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Lessons Learned: Protecting Drinking Water in the Rural Township of Tiny, Severn Sound

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ABSTRACT. *Drinking Water Source Protection is part of a multi barrier approach to protecting municipal drinking water in Ontario. In Severn Sound, two municipal wells are experiencing elevated nitrate concentrations. Maintaining high quality ground and surface water for generations to come takes a community approach, from agriculture to residential and cottage landowners. Lessons learned in building community trust, actions taken, and questions still to be answered in protecting a shared resource.*

Keywords. *Commercial fertilizer, community engagement, drinking water, groundwater, issue contributing area, municipal drinking water, nitrate, Ontario, risk management, runoff, Severn Sound, shared resource, source protection, Township of Tiny, water quality*

ACRONYMS USED

BMP - Best Management Practice
CWA – Ontario Clean Water Act, 2006
RMI - Risk Management Inspector
RMO - Risk Management Official
SGBLS - South Georgian Bay Lake Simcoe
SPC - Source Protection Committee
SPA – Source Protection Authority
SPP - Source Protection Plan
SPR - Source Protection Region
SSEA - Severn Sound Environmental Association
SS AAC – Severn Sound Agricultural Advisory Committee
SS SPA - Severn Sound Source Protection Authority
WHPA -Wellhead Protection Area

INTRODUCTION

Severn Sound is a collection of bays in the Southeast portion of Georgian Bay (Lake Huron, Ontario, Canada) with a watershed of approximately 1000km^2 (figure 1). Much of the Severn Sound watershed is rural and agriculture (mixed cash crop and livestock) which is an important component of the economy and landscape in the Severn Sound watershed. In 2003 Severn Sound was formally delisted as one of Canada's 17 Great Lakes Areas of Concern. The agriculture sector, working with the Severn Sound Environmental Association (SSEA) and implementing Best Management Practices (BMPs) to reduce nutrient transport to surface water (ex. Manure storage, fencing livestock out of rivers, changing to minimum and no till etc.), was critical in meeting the water quality objectives of reducing phosphorus nutrient loading and restoring the beneficial uses of Severn Sound. The Severn Sound Environmental Association (SSEA) is a Joint Municipal Service Board under the Ontario Municipal Act, 2001 (Section 202). SSEA serves 8 lower tier municipalities including the Townships of Tiny, Tay, Georgian Bay, Severn, Oro-Medonte and Springwater and the Towns of Penetanguishene and Midland. This paper addresses an area within the Township of Tiny. The SSEA has an Agricultural Advisory Committee (SS AAC) that was established to provide advice to the SSEA on agriculture related issues and opportunities.

Source water is untreated water from streams, lakes, rivers or underground aquifers that people use for potable water supply. In Ontario it is estimated that more than 80 per cent of Ontario's population receives their drinking water from a municipal drinking water system (MECP, 2021). In May 2000, a municipal well in Walkerton Ontario became contaminated with deadly bacteria, resulting in seven deaths and severely impacting thousands of others. The Government of Ontario reacted by developing the Clean Water Act, 2006 (CWA), a multi barrier approach to ensure clean, safe, sustainable drinking water for Ontarians by protecting existing and future sources of municipal drinking water including lakes, rivers and groundwater wells from overuse and contamination at the source. Science based assessment reports and local source protection plans were developed on a watershed basis by multi-stakeholder source protection committees. The SSEA was designated as a Source Protection Authority (SPA) under Ontario Regulation 284/07 to exercise and perform the powers of a SPA under the CWA.

Figure 1: Severn Sound watershed map with primary study area highlighted in green.

Study Area and Background

The study area covers a portion of the Lafontaine and Georgian Sands communities which are located in the Township of Tiny, in the northwest part of the watershed (figure 2). The study area consists of a Wellhead Protection Area (WHPA) that protects six municipal drinking water wells and contains four pump houses. A WHPA is a vulnerable area under the CWA. Due to high nitrate concentrations in the municipal well(s), this WHPA is also designated as an Issue Contributing Area (ICA) for Nitrates, as listed in the South Georgian Bay Lake Simcoe Source Protection Plan (SGBLS SPP) (2015).

