



Conclusion

# Issues and Concerns in the Rideau Valley



**T**he Rideau River Watershed is a complex region with environmental conditions ranging from excellent to very poor. While broad trends clearly show that developed areas generally have poorer environmental health overall, even in the most intensely built-up areas we can find pockets of excellent natural health. And in the most remote corners of the watershed, we can still find the irrevocable impacts of human activity. Regardless of location, notable issues often come down to a particular lake, one concerning catchment or even a specific section of a creek.

Compared to other regions of the province, the Rideau River Watershed boasts fairly high water quality overall, adequate natural land cover and good ecological health and biodiversity. But as this report has repeatedly shown, there are many areas of concern. Broad issues include excessive nutrient levels in lakes and rivers, ongoing loss of wetlands and woodlands, and erosion and climate change impacting flows and aquatic habitats. These issues will require effective mitigation and restoration wherever possible to protect and restore good watershed health, and to encourage climate change resiliency.

## REGIONAL CHALLENGES

The Rideau Valley is commonly subdivided into three geographic sections: the Upper, Middle and Lower Watersheds. Each have their own distinctive geography, hydrology and physiography – and each face their own unique sets of pressures.

### Upper Watershed:

Beginning in the Rideau Valley's headwaters in South Frontenac, the Upper Watershed is a largely rural region that includes dozens of small towns and hamlets, agricultural lands and a popular lake district. In general, the Upper Watershed scores highest in the region for water quality, natural land cover, habitat diversity and hydrological function, thanks to the relatively high level and diversity of forests, wetlands and riparian areas that help regulate flows and filter contaminants.



**Loss of wetlands and headwater drainage features is altering or cutting off the natural flow and storage of water through the system.**

But the lack of a big city doesn't mean there aren't issues. Many lakes struggle with excessive nutrients such as total phosphorus, either from natural lake aging or from increasing developmental pressures along their shorelines. Increasing pressure from urban expansion and agricultural impacts are also leading to loss of natural land cover, which compounds existing water quality concerns as runoff is less likely to be controlled or filtered effectively. Loss of wetlands and headwater drainage features is also altering or cutting off the natural flow and storage of water through the system.

### Middle Rideau:

The Middle Rideau from Smiths Falls to Burritts Rapids is home to many wetlands, mid-sized rivers and other streams and tributaries flowing toward the main stem of the Rideau River. It features a high level of agriculture and is moderately developed with the growth of mid-size towns such as Smiths Falls, Kemptville and Perth. Water quality and natural land cover predictably suffer more around these developed and agricultural areas, and as a result the region's overall numbers tend to be poorer than the Upper Watershed.

### Lower Rideau:

The Lower Watershed is the most densely developed area of the Rideau Valley, encompassing large parts of the City of Ottawa and its surrounding suburbs. The waterways in this region are generally in poorer health, with higher levels of phosphorus, chlorides and metals present in the region's urban and suburban streams. Natural land cover is lower than the rest of the watershed – often below the guidelines for adequate hydrological and ecological function – and streams and rivers more frequently feature straightened and hardened shorelines. Forest cover is being further reduced due to expanding agriculture and urban development. Headwater drainage features, including wetlands, have historically been subject to widespread encroachment and loss, which has significantly altered the local hydrological cycle and water budget. In some areas, particularly in older developed areas, woodland and wetland cover has been critically reduced – and what's left is under extreme development pressure.

## AREAS OF CONCERN

### A Natural Hazards:

Several important natural watershed hazards exist within the RVCA's jurisdiction, including floodplains around rivers and streams, their adjacent wetlands, and the upper watershed lakes; recurring but irregular periods of low-water conditions; valleys and shorelines with unstable slopes including in the sensitive marine clay plain; select river and stream meander belts; and an abundance of organic soil. Karst and dynamic beaches are not considered major areas of concern in the Rideau River Watershed.

