



Sawmill Creek: A Case Study on Urban-Environmental Interactions



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Introduction: Sawmill Creek – Resilience or Residual Degradation

Due to changes in water governance structures it is necessary for citizens to be involved and knowledgeable about their surrounding environment. Being aware of the involved actors, negotiations and changing legislation which realigns social and environmental responsibilities is necessary, as developers and planners do not necessarily have to be the most forthcoming with their development plans. The introduction of neoliberal reforms and downloading of governmental responsibilities have increasingly complicated notions of transparency, accountability and representation in decision-making processes. The “arm’s-length business model” approach to government and governance places responsibility on a critical and actively-engaged community¹.

Sawmill Creek is not just a stream but a watershed and thus the surrounding ecosystem and biodiversity it supports all rely on its integrity. Simultaneously, the creek’s water quality and conditions rely on the conditions within its watershed and particularly on the ecosystem which immediately surrounds the stream’s edges; known as the **riparian zone**. Further, it is not an isolated stream but is interconnected to the Rideau River, the Ottawa River, the St. Lawrence and the Atlantic; so relatively minor changes at local and regional scales can have a big effect!

Aside from the human impacts on the stream, the human attachments, interactions and experiences associated with the watercourse are highly important. A strong attachment to the surrounding environment promotes further local awareness and a vested interest in the sustainable management and conservation of local resources. However, while increased urbanization intensifies environmental stress and resource consumption, it paradoxically reinforces behaviours, perceptions and practices which are detached from their consequential impact on the environment². This detachedness results in a lack of awareness of their environmental impact and resource consumption. Further it can create a passivity or indifference towards current resource management. The infrastructure, policies and practices of today will affect the water conditions and preventative measures available to subsequent generations to ensure sustainability³.

Like all waterways, Sawmill Creek is of unequalled importance to ensuring the sustainability of the bio-physical processes it supports, as well as the socio-environmental experiences and interactions it produces. Of course, this does not solely apply to Sawmill Creek, but indeed to all streams, rivers, wetlands, groundwater systems and other hydrological processes. The interconnectivity of human and biophysical systems and processes necessitates multi-scalar approaches, policies and decision-making. However, without local awareness, interest and activism in one’s surrounding local ecosystems, the behavioural changes and political pressure required to adopt sustainable socio-environmental practices and policies may remain unrealized.

Sawmill Creek is a perennial stream which emerges from wetlands near Leitrim Road and feeds into the Rideau River near Billings Bridge Shopping Plaza; travelling a distance approximately 10 kilometres long⁴. It is a sub-watershed of the Rideau River watershed; covering 21 square kilometres⁵. Increasingly concentrated urban development and a substantial reduction in the stream’s riparian zone exert considerable stress on the vitality and resilience of the creek to adapt to further changes.

Although European settlement has occurred in this region since the mid-1800s, it was only after World War II that urbanization and substantial population expansion began to impact the watershed. The expansion of OC Transpo’s Transitway from Hurdman to South Keys, which began in 1992, substantially fragmented and impeded wildlife mobility along Sawmill Creek’s corridor, despite the NCC and the City of Ottawa’s reassurance that the Transitway would not impact its ecological integrity⁶. Phase three of the expansion included the construction of South Keys Shopping Mall and resulted in a substantial reduction

¹ Furlong & Bakker, 2012, p. 358

² Montanari *et al*, 2013, p. 1258

³ *Ibid*

⁴ Rideau Valley Conservation Authority [RVCA], 2012, p.1

⁵ *Ibid*

⁶ Urquhart, 1992

of its buffer zone. The Rideau Valley Conservation Authority (RVCA) refers to the riparian zone as the “ribbon of life” sustaining the stream’s integrity and health⁷. As a generalized rule regarding infrastructure development near streams, rivers and other waterways, Environment Canada (2004) suggests a natural buffer-zone of 30 metres along three quarters (75%) of its watercourse⁸. However, the RVCA’s studies observed that:

- **36% of Sawmill Creek has less than a 5 metre buffer zone**
- **24% has a buffer zone greater than 30 metres**
- **40% has a buffer zone which is in between 5 and 30 metres⁹**

Therefore, less than a quarter of the stream achieves the recommended target and protocol regarding shoreline development. This is detrimental to the long-term sustainability and health of the stream, ecosystem and community; thus emphasizing the importance of revitalization and naturalization efforts along Sawmill Creek.

This document presents a compilation of the changes surrounding Sawmill Creek’s land-use and governance which have influenced its current conditions. Additionally, a smaller case study of the small wooded section of the stream north of Hunt Club Road, east of Dazé Street and West of Bank Street (see Figure 2) highlights the complex issues surrounding management, protection and policy and the need for locally active and engaged individuals in raising awareness and effecting changes. The current restoration and revitalization initiatives along this section of Sawmill Creek and along the creek as a whole are paramount in creating healthy and sustainable social and environmental systems.

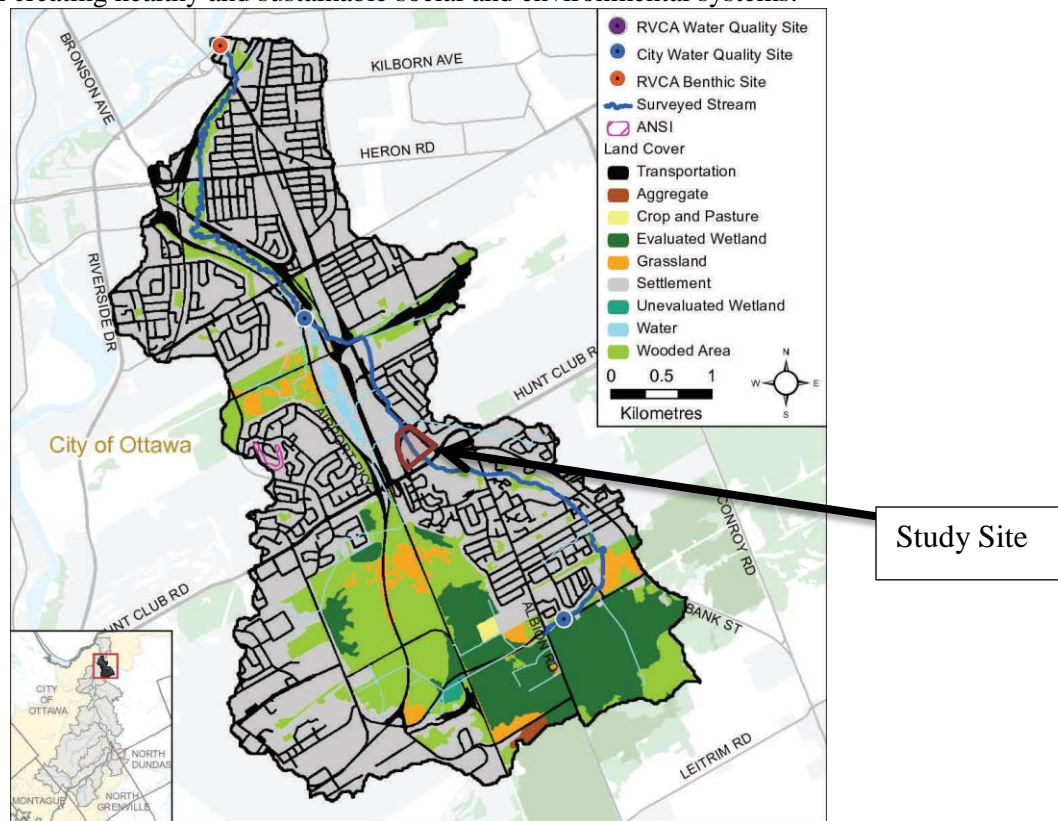


Figure 1- This map highlights the different land-cover and land-uses within Sawmill Creek’s watershed [Source: RVCA, 2012, p.1]. The study site (informally “North Sawmill Creek”) is outlined above and according to the map’s legend is designated as settlement, despite the presence of a relatively sensitive woodlot.