The Ontario drinking water standard for nitrate is 10 milligrams per litre (10 mg/L), which the pump house with the highest nitrate concentration has historically exceeded (figure 5). The Township of Tiny is required through Ontario's Safe Drinking Water Act to sample the wells in this system more frequently and as such are able to react to fluctuations timelier. To ensure municipal drinking water is safe for consumption, the Township is blending water from various multiple wells, in this system, to reduce the level of nitrates distributed to residents. The Township is committed to providing consumers with a consistent and safe supply of clean drinking water, meeting or surpassing all applicable regulations and legislation for the supply of drinking water in Ontario, and maintaining and continually improving their Quality Management System.

The predominant land use of this area is agricultural and single family residential. The majority of the agricultural lands are used for cash crops, primarily soybean corn, grain/forage rotation, and potato.

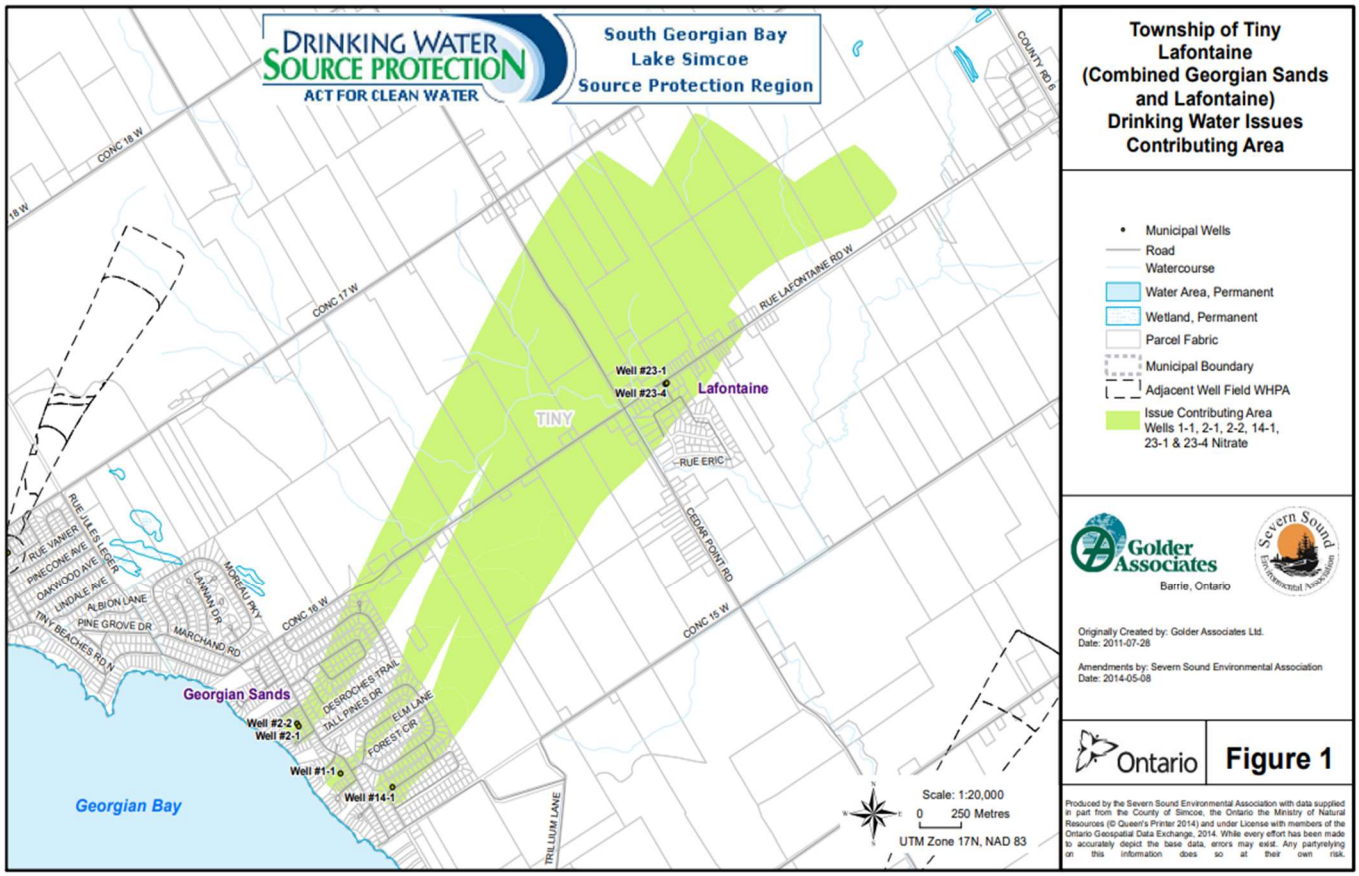

Figure 2: Lafontaine and Georgian Sands Issue Contributing Area.

The WHPA is part of the legislated multi-barrier approach to protecting municipal drinking water. The CWA, focuses on municipal drinking water source protection, the first barrier in the multi barrier approach (figure 3). Policies are implemented locally through the SGBLS SPP and are developed and amended by the South Georgian Bay Lake Simcoe Source Protection Region's (SGBLS SPR) Source Protection Committee (SPC). The SPC is composed of members from Municipal, Economic, Public, and First Nations backgrounds. These members have a wide range of experience including agriculture and sewage treatment plant operations. The SSEA is located within the SGBLS SPR (figure 4) and is listed in Ontario Regulation 284/07 as one of the Source Protection Authorities of the region, making SSEA the Severn Sound Source Protection Authority (SS SPA).

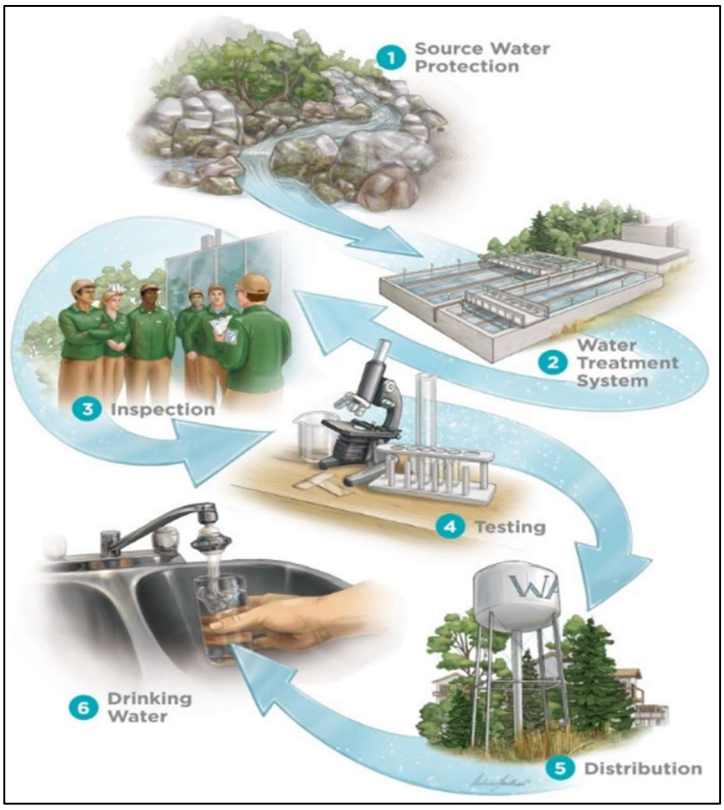

Figure 3: Ontario's multi barrier approach to protecting municipal drinking water.