### Areas of Concern:

1. Unmapped and unprotected marine clay landslide hazard areas that contain dense settlement, and that potentially overlap with urban expansion areas;
2. Unmapped and unprotected valley lands and lake shorelines that are potentially unstable;
3. Select areas of unmapped and unprotected meander belt hazards;
4. Select areas of unmapped and unprotected flood hazards;
5. Lack of protection or regulation for some wetlands and poor protection for headwater streams, both of which form critical flood and erosion mitigation functions;
6. Lack of data and analysis on the potential climate change impacts related to all natural hazards.



### Mitigation Activities and Measures:

1. Investigate and map: Continue to investigate, map, and regulate all unstable slopes and meander belts, with priority to developed and developing areas.
2. Regulate: Bring all wetlands, organic soils and minor areas of karst under conservation authority protection to align with the *Conservation Authorities Act*.
3. Restore: Increase focus on wetland and stream restoration, particularly upstream from known flood and erosion hazard areas.
4. Educate: Provide consistent and accessible information and comments to the public, developers, and decision makers about watershed-specific natural hazards and the natural features that are important for the management of those natural hazards, in accordance with the *Conservation Authorities Act*.

### B Surface Water Hydrology:

Hydrological function depends on a free-flowing network of surface water and groundwater to manage flows and mitigate severe flood and drought events, which can have catastrophic impacts on nearby communities and the local ecosystem. As wetlands and natural land cover are increasingly developed, the ability of the landscape to store and remove water has been reduced, leading to more extreme flood events during periods of high runoff, increased average flow conveyance across the system and, as a result, more frequent and severe low water events during the driest months.

#### Areas of Concern:

1. Increasing low water conditions: Between 2011 and 2022, low water conditions were declared in 9 out of 10 years, compared to only one in 10 years in the previous decade. Climate data suggests we are simultaneously experiencing increasing temperatures in the region, which could compound low water frequency going forward.
2. Climate change impacts: While trends are still being analyzed, the prospect of increasing local temperatures, changes in precipitation rates and an increase in extreme storms could have dramatic impacts on communities already vulnerable to flooding or low water conditions.

#### Mitigation Activities and Measures:

1. Maps and models: Continuing to expand our hazard mapping efforts while embracing more robust hydrological modelling programs will help us better predict where floods and erosion are most likely to impact people and property.
2. Trend analysis: In the long term, tracking our local climate conditions, water levels and the frequency of flood and drought conditions can reveal trends that will help us develop and implement new strategies to continue to protect our watershed resources and the people who live here into the future.



**Climate change is also creating more extreme storms which require the system to cope with excess stormwater more frequently.**



### **C Surface Water Quality:**

Surface water quality across the Rideau Valley presents a mix of positive and negative trends. Conditions are often localized and directly correlate to activities nearby.

#### **Areas of Concern:**

1. Urban creeks and streams: Smaller streams and tributaries are particularly under stress in highly-developed or agriculturally dominated areas in the watershed. Some urban areas, in particular the Lower Rideau, Ottawa East and Ottawa West Subwatersheds within the City of Ottawa, are experiencing rising levels of chloride, excessive levels of total phosphorus and nitrates, and high levels of ammonia.
2. Upper Watershed lakes: Development pressures and loss of natural shoreline cover or buffer zones are contributing to increased runoff impacting nutrient levels and water clarity. This can amplify the effects of climate change leading to increased algae blooms, more aquatic vegetation and reduced clarity.

#### **Mitigation Activities and Measures:**

1. Runoff reduction: Promotion of at-home sustainable drainage solutions and low-impact development such as shoreline naturalization, rain gardens and rain barrels, grid paving and bioswales can help reduce the amount of chemicals, pollutants and nutrients entering local waterways during rain events and snowmelt.
2. Municipal partnerships: Data from our monitoring programs can help us identify priority catchments for targeted initiatives, including opportunities for low impact development, including stormwater management system retrofits and salt use management and reduction plans.

## Conclusion



**Cold water systems support sensitive fish species that cannot tolerate fluctuating water temperatures and oxygen levels.**

### **D Aquatic Habitat Conditions:**

Aquatic conditions such as in-stream habitat, thermal regime and the presence of sensitive fish and benthic invertebrates can tell us about overall aquatic conditions in a waterbody. Scores range from extremely poor to very good across the watershed, with several problematic areas identified.

