

Comments on Draft Water Act – April 10, 2017

The present consultation draft of the Water Act focuses, to a large extent, on establishing rules and guidelines for the use of freshwater extracted from our Island ground water aquifers. While it offers an insightful look at how we should use our fresh water, there appears to be little consideration given to recharge of our underground aquifers. When I have expressed concerns about tributaries of the West River drying up, the Department of Communities, Land and Environment's response is that we have enormous quantities of high quality fresh water waiting to be tapped for various uses and it is natural for a few tributaries to temporarily dry up. My perspective on abundance and quality is somewhat different, having spent over a half century studying, working and teaching about aquatic ecosystems and how essential it is to maintain water flow in small tributaries throughout the year.

On PEI, ground water aquifers should be completely recharged after spring melt of snow. Typically, the water table on our Island gradually drops until the following spring, with a temporary slight rise in late autumn. Unlike other provinces, our rivers and streams are fed primarily by innumerable groundwater springs which exit the earth at approximately 7°C throughout the year. However, in order for these springs to keep flowing and supplying cool water to aquatic ecosystems, the ground water has to be replaced annually. Rain and melting snow seeps down to the aquifer and water pressure allows springs to flow. Unfortunately, in many of our watercourses, inadequate recharge leads to dry or greatly reduced flow rates in streams. This can have a profound negative impact, as the presence of water is required for many organisms living in the streambed, within the water column and in or on the adjacent vegetation and soils.

What has changed on PEI over the past 50 years that would reduce ground water recharge? Perhaps most significantly, agricultural field expansion reached an all time high with the implementation of the PEI "Development Plan". The Plan, which among other things paid for the removal of thousands of kilometers of hedgerows, was an essential action to dramatically expand field size for efficient use of the huge new equipment. Hedgerows, such as those lining former small fields, were formerly composed of shrubs and trees which caught and held large quantities of snow in winter. Snow is a great insulator and although it was difficult "to get on the land early", much of the melt water from the snow went into the ground. In today's major agricultural areas, drifting red snow often ends up in the waters surrounding PEI (or Nova Scotia!) rather than seeping down to the water table. To make matters worse, autumn cultivation – especially on large, sloped fields - usually results in more run-off from frozen soils and facilitates evaporation, thus less penetration of moisture down into the aquifer. Another contributor to the decline in recharge, and the kiss of death for countless small wetlands across Prince Edward Island, was a Federally sponsored program of the 1990s which helped to pay for sub-surface drainage of depressions and small wetlands in farm fields. Water that would previously have seeped into the ground or provided wetland habitat for wildlife was diverted directly to streams where it is quickly carried to estuaries and salt water.

Other land use changes have also affected aquatic ecosystems. It is well known by soil scientists and most progressive farmers that high organic matter levels in soils greatly increase soil moisture and enhance crop production. However, in spite of repeated provincial attempts to identify and promote

good land use practices, data from our agricultural Department from 2000-2015 clearly shows that soil organic levels in intensive potato production has generally plummeted, primarily due to monoculture and short crop rotations. Hence, more demand for irrigation which can lower ground water levels and put more stress on aquatic ecosystems.

We cannot overlook climate change as a factor that is already having a substantial impact on our aquatic ecosystems. In 2014, our field data collection shows that two massive spring rainfall events in the West River watershed severely impacted rainbow trout redds (where eggs are deposited) on the Howells Brook tributary. In autumn, a second storm washed out brook trout redds on Quinns Brook. Both events were so severe that the road crossing at Green Bay was washed out. This is but one example which demonstrates that while the amount of precipitation falling per year may not change dramatically, the runoff from intense storms can vary substantially and does cause damage to stream ecosystems. We will have to adapt our road construction, stream restoration activities, and commercial farming techniques to reflect these climatic changes.

Three years ago, while attending a conference on water temperature, I was struck by how concerned some biologists were about the increasing rate of evaporation from surface water in fresh water ecosystems. In Europe, they predicted a 40% increase in evaporation by the middle of the century. A speaker from Scotland caught my attention when he suggested the introduction of beavers has really complicated the chore of restoring riparian forests and re-establishing stream cover. On PEI, the introduction of beavers in 1949, as well as subsequent management strategies, has resulted in enormous decreases in riparian zone tree canopies and increases in the amount of fresh water exposed to additional solar radiation. This is especially true in low gradient streams, for example the headwaters of the Morell and Midgell Rivers. Water temperature data collected over two decades show temperatures are well in excess of the acceptable range for brook trout, largely due to solar radiation.

So, what does the future look like for our environment, specifically aquatic ecosystems, on PEI? After countless commissions and reports, can we see light at the end of the tunnel? On April 5, 2017 I witnessed some of the worst soil erosion from exposed potato fields that I have ever seen. To continue to inundate our beautiful cold water streams with such pollution is truly a provincial disaster and disgrace. Have we not learned how to produce crops without destroying our aquatic ecosystems? I haven't even mentioned the issue of nitrate contamination from agricultural sources. Why are we continuing to allow our streams and estuaries to be degraded without considering the impacts on wildlife and on the social and economic benefits they can provide?

Despite all of this, I cling to a thread of optimism that we will reverse this ship. Public awareness and knowledge about water quantity and quality has increased dramatically in recent years, due in large part to the involvement of watershed groups. On the same day as I watched tonnes of topsoil slide into the headwaters of the Clyde River, I walked through a stand of hardwoods. Snow cover was still deep in the cradle hollows and there was absolutely no runoff visible from the site. Hardwood trees use a lot of water for about five months of the year, but once leaves fall, the trees become dormant. Snow falling on conifers collects on branches and is prone to sublimation but under hardwoods, it collects and eventually soaks through organic soil, mosses, lichens, and decaying vegetation. The aquifer gets replenished and practically no runoff occurs, even with heavy rainfall during snow melt.

Landowners on PEI can play a leading role in restoration of aquatic ecosystems and in assuring we have abundant clean water in future. Already, numerous landowners have given access to watershed groups

who are trying to improve the habitat in and along our watercourses. One need look no further than the Morell River as an example of the benefits that can occur where a much broader buffer zone has been protected adjacent to the river. The original 60 metre Conservation Zone that was established on a large portion of the river in 1972 has been widened in some areas by private donations, purchases by the Island Nature Trust, and by added protections on forested government land. The Morell River is a priceless gem that is extensively used by innumerable Islanders and visitors for all sorts of outdoor recreational activities and St. Peters Bay is a major mussel production area. We cannot transform the entire Island into forest, but we can identify key areas needing protection and locations in need of restoration. We can start by acknowledging the role of forested areas, particularly in the headwaters of our streams, in protecting the quantity and quality of our freshwater. I believe that with the guidance of knowledgeable individuals, the support of landowners, the energy of watershed groups and help from a wide variety of funding agencies, we could greatly expand watercourse buffer zones and help solve many of our land use, water quality and water quantity problems - in spite of the provincial government's reluctance to address them.



Figure 1. Deep snow in a hardwood stand on April 5, 2017



Figure 2. Without anything to slow it down, water scours a trail downhill to the stream. April 5, 2017



Figure 3. A "grassed" buffer is little match for the tonnes of top soil moving off a large, bare field. April 5, 2017.



Figure 4. In autumn 2016, the same stream was stocked with young brook trout to compensate for those lost in a July fish kill.