⁷ RVCA, 2011, p.7

⁸ RVCA, 2012, p. 10

⁹ *Ibid.* & RVCA, 2008, p. 5

Restoration Project: Revitalization and Resolution

North Sawmill Creek's location is significant given it is the final section of the stream before the storm-water diversion to the engineered wetlands. This small forested area plays an important role in the interception, infiltration and filtration, as well as reducing the volume and concentration of runoff into the stream during rainfall events. Considering the surrounding road networks, expansive concrete parking lots of South Keys Shopping Centre and other non-permeable surfaces and infrastructure, this and other less developed sections of the stream are integral in the revitalization of the stream's health.

Although better than other locations along the creek's length, both sides of the banks show erosion. The east bank is rather steep and has a smaller buffer between urban infrastructure and the stream. While bank erosion is a natural process of fluvial geomorphology, anthropogenic pressures such as concentrated urban development can cause detrimental amounts of erosion; having adverse impacts on local ecosystems and biodiversity. This causes increased sediment and pollutant concentrations, higher potential for stream blockages and other adverse impacts (e.g. shading, water-levels and fish habitat).

Additionally, the protection of this portion of the stream is complicated by its segmented ownership and overlapping jurisdictional agencies and actors involved in its protection; with different portions owned by the City of Ottawa, the Rideau Valley Conservation Authority (RVCA), the Ministry of the Environment (MOE), Property Owners' Association and Community Associations, as well as private and corporate ownership. Consolidated and complete environmental protection of a watercourse and its surrounding buffer is necessary in creating a more sustainable watershed. Partial protection will be reflected by partial or negligible improvements.

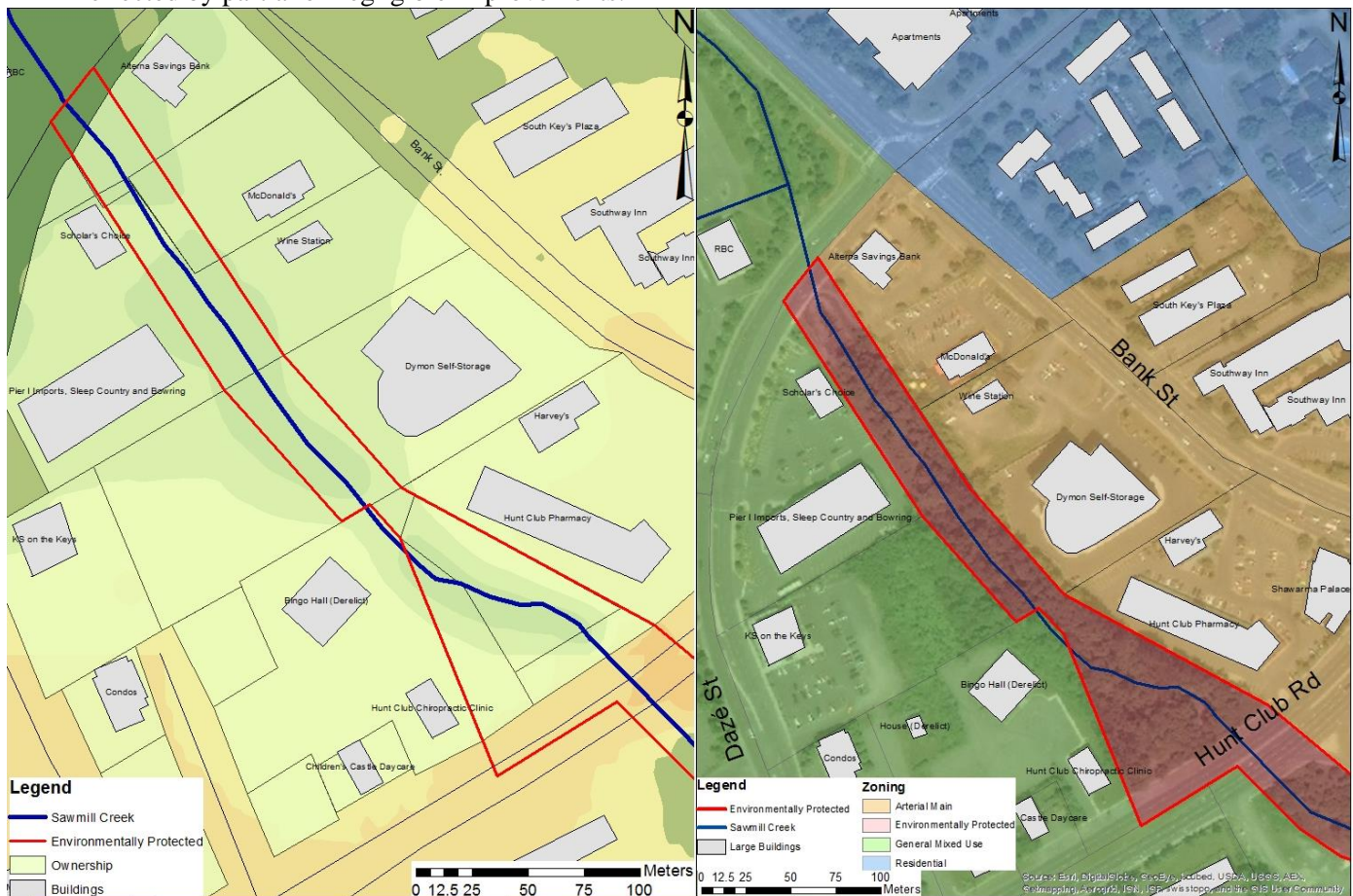


Figure 2 – The map on the left delineates the existing property boundaries surrounding Sawmill Creek. The environmentally protected section of the corridor is highlighted in red. There is a visible discrepancy where a section of the creek falls outside of the spatial boundaries of the Environmentally Protected Area. On the right, the map indicates the current designated land-use for the study site and surrounding area.