#### **Areas of Concern:**

3. Municipal drains: Municipal drains are often highly channelized, fragmented from natural watercourses and lacking in habitat and natural shorelines. Some of the watershed's poorest aquatic habitat conditions scores were found in municipal drains such as Monahan Drain, Cyrville Drain and Arcand Drain.
4. Cold/Coolwater systems: Systems with cold and cool water thermal classifications are more sensitive than warm water systems. Cold water systems support sensitive fish species that cannot tolerate fluctuating water temperatures and oxygen levels. As climate change continues it is critical that we track and mitigate potential warming in these systems.

#### **Mitigation Activities and Measures:**

1. "Protection First" approach: Waterbodies with robust natural shorelines, good hydrological function and low levels of development or industry nearby have better environmental outcomes. Protecting existing natural areas in the watershed through stewardship, regulation, zoning or acquisition will keep the system intact while avoiding more costly restoration efforts at a later date.
2. Targeted restoration: Data from our monitoring programs can point us toward priority catchments for targeted initiatives. Where land and partnerships allow, the RVCA and its partners can restore highly-impacted areas to more ideal conditions through targeted shoreline naturalization, clean water projects, wetland restoration, reforestation and other stewardship activities.

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### **E Groundwater:**

Groundwater quantity is generally adequate across the watershed, but groundwater quality varies widely. Many of our groundwater aquifers are highly vulnerable to contamination thanks to natural conditions like karst limestone, exposed bedrock and thin soil cover which do not provide adequate filtration for common land use contaminants.

#### **Areas of concern:**

1. Highly Vulnerable Aquifers (HVAs): Aquifers underlying some parts of the watershed are highly vulnerable and at a heightened risk for contamination from septic systems, fires, agriculture (especially livestock activity), road salting and storage, and other human activities.
2. Monitoring gaps: Groundwater monitoring is currently inadequate across the watershed, especially where it is used for private drinking water supplies. In those areas, more information is needed about the levels of naturally occurring substances such as fluoride and barium, and contaminants such as nitrates and pathogens from septic systems. As our aquifers are vulnerable to contamination and can also at times provide naturally unsafe drinking water, this is particularly important.

#### **Mitigation Activities and Measures:**

1. HVA protection: Better protection for rural drinking water in vulnerable aquifers through fuller implementation of related provincial policy and guidance tools, and through the on-going implementation of Source Protection Plan policy about HVA education.
2. Robust monitoring: Advocating for and implementing more and better groundwater monitoring programs will be critical to understand how our drinking water reserves are affected by surface activities. This will require support from multiple levels of government as well as local partnerships to ensure lasting programs that deliver accurate and timely data.

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### F Woodland Cover:

Woodlands are under an increasing threat as agricultural land expansion and development pressures ramp up across the entire watershed. Overall woodland cover decreased in all subwatersheds between 2008 and 2020. In the past 15 years, there have also been decreases in average woodland patch size and amount of available interior woodland habitat.



### Areas of Concern:

1. Large patch sizes: Woodland patches greater than 100 hectares in size have decreased significantly since 2008, which not only impacts the wildlife and ecosystems that rely on them but can also have severe consequences for water quality, flood and drought control and erosion. Ottawa East does not meet the minimum guideline for at least one patch larger than 200 hectares, and Ottawa West only has one which puts it at risk of falling below the guideline.
2. Woodland interior habitat: None of the Rideau Valley's subwatersheds meet the Environment Canada threshold of 10% for woodland interior habitat, with Kemptville Creek coming closest at 6.8%. Ottawa West and Ottawa East each have less than 3%.

### Mitigation Activities and Measures:

1. "Protection First" approach: Protecting remaining large woodland patches – particularly those with interior habitat – can be achieved through landowner outreach, public education, provincial conservation land/forest tax incentive programs, municipal and private partnerships and through land donation to the RVCA's charitable foundation and land trust.
2. Reforestation: A continued focus on tree planting through private landowner partnerships will continue to create new woodlands and fill gaps in existing woodlands throughout the watershed. Efforts can also be made to identify corridor areas where woodlands can be established to promote wildlife connectivity/movement across the landscape.