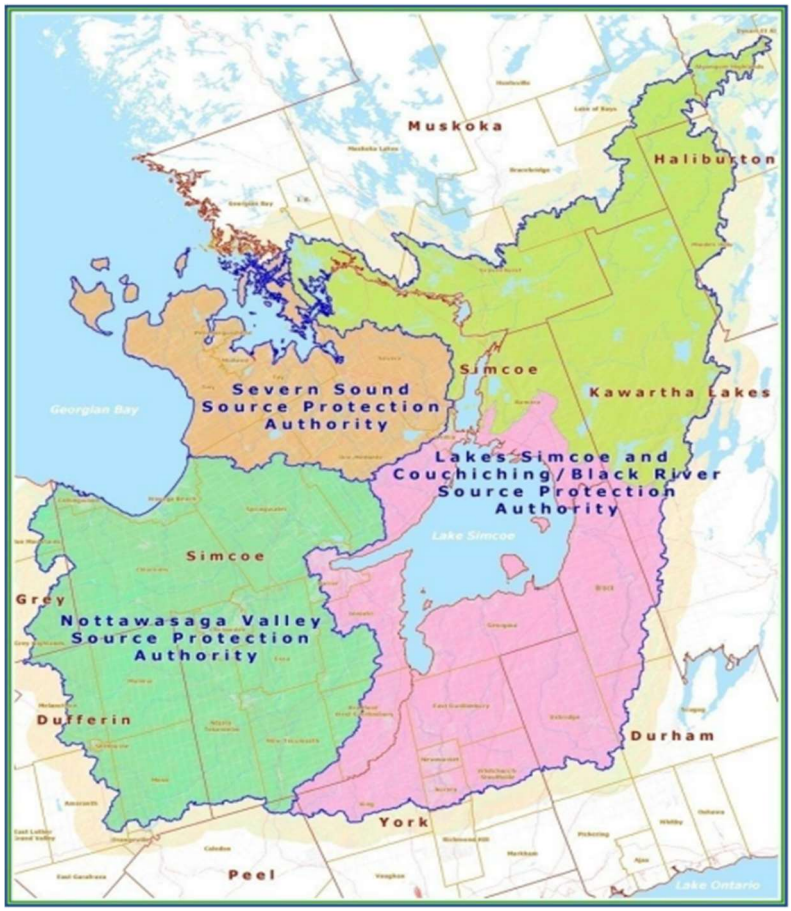

Figure 4: South Georgian Bay-Lake Simcoe Source Protection Region

Under the CWA, there are Risk Management Officials (RMO) and Risk Management Inspectors (RMI) who inspect properties and enforce policies in the SGBLS SPP. The SSEA is the SPA in the Severn Sound watershed with one RMO/RMI on staff. Seven of the 8 municipal members have delegated their authority, under Part IV of the CWA, to the SSEA RMO/RMI for their municipalities risk management services, including the Township of Tiny.

Being an ICA, additional policies apply to the Georgian Sands and Lafontaine WHPA. Policy FERT(ICA)-1, using a risk management plan as a policy tool, and policy FERT(ICA)-2, using prohibition as a policy tool, are applicable to this area and the RMO implementation progress will be discussed.

To help determine the source of nitrates and aid in determining a course of action to reduce concentrations, a study of the Lafontaine ICA was completed that examined potential nitrate sources. As part of this comprehensive study, the following was completed:

- Monitoring of nitrate concentration trends in municipal production wells in the Lafontaine and Georgian Sands systems (Sherman, 2018)
- Integrated surface water / groundwater modeling of nitrate issue contributing areas by Golder Associates (Hannan and Easton, 2016)
- Nitrogen balance on affected croplands by a Certified Crop Advisor (van Niekerk, 2016)
- Survey of private wells was conducted by SSEA in cooperation with the Township of Tiny, the Simcoe-Muskoka District Health Unit, and a researcher with Environment Canada Climate Change/University of Waterloo during 2015 and 2016 (Sherman, 2018)
- Basic chemistry sampling of 25 wells for nitrate concentration, isotope ratios, and sweeteners. Analyzed by Environment Canada - University of Waterloo research lab. (Sherman, 2018)
- An estimate of potential nitrate contributions from on-site sewage disposal systems by Golder Associates Ltd. (Easton, 2017)
- An estimate of potential nitrate contributions from the application of commercial fertilizer on residential lawns. (Sherman, 2018)