Proposal

The proposal sent to city planners to potentially add a permeable path network through North Sawmill Creek Park was rejected based on the environmental sensitivity of the site, as well as complications in relation to zoned and existing uses of the land. Considering the expansive concrete parking lots at South Keys and road infrastructure surrounding the relatively small wooded area, planners decided that adding pathways and facilitating its accessibility would further adversely affect the health of the stressed ecosystem. For example, despite the directed land-use pathways could provide through the site, individuals would inevitably stray from the path, just as the placement of a garbage can at the site may not prevent an individual from littering. Considering the environmental sensitivity of the North Sawmill Creek site ultimately underpinned this decision.

Additionally, the high-density traffic at this section of Hunt Club, exiting the arterial roads such as Bank Street, the Airport Parkway and the Transitway inhibit creating a continuous path network through towards this section of green-space. With a high density of existing traffic lights regulating traffic in the area, it is not feasible to place another crosswalk in this location; however to create a linked path network and not do so would be a liability. The Community Design Plan which will be released later in 2014 prioritizes the reaches of the stream at South Keys Shopping Centre and the residential housing across from it due to erosion levels along these sections¹⁰.

Any recreational and infrastructural developments near water within the city's limits are dictated by planning policies and manuals which are routinely released by the City of Ottawa. It is a multi-step process, which involves multiple draft submissions and revisions before approval for development can occur. These developments often require effective coordination and communication between all involved stakeholders, such as the Rideau Valley Conservation Authority (RVCA), developers, property owners and other actors/agencies involved in a proposed project. The City also identifies in its *Park and Pathway Development Manual* its right to opt out of any proposed park developments if the location is:

- An Environmentally Protected or Sensitive Area (woodlands, wetlands, etc.)
- In a Flood Plain
- Susceptible to other potentially hazardous processes and events (e.g. erosion and slope stability)
- Does not align with the City's Master Plan, dictating zoning and development (e.g. transportation and watercourse corridors)¹¹

Certain sections of "North Sawmill Creek's" corridor are designated as environmentally protected and other near-stream sections designated as a flood plain zone. Additionally with other planned transit corridors and linked at local, regional and city scale the combined social and environmental issues led to this initial reception of the North Sawmill Creek Park restoration project and proposal.

Additionally balanced with safety issues of social use it is unlikely that the city would have promoted the use of the park anyway. The site's relatively constricted area would create difficult decision regarding accessibility to the park balanced against maintaining the surrounding ecological integrity.

- A multi-use pathway could not be implemented due to slope stability and the environmental versus infrastructural buffer requirements (e.g. Multi-use Pathway Requirements: 3 metre wide concrete pathway, with additional 1.5 m clearance and an 18 metres buffer between larger trees and the paths)¹².
- A permeable recreational pathway would have complicated socially inclusive access to the path network, such as wheelchair and stroller access.

Ultimately, the long-term benefits of revitalizing, maintaining and enhancing the ecological integrity and sustainable use of the stream outweigh the short-term benefits of promoting its accessibility and intensified use. Despite rejecting the proposed path network plan, both of the City's representatives encouraged to continue active participation and engagement with this and other sections of Sawmill

¹⁰ Open House on the Bank Street Community Design Plan. (2014, February 20th). At Greenboro Community Centre.

¹¹ City of Ottawa, 2012, p.29

¹² City of Ottawa, 2012, p. 46

Creek; particularly with stream clean-ups, naturalization (with appropriate native species) and revitalization efforts.

Water Contamination

The RVCA's tests indicate Sawmill Creek surpasses provincial standards for concentration of phosphorous, metals (Cu, Fe), bacteria (E. Coli) and other stream health indicators at least once throughout the year, based on monthly averages over five year periods. Phosphorous and nitrogen concentrations are used by the RVCA as an indicator of excess nutrient loading into the stream. Phosphate and nitrate inputs may result from soil disturbances, rainfall runoff over impermeable surfaces, wastewater overflow, fertilizer application, pet waste, laundry detergents and other potential sources¹³. This can result in the **eutrophication**, where excessive algae production depletes the dissolved oxygen content, clarity and quality of the water¹⁴. Low oxygen levels and contaminated waters can radically alter the aquatic and terrestrial biodiversity supported by the ecosystem.

The phosphorous concentrations of the RVCA's water samples of Sawmill Creek exceeded the Provincial Water Quality Objectives more frequently during the period of 2006 to 2011 than that from 2000 to 2005 (see Figure 3). During 2000 to 2005 the samples were below provincial guidelines (0.030 mg/L) on the total phosphorous (TP) concentrations 76% of the time, whereas for the 2006 to 2011 period TP concentrations were below the guideline 32% of the time¹⁵.

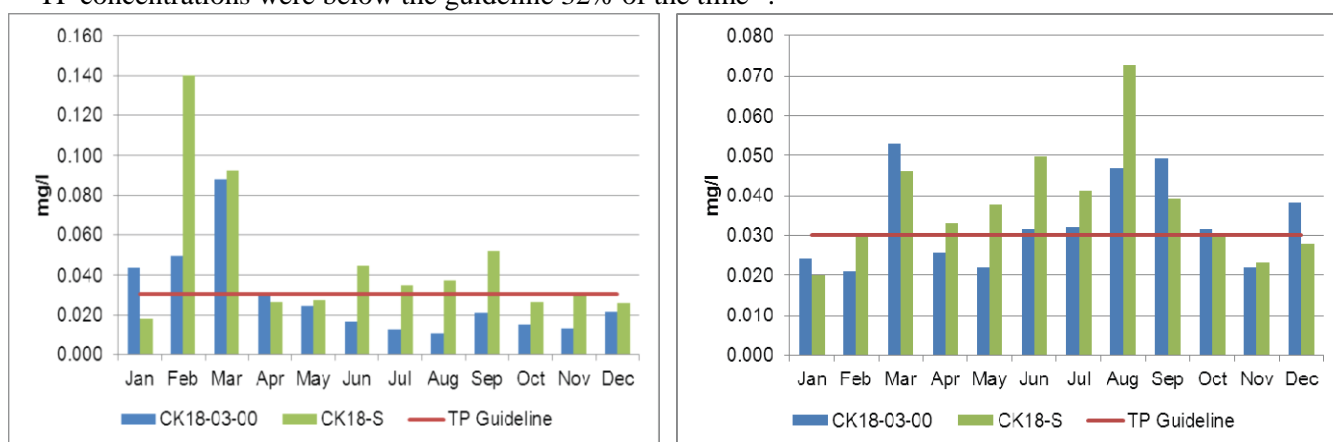


Figure 3 – The graph on the left shows the total phosphorous (TP) concentrations in Sawmill Creek for 2000-2005 on a monthly basis at two monitoring locations (CK-13-C3-CO & CK 18-S), while the graph on the right shows the 2006-2011 total phosphorous concentrations for the same two locations [Source: RVCA, 2012, p.3]. The horizontal line in red indicates the guideline maximum levels outlined in the Provincial Water Quality Objectives (PWQO).

However, changes in these indicators over time are highly varied and complex. Thus results can be interpreted and represented in numerous different ways. For example, the concentrations in E. Coli for one of the monitoring sites slightly decreased from 2000-2005 to 2006-2011; however the number of months surpassing the PWQO for E. Coli at both sites increased¹⁶. Similarly, despite the reduction in the water's average concentrations of Aluminum over the two study periods, the percentage of samples surpassing the provincial standards surpassed¹⁷.

