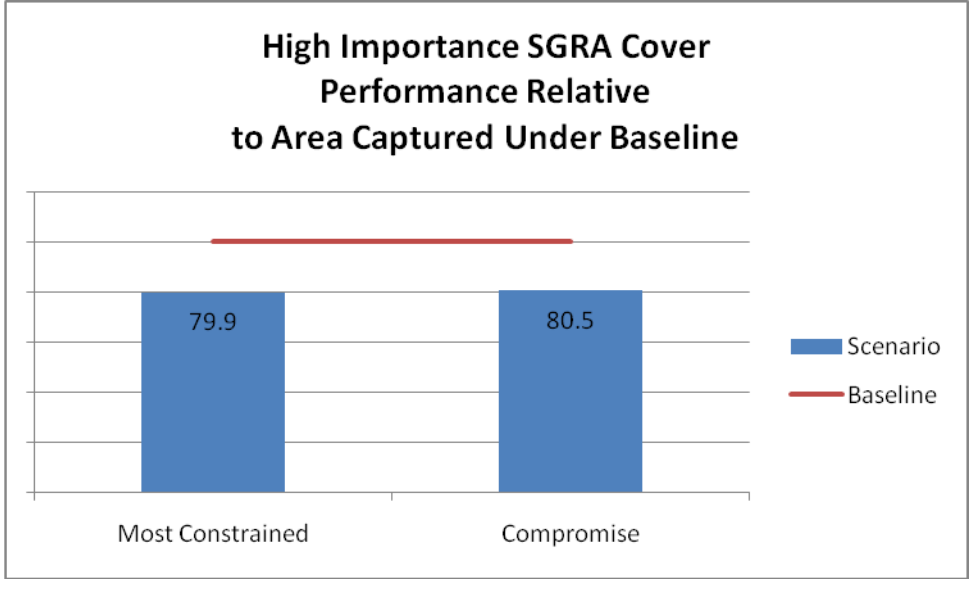
Representation in the Final Scenarios
Under the Baseline Scenario, Groundwater Recharge, in the High importance area of the Fonthill Kame achieved 100.0% of the value in the targets.

Figure 35: Groundwater Recharge – High Importance Cover Performance Relative to Science Thresholds



Under the Most Constrained Scenario, Groundwater Recharge, in the High importance area of the Fonthill Kame achieved 85.8% of the value in the targets, and 77.9% of the Baseline value.

Figure 36: Groundwater Recharge – High Importance Cover Performance Relative to Baseline Comparator



Under the Compromise Scenario, Groundwater Recharge, in the High importance area of the Fonthill Kame achieved 80.5% of the Baseline value.

Recommendations

Update mapping of rate of recharge in relation to type of cover (natural or non-natural).