The nitrogen and oxygen isotope and artificial sweeteners analysis completed by Environment Canada - University of Waterloo research lab, “found low or non-detectable concentrations of artificial sweeteners in the water samples conducted by SSEA and concluded that septics were not a significant source of nitrate to the production wells” (Sherman, 2018). This finding, supported by all study components, further supported the need for policy FERT(ICA)-1 and FERT(ICA)-2 in the SGBLS SPP which aim to reduce or eliminate the amount of commercial fertilizers used on the land within the Georgian Sands and Lafontaine WHPA.

Implementing SPP Policies in the ICA

SGBLS SPP came into effect in 2015 and includes various policies that impact fertilizer uses for the agricultural and residential communities.

FERT(ICA)-1

The FERT(ICA)-1 policy states “The existing and future application, handling and storage of commercial fertilizer to land is designated for the purposes of Section 58 of the Clean Water Act, and therefore requires a risk management plan for those not phased in under the Nutrient Management Act, where the vulnerability score is less than 10…” (South Georgian Bay-Lake Simcoe Source Protection Committee, 2015). Since the SGBLS SPP was approved in 2015, the SS SPA and Township of Tiny RMO have engaged with the agricultural community and have advanced on the implementation of policy FERT(ICA)-1. All agricultural properties within the Georgian Sands and Lafontaine ICA are not phased in under the Nutrient Management Act and require a Risk Management Plan (RMP) to be

negotiated and signed by the RMO and the farm operator if they stored, handled, or applied commercial fertilizer to their fields (rented or owned). The agriculture RMPs require best practices to be used and could include: advice of a certified crop advisor (CCA), training as appropriate (i.e., nutrient stewardship), maintaining and calibrating equipment, crop rotations as appropriate, using variable rate application, following nutrient stewardship principles including 4R Nutrient Stewardship (Right Source @ Right Rate, Right Time, Right Place ®), thorough record keeping, fertilizer application tracking, soil testing, and use of cover crops, and safe fertilizer storage.

The SS SPA and RMO have and continue to foster critical communications with the agricultural community through open houses that aim to address community questions and concerns, farmer only meetings to discuss detailed issues, tours to increase existing relationships and promote new connections, and attend municipal or agricultural events to show support of the community and help educate members of the public on current agricultural practices. Throughout the implementation of this policy, the SS AAC has advised the SS SPA and RMO to ensure positive engagement with the agricultural community. Building and maintaining these relationships and mutual respect with the agricultural community have aided in the implementation of the policy and created a trusted open dialogue helping to ensure further protection of the municipal drinking water sources.

To further aid the farmers in the watershed who have an existing passion for best practices and the environment, the SSEA implemented a project in 2021/2022 called Healthy Soils = Healthy Watersheds (https://youtu.be/awy3Y1Nvr0g) with funding from the Ontario Ministry of the Environment, Conservation and Parks. This project engaged the local farming community and connected them with soil health experts and champions to encourage adoption of Best Management Practices (BMPs) using demonstration projects (e.g. cover cropping, grid soil sampling, tracking soil health and nutrient deficiencies), peer-to-peer networking, video tools, and significant outreach efforts resulting in adoption of practices to improve soil conditions over the long term. The priority of the program was identifying and implementing BMPs to improve soil health and reduce nutrient loss in targeted areas of Severn Sound. As the funding allotment was small, this project focused primarily on nitrogen loss while also considering phosphorus and overall soil health.