Therefore, generalized statements regarding contaminant concentrations in the water is somewhat limiting. However this is not to understate the need to reduce and mitigate the concentration levels of these contaminants in the creek. This can be achieved through revitalization and naturalization projects focussed on rejuvenating degraded and eroding riparian zones, as well as expanding upon pre-existing,

¹³ Walmsley & Godbold, 2010; United States Environmental Protection Agency [EPA], 2013

¹⁴ EPA, 2013

¹⁵ RVCA, 2012, p.3

¹⁶ *Ibid*, p.4-5

¹⁷ *Ibid*, p.7

healthy riparian zones. Knowing that the integrity and health of the riparian zone reflects the health of the stream and surrounding terrestrial ecosystem, the percentage of the stream which is designated as in need of riparian restoration is substantial.

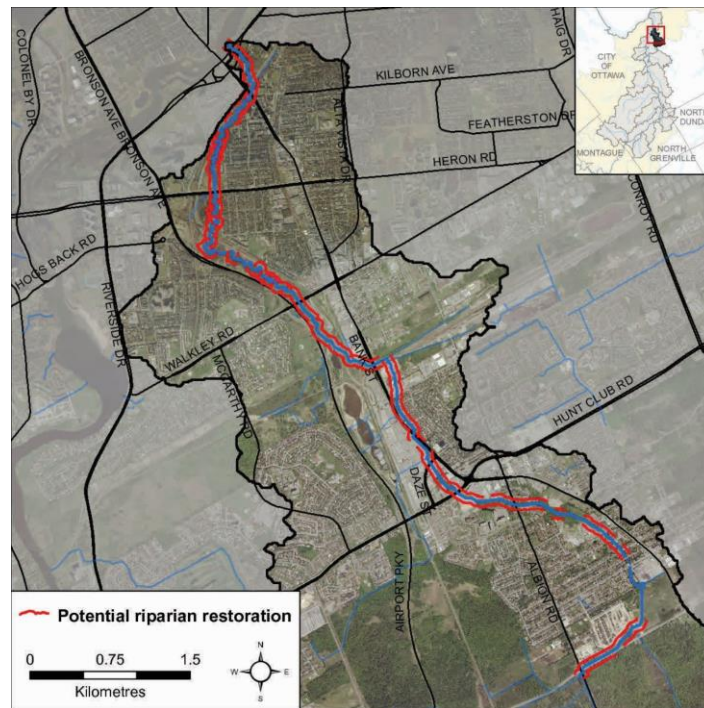


Figure 4 – Identified stretches of Sawmill Creek by the Rideau Valley Conservation Authority which have the potential for riparian restoration initiatives [Source: RVCA, 2012, p.14]. All of North Sawmill Creek and most of the watercourse are labelled as potential sites for riparian restoration initiatives along both sides of the stream's banks.

Since 2007, the engineered Sawmill Creek Wetlands have been in place to manage storm water treatment and decrease contaminant inputs into the stream¹⁸. Wetland vegetation is known to be very effective in removing pollutants and thus it is hoped that the artificially constructed wetland will yield the same results. In this early phase of its operation visible improvements have yet to be seen, however observable improvements may take time. The extent to which the constructed wetlands will improve the water quality remains uncertain.

The addition of road salts and piling of snow in proximity to the stream is another significant source for water pollution and soil contamination. This can create a prolonged and damaging impact on the environment. The site's proximity to Hunt Club Road, Bank Street, Dazé Street and South Keys Shopping Centre, which are regularly salted during the winter months, compounds this issue. The piling of snow from roadways and sidewalks should be avoided in regions which will directly drain into the creek during the spring snowmelt.

¹⁸ *Ibid.*



Figure 5 – This is the stormwater diversion infrastructure located in “North Sawmill Creek” which is part of the constructed wetlands project in 2007. The concrete barrier running across the stream to the gridded rail on the left-side of the photo diverts excess water during rainfall events away from Sawmill Creek towards the constructed wetlands. This is in attempt to reduce erosion and contamination along subsequent sections of the stream before reaching the Rideau River.

Trees & the Roots of Riparian Stability:

This particular stretch of Sawmill Creek contained over 50% ash trees; many of which have been decimated by the invasive Emerald Ash Borer (EAB). If no action is taken the death of the ash trees will have a substantial impact on the stream affecting:

- **Stream Shading:** daily water temperature fluctuation (impacting aquatic biodiversity)
- **Slope Stability:** trees roots are crucial in stabilizing soils on a slope and decreasing erosion
- **Soil Erosion:** decreased filtration of chemicals, pollutants, and excess water during rainfall events
- **Stream Blockages:** potential for dead trees near the creek to interrupt and/or inhibit flow and aquatic migration with slope failures

However, their death simultaneously presents the valuable opportunity to replant a sustainable and diverse native woodland which attempts to optimize species given the particular lighting and soil conditions at the site. “North Sawmill Creek” has a diverse selection of planted native tree species, such as shagbark hickory, bitternut hickory and red pine; thus there is the strong potential for these aspirations to be realized. Many of the ash trees are on the West Bank and are clustered along the creek’s edge and around small ephemeral and intermittent drainage channels. Trees thrive in the riparian zone; thus these locations adjacent to the stream are ideal for replanting native species. This provides slope stability and a diversified local ecology. Aside from the aforementioned species, *some* other possible native species that could be replanted to replace the ash are: Willows, Poplars, Red Spruce, Yellow Birch, Heartleaf Birch, Red Maple, Silver Maple, Black Maple, Hemlock, Rock Elm, Slippery Elm, Kentucky Coffee Tree and Speckled Alder.

Prioritizing areas that require tree removal and replanting is fundamental in mitigating further potential stresses to the ecosystem. Considering the steep slopes and bank erosion, tree removal and replanting requires careful implementation in preventing further erosion. The ashes’ roots continue to provide some slope and soil stability and moisture retention, yet are no longer absorbing water; reducing the capacity to intercept and store rainfall. This leads to a greater potential for overland flow and erosion.

Replanting is necessary in providing slope stability, reducing erosion and maintaining the local biodiversity the small woodland harbours. Considering that the study site has some of the highest percentage values in terms of shading it provides (81 – 100%) but simultaneously has some of the highest levels of erosion (41-60%), this issue should be prioritized¹⁹. Erosion is occurring along straight sections of the stream rather than at bends in the stream (as is generally more common of natural erosion

¹⁹ RVCA, 2012, p. 11

processes); highlighting the need to address and resolve issues of slope and stability along Sawmill Creek. North Sawmill Creek's percentage of in-stream woody debris was elevated in comparison to surrounding sections (41 - 60%). Thus, dead ash trees that are proximate to the stream will have to be monitored and appropriately removed to avoid potential stream blockages.