## G Wetland Cover:

Wetlands provide critical habitat, water storage and climate mitigation services. But the Rideau Valley's most developed areas have lost 40% or more of their historic wetland cover, and wetland loss continues across the watershed.

### Areas of Concern:

1. Wetland loss has slowly taken place over many decades, leading to a pronounced lack of wetland cover in some subwatersheds. Despite this, remaining wetlands still face extreme developmental pressures and are at risk of being further lost, fragmented or damaged, which impairs their hydrologic and habitat functions.
2. Adjacent lands: The lands that extend 120 metres around a wetland are a functional extension of the wetland and are an essential part of the wetland hydrology. They are critically important for water storage and hydrological function, as well as water filtration. Three historically developed subwatersheds have seen losses of this kind of land cover since 2008: Kemptville Creek, Jock River and Lower Rideau.



### Mitigation Activities and Measures:

1. "Protection First" approach: Protecting remaining wetlands – particularly those in highly developed areas – can be achieved through increased enforcement of the regulations contained within the *Conservation Authorities Act*, as well as targeted land donation through the RVCA's charitable foundation and other land trusts in the watershed.
2. Restoration: Targeted efforts to restore and create functional wetlands in the most vulnerable areas of the watershed will help restore hydrological function and improve flood storage and habitat support in those regions. Efforts can also be made to identify new areas where wetland creation, enhancement and restoration projects may be possible.

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### H Riparian Land Cover:

The riparian zone remains largely intact across much of the Rideau Valley but has been heavily impacted in agricultural and urban areas. Overall, nearly a quarter of the land area included in riparian zones across the watershed has been displaced by human activities – and in some areas has almost entirely disappeared.

#### Areas of Concern:

1. Urban and rural streams and rivers: In the City of Ottawa and other rural areas within the Lower Rideau and Ottawa River Systems, there are a number of riparian zones that do not meet the guideline of 75% natural cover for 30 metres on either side. This can impact water quality, biological diversity and the potential for increased erosion and flooding, as stormwater runoff is not stored, slowed or filtered.
2. Bass, McKay and Otter Lakes: These lakes – one in the Rideau Lakes Subwatershed, one in the Middle Rideau Subwatershed and another in the Lower Rideau Subwatershed – have the lowest percentage of natural riparian cover of all lakes in the watershed. Coupled with the density of nearby development and smaller lots, this puts these lakes at an increased risk of poor water quality and fish and wildlife outcomes. Another 16 lakes in the Rideau Valley Watershed have less than the recommended 75% of natural shoreline cover.



**Overall, nearly a quarter of the land area included in riparian zones across the watershed has been displaced by human activities – and in some areas has almost entirely disappeared.**

#### Mitigation Activities and Measures:

1. “Protection First” approach: Regulating and protecting waterbodies with robust natural shorelines across the watershed will help the system remain intact while avoiding more costly restoration efforts at a later date.
2. Targeted restoration: Where land and partnerships allow, the RVCA and its partners can restore highly-impacted riparian areas to create more ideal conditions through targeted shoreline and riparian zone naturalization efforts.

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## NEXT STEPS

Staff will use the findings in this report to develop a comprehensive Watershed Management Strategy to implement targeted monitoring and on-the-ground conservation programs to address ongoing issues and specific areas of concern throughout the watershed.

While specific areas of concern must be identified and prioritized, it is clear that across the watershed – particularly in areas of intense or expanding development, industry or agriculture – we must continue to protect the natural land cover that exists while restoring degraded areas back to functioning green infrastructure. This is the single most important conservation task we can undertake to effectively and efficiently mitigate risks from natural hazards like flooding, drought and erosion, while safeguarding critical habitat and carbon sinks like wetlands and forests.