FERT(ICA)-2

The FERT(ICA)-2 policy states “Where the Nutrient Management Act does not require an approval, the existing and future handling, storage and application of commercial fertilizer is designated for the purposes of Section 57 of the Clean Water Act, and is therefore prohibited…” (South Georgian Bay-Lake Simcoe Source Protection Committee, 2015). In December of 2019, the SS SPA and Township of Tiny RMO implemented this policy, putting a prohibition in place December 31, 2019. Various residential properties within the Lafontaine ICA (Georgian Sands wellhead protection areas A and B and Lafontaine wellhead protection area A) are prohibited to handle, store, and apply commercial fertilizer containing nitrogen.

Prior to the prohibition being put in place and to address concerns from the community regarding the residential commercial fertilizer prohibition, the SS SPA and RMO promoted positive engagement with the public by hosting an open house. Along with SS SPA staff, members of the Township, Simcoe Muskoka District Health Unit, and members of the SS AAC were in attendance to speak with impacted residents on topics such as the SGBLS SPP policies, health impacts, distribution and testing of the municipal system, and what the actions being implemented by the agricultural community . The RMO also sent letters to landowners affected by the policy before it was implemented, discussing the reasoning for the prohibition, what it means to them, health impacts, alternatives to commercial fertilizer, and more to promote open and positive engagement. Residents within the prohibition area were sent notice of the prohibition through registered letters.

Recently in September 2022, a letter was sent reminding residents of the prohibition, addressing

questions, and inviting them to attend the SSEA's 'Lafontaine Commercial Fertilizer Prohibition Webinar' later that month. This webinar hosted speakers including the RMO, The Township of Tiny, Simcoe Muskoka District Health Unit, Guelph Turfgrass Institute, and Lafontaine Farmer - Paul Maurice (Monpiero Farms) (https://youtu.be/0A14z-N_NMc). Topics covered included an overview of the SS SPA drinking water source protection program and the prohibition, nutrient management initiatives in the community, nitrate sources and local levels, and health effects of high nitrate concentrations. Paul Maurice discussed how this is a community problem to tackle, and though there is a prohibition for residential commercial fertilizer, the agricultural community is also addressing this issue by negotiating and signing RMPs with the RMO to ensure best practices are being followed.

RESULTS

The RMO has made progress on the implementation of policy FERT(ICA)-1. As of June 2023, it is estimated seven agricultural RMPs are required for this area, with four of the seven signed since the implementation of this policy in 2015. Through the process of signing and negotiating the RMPs, most farmers had all best management practices in place, except for tracking and keeping detailed records. Some have expressed their support for the RMPs as a tool to help further protect farmers by documenting the best practices that they are completing.

During the 12-month Healthy Soils = Healthy Watersheds program, 160 soil samples were taken and submitted for analysis, 990 acres of cover crop planted, and 2 long term weather stations were installed (https://youtu.be/IvNlCtrjc5s). These weathers stations provide publicly available near real-time data at https://www.severnsound.ca/.

The RMO has made progress on the implementation of policy FERT(ICA)-2. The residential commercial fertilizer prohibition was implemented December 31, 2019. Approximately 269 letters were sent in 2019 and 291 in 2022 to the affected properties; one open house and one webinar was hosted with guests representing four organizations.

The Township of Tiny continues to monitor nitrate concentration trends within the wells of the Georgian Sands and Lafontaine WHPA, as per their requirements with Ontario Regulation 170/03 under the Ontario Safe Drinking Water Act, 2002. This data shows that nitrate levels in the treated water from the two wells with the highest nitrate levels have ceased to rise in recent years (figure 5).