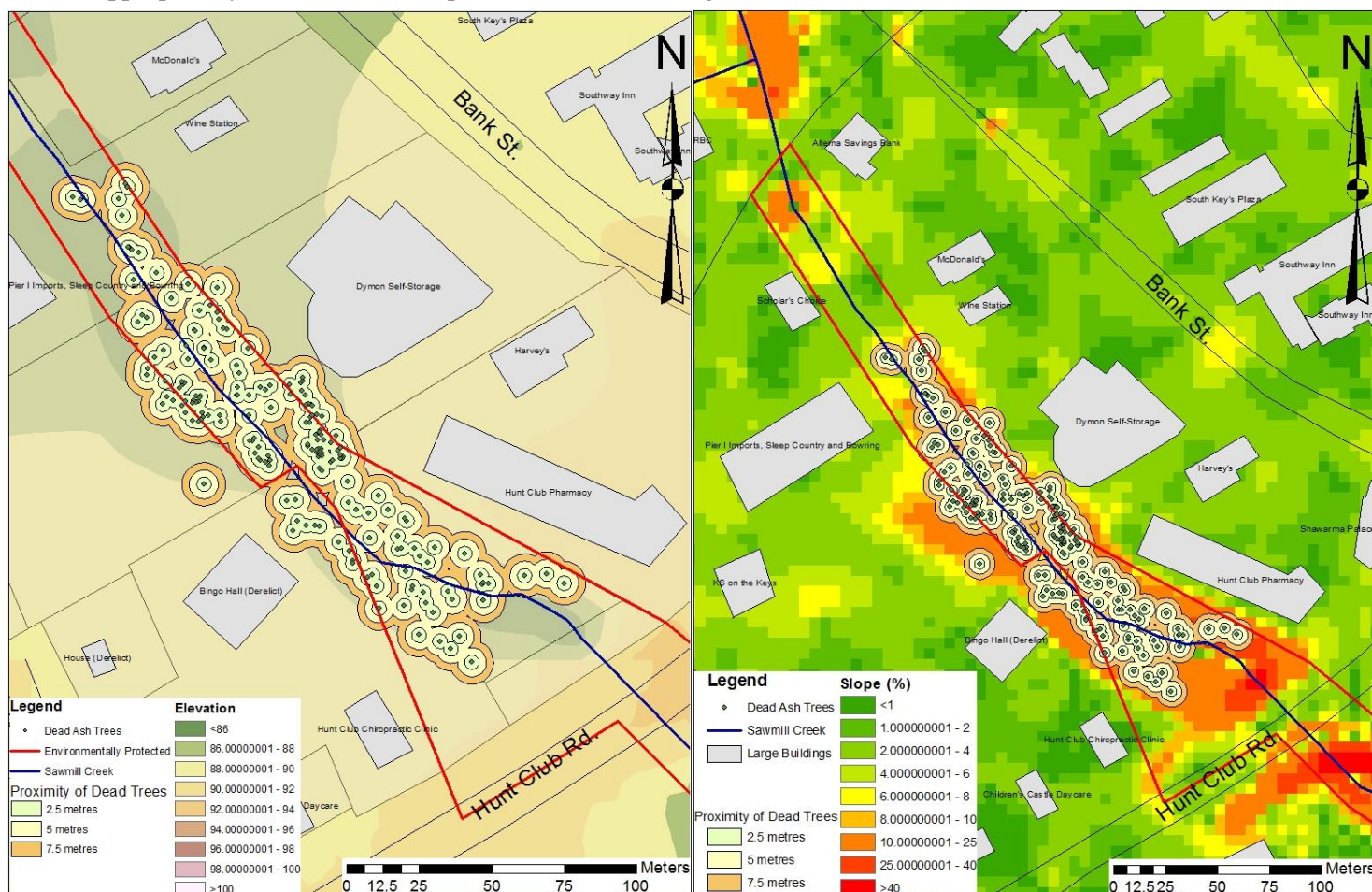


Figure 6 – The dotted locations on this map are locations of dead ash trees taken by GPS at the study site.

In contrast, tree removal should only be implemented when it is necessary to do so, such as threatening human safety or causing a considerable alteration to the biophysical regime of the area (e.g. forest to field). If so, removal should be exercised in a manner which mitigates potential harm to surrounding trees or practices which prevent regrowth. For example, removing tree stumps can cause further environmental disturbances to the creek by removing potential nutrient sources from the soil, increasing erosion and impacting the nutrient and soil carbon regime; further degrading stream conditions²⁰. Thus, a few sparsely scattered dead trees should not necessarily be removed, as they provide a home for various creatures living in the wooded region.

Litter in the Littoral Zone and Riparian Rubbish:

The heavily urbanized surroundings of Sawmill Creek ultimately require annual maintenance and waste collection in reducing the anthropogenic impacts on the stream²¹. This requires a committed community to ensure the safety of this local asset. Moreover, beyond the community collective, the stream is not solely a local asset but due to the inherent interconnectedness of hydrological systems a

²⁰ Walmsley and Godbold, 2010

²¹ RVCA, 2008, p. 8

regional and global resource. In the fall 2013 cleanup three tires were removed from the streambed, as well as stacks of newspapers, rusty cans and plastic bottles. Approximately 75 tires have been removed along Sawmill Creek's streambed, as well as countless other harmful materials such as shopping carts, small electronics, stacks of flyers, plastics and rusting metals. Like the deposition of sediments producing distinct layers in sedimentary rocks, the stratigraphic deposition of garbage along the stream banks is vividly apparent; with plastics and other materials extruding from the soil. McDonald's waste is a substantial contributor to the garbage found in this section of the creek; however diverse waste producing sources exist surrounding the site (e.g. South Keys Shopping Mall, Hunt Club Road). Increased amount and distribution of garbage bins would be advantageous in capturing potential litter. Particular target sites for additional trash receptacles would be at McDonald's patio-site and Hunt Club road where the sidewalk passes by the stream. However, it is recommended that added and existing trash receptacles are covered to prevent further littering by other animals. Visits to the site strongly indicated that not only humans, but birds and other animals routinely relocate garbage from receptacles to the stream site.

Pollution/Garbage of Sawmill Creek

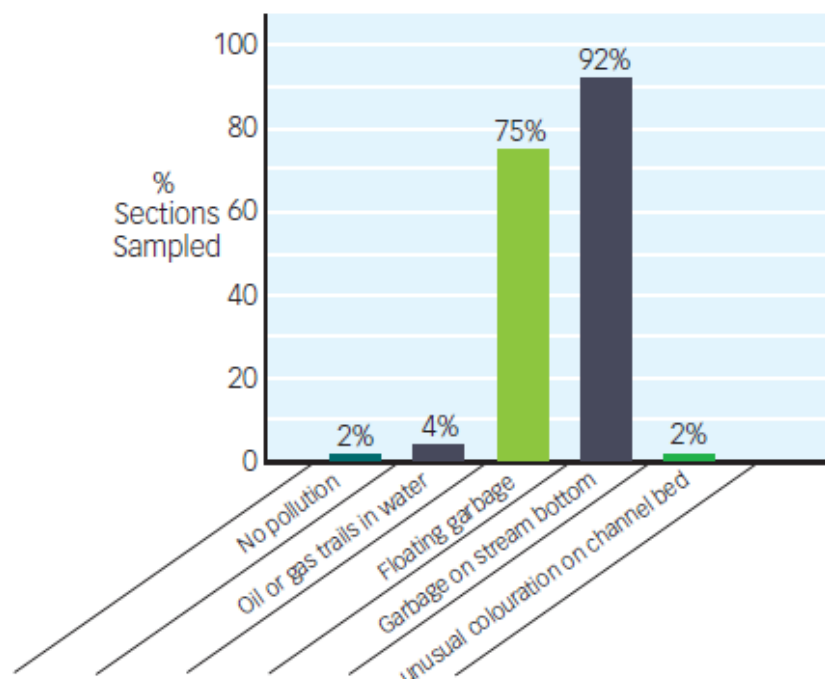


Figure 7 – This graph highlights the significant amount of pollution found along the creek with only 2% of the sampled sections along the stream having no observable sign of garbage or other indicators of pollution [Source: RVCA, 2008, p.5].