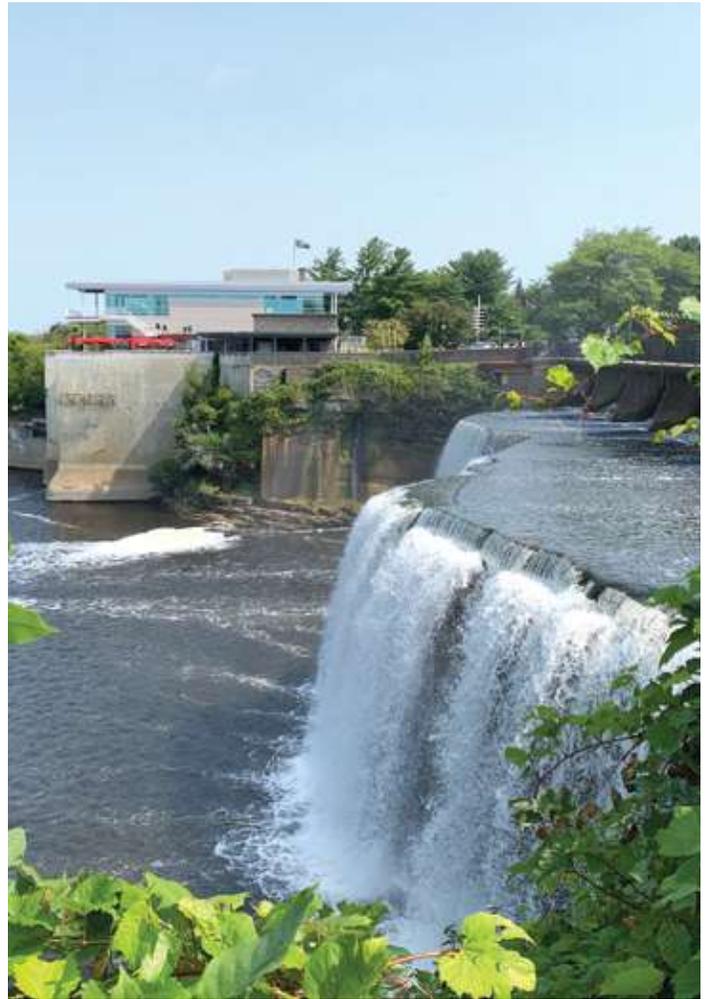


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Planning and regulations will continue to play a significant role in protecting our existing wetlands and watercourses from increasing development pressures. We must continue to direct development away from shorelines, floodplains, unstable slopes and wetlands to protect people and property while maintaining those hazard lands as natural buffers for the added benefit of water and air filtration, carbon sequestration and wildlife habitat.

In areas already degraded by nearby development, we must continue to implement large-scale tree planting, shoreline naturalization, wetland restoration and clean water projects. These protect the natural green infrastructure we already have, while restoring what has been lost.

Robust monitoring of both our land and water will help us further pinpoint precisely where the problems exist, and how to mitigate them. More monitoring is especially needed to expand our knowledge of groundwater quality and quantity concerns.



## CONCLUSION

The Rideau River Watershed is a vibrant and thriving watershed, a beloved home to more than 700,000 residents and millions of plants and animals. It is a place to live, work and play; a place to get outside, be industrious and raise families. Parts of the watershed remain in good health, and RVCA programs and services are actively working to improve areas that are suffering.

It is not perfect; the Lower Watershed in the City of Ottawa is particularly plagued by lack of natural land cover, hardened shorelines and hydrological disruptions – all of which lead to poorer water quality outcomes, erosion, flooding and reduced hydrological function.

But areas of the Upper and Middle watershed are also facing challenges as all of Eastern Ontario

strains under the increasing pressures of urban development and agricultural intensification.

Everything in this watershed is connected. Changes in one area of the watershed affect others. When wetlands or forests are lost, flooding and erosion impacts increase, water quality declines and wildlife is negatively impacted. When shorelines are cleared of their natural buffer, water temperatures rise, runoff increases and waterfront residents see a rise in harmful algal blooms, reductions in healthy fish communities and declining water quality levels.

The RVCA is committed to developing a comprehensive and robust water resources management strategy and associated policies, programs and projects to protect and restore the Rideau River Watershed for all who call it home.

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