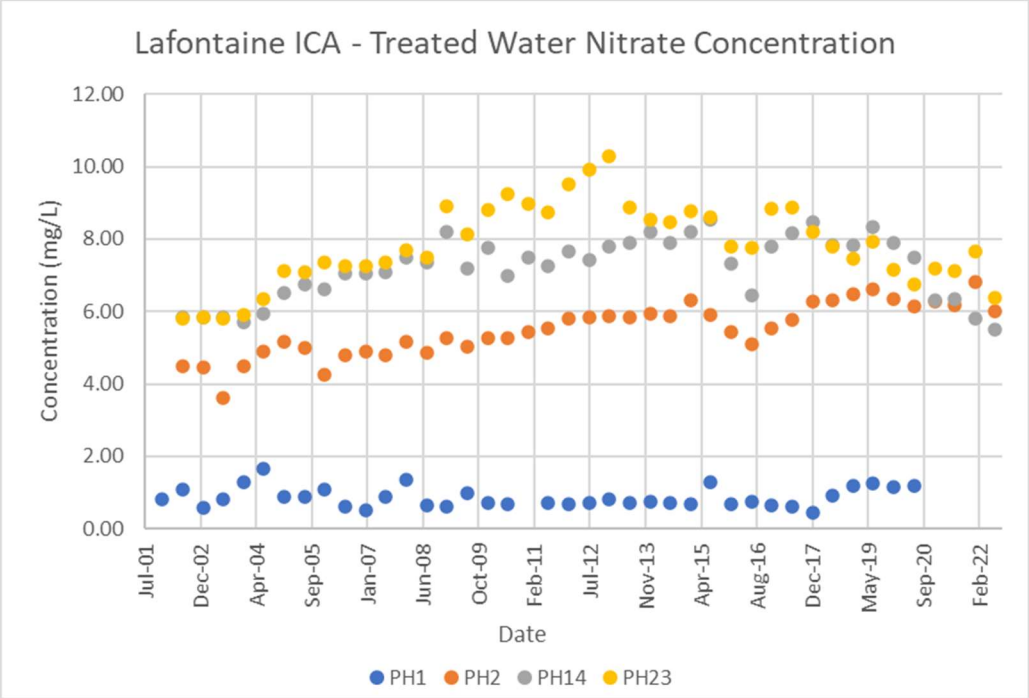

Figure 5: Bi-annual average nitrate concentrations in the Lafontaine and Georgian Sands municipal pump houses.

CONCLUSION & RECOMMENDATION

The positive engagement with the Township, the agricultural community and the Georgian Sands and Lafontaine community resulted in a successful start in implementation of SGBLS SPP policy FERT(ICA)-1 and FERT(ICA)-2. This is a successful example of multi stakeholder collaboration and has resulted in increased protection of the communities municipal drinking water sources. The SSEA used a variety of tools including public outreach, workshops both in person and virtual (https://www.youtube.com/@SevernSoundEA/videos) as well as social media to engage and communicate with the affected community.

The SSEA, SS SPA and RMO will continue to engage with and educate the community on best practices. The prohibition will continue to be monitored and re-enforced. All RMPs will be negotiated and signed before the set deadline from the Ministry of the Environment, Conservation and Parks of July 2024. Inspections from the RMI have begun and will continue for all RMPs in place.

The agricultural community is very engaged and wants to see data and information demonstrating the impact of their actions to reduce nitrogen, however, it could take a long time (ex. 20 years) before seeing those results. They are committed to and take pride in the actions they are implementing to improve and protect the local groundwater. Being able to show progress and impact of nitrogen reduction actions in a short time frame (i.e., 1 year or a growing season) remains a challenge.

The Township of Tiny will continue to frequently monitor nitrate concentrations and post results in an annual drinking water report, to their website, to keep residents informed and track levels.

The goal of the CWA is to protect existing and future sources of drinking water. To achieve this protection, positive collaboration and partnership across the community is key. Working together, sharing knowledge from both sides of the issue and being transparent is critical. Taking the time and making the effort to engage and work with the local community towards the common goal of clean safe sources of drinking water is critical to success.

ACKNOWLEDGMENTS

The SSEA thanks the Severn Sound Agricultural Advisory Committee, the agricultural community and residents of Lafontaine, all report writers from the ICA study, and Keith Sherman the previous SSEA Executive Director and RMO.

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