History:

The entire City of Ottawa and a substantial portion of Eastern Ontario exist on **unceded and unsurrendered** Algonquin lands. This means that the Algonquin were *never* formally or informally involved in negotiations regarding the exchange of their land. Thus, when the Crawford Purchase was made in 1783 and subsequent purchases thereafter (Rideau Purchase of 1818 and Williams Treaty of 1923), the Algonquin were explicitly left out of negotiations. The principle draft agreement submitted in 2012 expresses and asserts their claims and rights to lands covering 36 000 km² of Eastern Ontario and is

occupied by approximately 1.2 million people²². If settled it would be the largest land claim settlement in Ontario's history²³.

The Township of Gloucester was much larger than its contemporary jurisdictional boundaries. As the City of Ottawa rapidly grew during the late 19th and 20th centuries, it parcelled and annexed pieces of the township. The first European settler to the township was Braddish Billings, who had migrated from the US in 1793. In 1812, indebted from previous ventures, Braddish Billings resettled across the Rideau River to "Lot 17", the contemporary location of Billings Estate²⁴.

The location's access to timber, agriculture and transportation networks (e.g. Rideau River and Sawmill Creek) allowed Billings to independently establish himself. He established a ferry network and a tavern to facilitate travelling across the Rideau River; in and out of Bytown. In 1830 he built Billings' Bridge and was central in raising funds and providing land for the Prescott Railway, both of which were fundamental in facilitating the increased mobility and migration of individuals between Bytown, Gloucester and Merrickville. By 1915, the urban environment had encroached to the north side of the Rideau River and the remaining lands of the estate were split between Billings' two sons.



Figure 8 – The opening of the newly re-built Billings Bridge in 1915 [Source: Gloucester Historical Society].

Sawmill Creek's name is attributed to the sawmill that Braddish Billings constructed along the creek in 1823 to support his agricultural and industrial activities²⁵. The sawmill fell into disuse around the turn of the 20th century and shortly burnt down thereafter. The sawmill was located at the contemporary site of Billings Bridge Shopping Plaza and Bank Street before the creek was rerouted in 1960 with the expansion of Billings Bridge Shopping Plaza and expansion of Riverside Drive²⁶.

²² Government of Ontario. (2013). Algonquin Land Claim. Retrieved on January 14th, 2014 from: <http://www.ontario.ca/aboriginal/algonquin-land-claim>

²³ *Ibid.*

²⁴ City of Ottawa. (2013). Braddish Billings 1783-1864. The Billings Family Virtual Exhibit. Library and Archives Canada. Retrieved on February 1st from: <http://ottawa.ca/en/residents/arts-culture-and-community/museums-and-heritage/billings-family-virtual-exhibit-0/braddish>

²⁵ *Ibid.*

²⁶ The Heron Park Herald

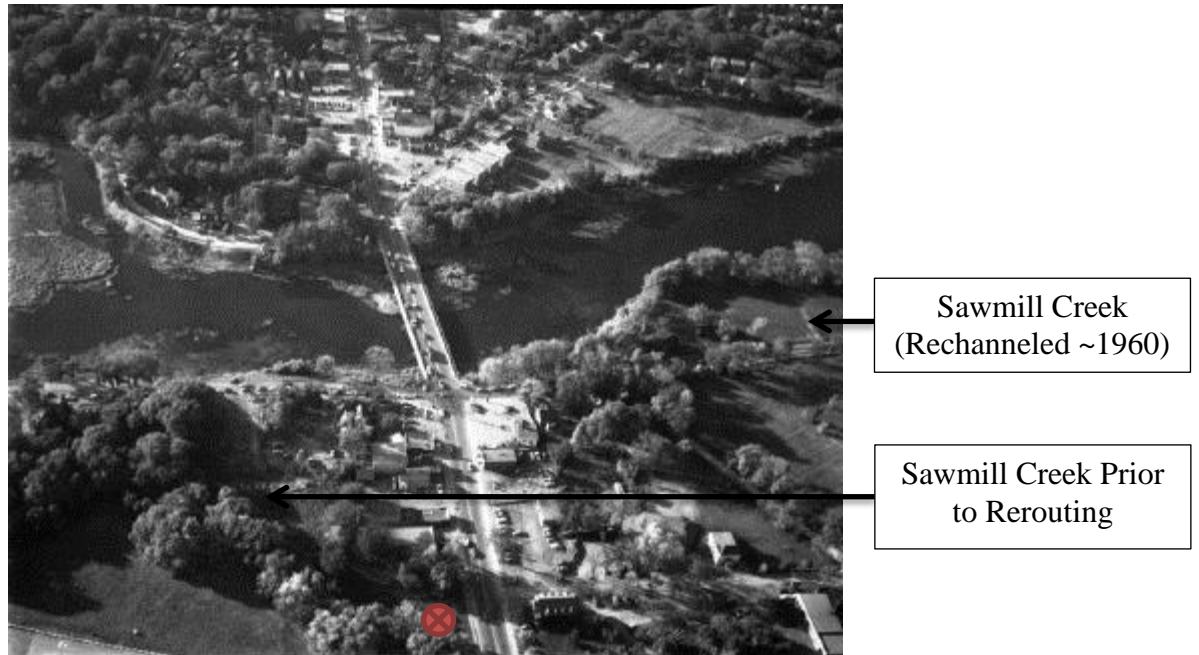


Figure 9 – An aerial image of Billings Bridge taken in 1957 facing north²⁷. Sawmill Creek would be relocated and channelled a few years later, but in this photo the creek follows the string of trees visible at the bottom left corner of the photo, where it flows into the Rideau River.

Queen Victoria's designation of Bytown (Ottawa) as the capital of the Province of Canada, (later to become the Dominion of Canada with Confederation in 1867), substantially impacted and accelerated the settlement and growth patterns in Ottawa; particularly in the latter half of the 20th century. However, William Upton of Groveland settled near this region in 1854 and by 1876 his journal recounts the increasing popularity of the area for sport hunting by Ottawa's business and political elite.

In 1908, 160 acres was purchased from Upton and converted into lands used for the Ottawa Hunt Club, established the same year by the Fourth Lord Earl Grey (1851-1917). Similar to Billings' Estate, the Hunt Club's lands were gradually parcelled and sold off over the next half-century; however the golf-course remains intact. Much of the lands would be developed into residential areas, many of which include the name reference to the hunting club²⁸.



Figure 10 – These residential zones would be developed in the 1970s and adopted names which reflected the hunting club's use of the lands²⁹.

²⁷ Image Source: City of Ottawa. (2013). The Billings Family Virtual Exhibit. Retrieved on February 12, 2014 from: <http://ottawa.ca/en/residents/arts-culture-and-community/museums-and-heritage/1812-1865>

²⁸ Sankey *et al.* Our Names. Retrieved from: <http://hunt-club.ncf.ca/name.html>

²⁹ Image Source: *Ibid.*

Post Second World War: Modernism and Urban Growth

Ottawa's urban sprawl in the 1970s increasingly encroached on Sawmill Creek's watershed and surrounding environment. Uplands Air Field was designated as Ottawa's International Airport on August 24th, 1964. By 1972 the Airport Parkway, which bordered the edge of the stream from Heron to Hunt Club Road, was under construction and by 1975 the National Capital Commission (NCC) opened this extension for public use. The entire Hunt Club region's land-use in 1967 remained predominantly agricultural and industrial with no visible clustered residential or commercial developments. Despite this intensification of urban infrastructure Sawmill Creek remained one of the few North-South "Green Corridor's"; playing an integral role as a migratory pathway for wildlife and a public space for recreational activity³⁰. Extending from the surrounding Greenbelt, the corridor derived from Jacques Gréber's *Plan for the National Capital* (1950), which was based upon modernist urban planning principles and firmly grounded in the "City Beautiful" urban planning and architecture movement prominent in the late 18th and early 19th centuries³¹. This movement called for the dispersal of the population away from "crowded" city centres, the creation of large expressways, roadways connected by expansive green-spaces to reinforce an "organic", functional and aesthetically 'beautiful' city³². This plan significantly influenced the NCC's development of the capital.

However, the plan and the NCC grossly underestimated and proceeded to overlook the rate of growth in Ottawa. The intensification of residential neighbourhoods without subsequently providing sufficient transportation infrastructure to access the city produced frequently congested road conditions, which justified the extension of Ottawa's public transportation to the region. This highlights the contradictions of modernist aspirations and urban planning of the era, as sprawl rapidly resulted in the degradation and destruction of the green-spaces essential to the city's long-term health.

This is epitomized by the NCC and the City of Ottawa's expansion of its public transportation infrastructure in the 1990s. The residential developments in the region necessitated public transportation infrastructure, however it is highly debatable that the optimal location for the Transitway was directly through the creek's corridor; as was implied by OC Transpo planners at the time. The unheeded, yet incredibly insightful plea of a young girl guide to city council members prior to construction highlights: **"You can move the road but you cannot move the creek, once it is gone you can never have it back"**³³. Aside from other viable methods and locations for creating an effective North-South public transit route for Ottawa and despite significant public resistance to the plan the involved stakeholders decided that the transit corridor would cut right through Sawmill Creek Valley.



Figure 11 – Photo on the left is a segment of Sawmill Creek Valley in 1991 before the construction of the Transitway [Source: Garrow, 1994]. The photo on the right shows the stretch of Sawmill Creek's corridor between Heron and Walkley Road which has been razed during for the Transitway's construction in 1992.

³⁰ Urquhart, 1992

³¹ Gordon, 1998; Gordon 2001

³² Fullerton, 2005

³³ Urquhart, 1992

This involved the expansion of the Transitway from Hurdman station to Hunt Club Road; based on a three-phase development plan approved by the city on December 12, 1990³⁴. Phase II and III of the plan had substantial impact on the creek's ecosystem. From Billings Bridge to South Keys the Transitway follows the edge of the creek and is distinctly visible from the bus. The creek is particularly stressed from Heron to South Keys, as it is stuck in between the Transitway, the Prescott Railway (O-Train) and the Airport Parkway. Phase III of the construction involved straightening three natural curves in the stream, adding a stone embankment and other hydro-engineering tools. Additionally, the phase planned for the creation of South Keys Shopping Centre and an accompanying 600 space Park & Ride, which radically altered the extent and ratio of green-space to concrete³⁵.

Despite public activism and outcry demanding for an environmental impact assessment and potential alternatives, little action was taken by any level of government prior to the approval and construction of the infrastructure. The local residents' demand for an updated Environmental Impact Assessment prior to the Transitway's construction was initially agreed upon with city council staff and the developers. However, this decision was reversed early in January, 1992 and the decision to use existing data from 1984 and 1988 to conduct an environmental impact assessment implemented instead³⁶. It was not until October 1992 that an updated watershed study was conducted at which point the Transitway was already under construction.³⁷

Therefore any opportunity for knowing and implementing measures to mitigate possible impacts on the ecosystem was largely lost. It was only after its construction that the City of Ottawa dipped into environmental protection funds to buy portions along the creek, as did the Rideau Valley Conservation Authority (RVCA)³⁸. The stream still has sections which remain subject to multiple forms of ownership and land-use zoning.

To contextualize these historical changes here are aerial photos of "North Sawmill Creek's" development over time

a) 1976



³⁴ Citizen Staff. (1990, December 13). Transitway Link to Hunt Club Gets Approval. *The Ottawa Citizen*, B3.

³⁵ *Ibid.*

³⁶ Lapointe, Elizabeth. (1992, January 15). Existing Data to be Consolidated. Hunt Club/Riverside News.

³⁷ Billington, Charles. (1992, September 20). Joint Environmental Project Undertaken: Sawmill Creek Subwatershed Study. *News*. p.8.

³⁸ Denley, Randall. (1992, November 12). Inaction Puts Environment Up The Creek. *The Ottawa Citizen*.

b) 1991



c) 1999



d) 2011

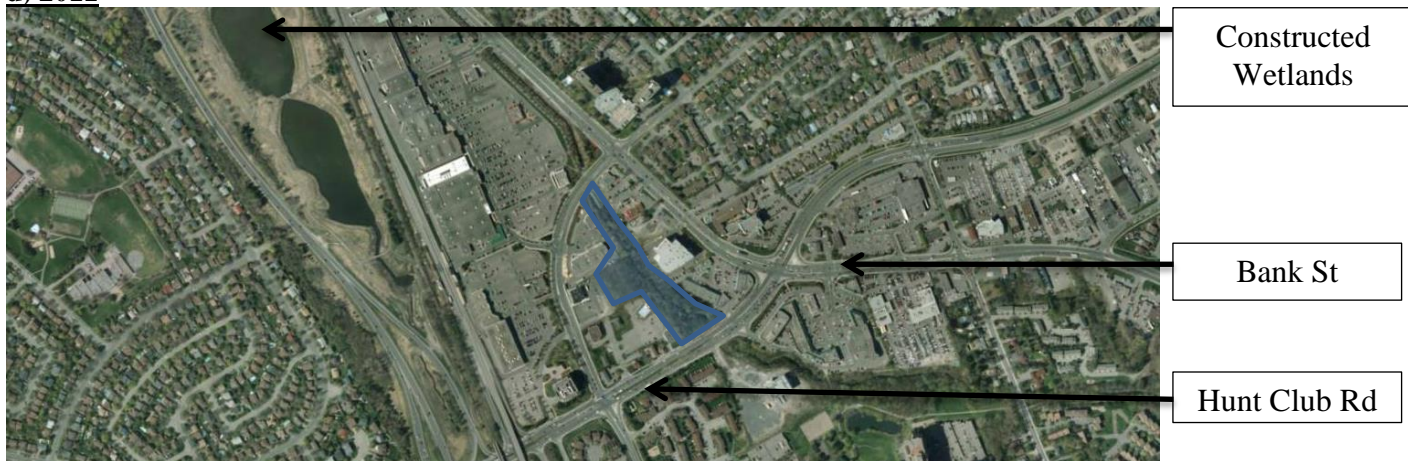


Figure 12 – Highlights the changes in land-use surrounding “North Sawmill Creek” from 1976 to 2011 [Source: GeoOttawa *Beta*, 2013]. As can be seen in the photos, there is a substantial reduction in Sawmill Creek’s buffer zone and a drastic increase in urbanization and intensification in the region over 35 years. These changes have undoubtedly influenced the degraded water quality conditions in recent years.

Get Involved:

Clean ups of “North Sawmill Creek” are organized twice a year and dates are posted on Ecology Ottawa’s website once dates have been arranged. Additionally, other localized cleanups occur along the stream and are posted online on various community associations and NGOs websites (e.g. Ottawa River Keeper, Heron Park Community Association). Moreover, every six years the City Stream Watch Program revisits one of the 25 subwatersheds within Ottawa’s municipal boundaries, providing an update report on the conditions of the watershed. In 2014, Sawmill Creek is due for an update report based on the City Stream Watch Program. The Rideau Valley Conservation Authority (RVCA) is a non-governmental agency which provides environmental consultations and recommendations with individual property owners, private corporations and local governments regarding infrastructural development and alterations. They coordinate with the city and volunteers in administering the City Stream watch updates, providing water quality tests, tree planting initiatives and other activities geared at revitalization and naturalization efforts anywhere within the Rideau watershed’s boundaries.

This particular strip of Sawmill Creek has been adopted by Hunt Club resident Christine Johnson through RVCA’s Adopt-a-Stream program. She has worked closely with Ecology Ottawa, the RVCA, the City of Ottawa, community organizations and other volunteers in promoting community awareness and attention to this previously neglected section of the stream, exemplifying the importance of local awareness, engagement and involvement. Although the vision for a permeable path network through the park was rejected, this has not deterred her overall motivation to ensure the protection of this natural wooded lot. Moreover, it highlights the discrepancies in the stream’s environmentally protected sections and places pressure on the involved stakeholders to resolve these issues by ensuring and maintaining the integrity of the stream.

Local activities and activism surrounding the protection of Sawmill Creek is just one of many grassroots based initiatives advocating the conservation of local green-spaces and protection of sensitive urban-environmental areas. Here, as elsewhere, local and regional resources are available to kick-start revitalization initiatives (RVCA, Ecology Ottawa, etc.). The RVCA and City of Ottawa’s Adopt-A-Stream and City Stream Watch initiatives apply to streams, creeks and rivers across the city and within the Rideau River watershed. If someone has not already done-so, you can adopt a stream in your neighbourhood and Ecology Ottawa and other NGOs are available to help you mobilize others in the process!

Summary

Sawmill Creek is just one example of many overlooked green spaces, which may be integral ecosystems across Ottawa. Sawmill Creek, like countless other watersheds, has been subject to substantial urban intensification and anthropogenic impacts in recent decades, which reduces the resiliency and adaptability of the system to further changes.

Human and environmental processes are intangibly interconnected and co-evolving. Human activities and behaviours not only impact hydrological and ecological processes (e.g. road salts, fertilizers, alterations), but are also shaped by and respond to changes in environmental processes and conditions. The wellbeing, sustainability and stability of society is inherently linked to the integrity of the surrounding environment. Environmental processes are multi-scalar phenomena occurring at local and transnational scales. Therefore, fostering local awareness, engagement and conservation is a fundamental initial step in catalyzing behavioural, social, political and environmental changes at greater scales. The history of Sawmill Creek attests that relatively small changes over time can have big effects, *for better* or *for worse*. As individuals and as a collective, our present and future is synonymous with the future of the surrounding environment and we each have the capacity to make our own small changes.



Resources

Ecology Ottawa. <http://ecologyottawa.ca/>

Ontario's Ministry of Natural Resources. The Tree Atlas.

http://www.mnr.gov.on.ca/en/Business/ClimateChange/2ColumnSubPage/STDPROD_085782.html?region=nativeSpecies

Rideau Valley Conservation Authority. <http://www.rvca.ca/>

Jillian Savage - Planning and Growth Management - City of Ottawa

Rebecca Aird – Environmental Steward – City of Ottawa

Local City of Ottawa Representative – Diane Deans

Glossary

ANSI: Area of Natural Scientific Interest. Official terminology used by the Ontario government for locations which contain particularly important physical processes, formations or other natural features which are deemed to be scientifically important.

Anthropogenic: Refers to the impact of human activity, infrastructure and presence on biophysical processes and the “natural” environment.

Eutrophication: Refers to the process in which increased nutrient levels in the water results in the excess production of algae and phytoplankton. The result of this excess production of aquatic vegetation can result in the significant depletion of dissolved oxygen content in the water and thus restricting the diversity of life which the stream can support. This process occurs naturally in certain ecosystems, but also occurs due to substantial addition of these nutrients into water systems through human activities and infrastructure (particularly nitrates and phosphates).

Fluvial Geomorphology: A sub-discipline in geomorphology which focusses on the role of streams, rivers and other flowing water in transforming the landscape through erosional and depositional processes.

Perennial Stream: A perennial stream is a stream which flows year-round, as opposed to intermittent or ephemeral streams, which only have water flowing during the wet-season of the year or after intense rainfall events, respectively. Thus, perennial streams often have a groundwater component which sustains flow during periods of less intense rainfall.

RVCA (Rideau Valley Conservation Authority): Created with Conservation Authorities Act of 1946 passed by the Ontario Government, work with public and private organizations and individuals in making recommendations, assessments and suggestions regarding development changes and ensuring effective conservation of surrounding environment and resources.

Riparian: The riparian zone is the critical transition zone between terrestrial and aquatic environments. It is an integral location for its conditions (e.g. slope and soil stability, naturalized or modified banks, etc.) impact the surrounding ecosystem; largely determining the terrestrial and aquatic biodiversity it supports. Thus, due to its importance it is often referred to as a “buffer” zone integral in mitigating the impacts of urbanization and human activity on the stream.

Stratigraphic: The term “stratigraphic” derives from a sub-discipline of geology known as “stratigraphy”, which examines and dates different layers and ages of rock in examining dynamic environmental events and processes occurring in the past.

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