

DOG AND CRANBERRY LAKE

STATE OF THE LAKES REPORT

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The Association also acknowledges the contribution by Holly Evans, Cataraqui Conservation. Throughout the process, Ms. Evans provided the Association with resources, guidance and advice. Her contribution is gratefully appreciated.

A note about syntax. In the interest of brevity, the phrase "Dog and Cranberry Lake" is used to refer to the two lakes instead of "Dog Lake and Cranberry Lake" as they function for all intents and purposes as one lake.

Preface

The Dog and Cranberry Lakes Association is an incorporated community organization comprising property owners on and others with a stake in the future of the two lakes. The purpose of the association is to promote stewardship of the two lakes and surrounding environment. At the 2022 Annual General Meeting, the membership voted in favour of a motion to commence a multi year project culminating in a lake stewardship plan. The Association is undertaking this project to provide long term direction to achieve the mission of the association.

The planning process has two distinct phases. The first is the preparation of a State of the Lakes Report, the second is the lake stewardship plan. The State of the Lakes Report is a compendium of all known information about the two lakes. As well it identifies, issues, information gaps and makes recommendations for the lake stewardship plan actions. The findings and recommendations in the state of the lakes report form the basis for a public consultation program to obtain input into the preparation of the lake stewardship plan.

The state of the lakes report was produced by Manuel Stevens, a Board member with extensive planning experience with the Rideau Canal, with input from a planning committee of DCLA members, the two municipalities and government agencies, especially the Cataraqui Region Conservation Authority.

1.0 Welcome to the State of the Lake Report

The State of the Lake Report provides a summary of the most current and relevant environmental and social information on Dog and Cranberry Lakes . This report is the first step towards preparing a Lake Stewardship Plan, which is an action-oriented document to guide

stewardship activities and land use policy for long-term protection, maintenance, and restoration of the lake environment.

The Lake stewardship planning process is a community-based approach, designed to present multiple opportunities for everyone with an interest in Dog and Cranberry Lake to provide their input, collaborate, and discuss issues pertaining to the lake. This approach involves community consultations, surveys and meetings, with participation from individual community members, representatives from community groups, non-government organizations, and various levels of government. All partners are invited to contribute expertise, data and information, and share in decision making and overall ownership and implementation of the plan.

During the Lake Planning Process, two key documents are produced: a Report on the State of Dog and Cranberry Lake; and the Dog and Cranberry Lake Stewardship Plan. The State of the Lake Report is a technical document summarizing the known information about the various environmental and social characteristics of the lake and its watershed. Its purpose is to provide and confirm key observations about various aspects of the lake in order to provide recommendations based on science and consensus; the recommendations are then considered by the community on and around Dog and Cranberry Lake, revised accordingly, and included in the Lake Stewardship Plan. As an added benefit, as the state of the lake report contains a wealth of information, it is a valuable resource for anyone interested in their characteristics and issues that will be addressed in the stewardship plan. Finally, the report is a living document, it will be updated yearly as more information becomes available, thus providing a solid information base for the Association to achieve its mission.

The stakeholders for both documents are defined as: anyone who works, lives, or plays on and adjacent to Dog and Cranberry Lakes; South Frontenac Township and the City of Kingston; local non-government organizations; and other relevant agencies, including the Cataraqui Region Conservation Authority, Ministry of Natural Resources and Forestry, Ministry of the Environment, Conservation and Parks and Parks Canada.

The purpose of the lake planning process is to:

- Identify and protect specific lake values both natural and social articulated by the community
- Promote community discussion, education and action by engaging diverse interests in the preparation of the plan
- Establish a future vision for the lakes so that we stay focused on tasks to be accomplished
- Set environmental and social targets
- Recommend stewardship actions to engage all stakeholders

- Recommend land use policy, bylaws and regulations
- Identify current and emerging issues and concerns

The Lake Stewardship Plan will be a long-term plan of action developed by the community and its partners to protect the health and special characteristics of the two lakes and surrounding shoreland environment. It is a voluntary, non-regulatory document that will:

- Identify the characteristics of the lakes valued by the community
- Present the values and issues from the stakeholders
- Set goals and objectives for their protection and for overall enhancement of the lake environment.
- Recommend land use policies that influence development around the lake
- Recommend stewardship and community education actions to better care for the lake; and
- Promote continued community discussion, education, action, and research

The State of the Lake Report and the Dog and Cranberry Lake Stewardship Plan are not government produced documents, nor is the implementation of the recommendations contained in it mandatory or legally binding. Instead, its actions and recommendations are voluntary and represent a consensus on the values to protect, issues to address, and actions to be implemented to ensure a healthy lake environment for future generations. The Township of South Frontenac, the City of Kingston and federal and provincial agencies have expressed support for this process and are regarded as partners to implement the relevant recommendations contained in the plan.

1.1 The Dog and Cranberry Lakes Association

The Dog and Cranberry Lake Association (DCLA) was incorporated in 2022 and has a membership of roughly 110 members.

The purposes of our association are:

The establishment and operation of a community association to promote the stewardship of Dog and Cranberry Lakes and the surrounding environment by:

- Creating a sense of community in which we can socialize and learn together;
- Engaging our members in environmental conservation initiatives;
- Promoting and carrying out research into issues connected with the water quality of these lake ecosystems; and

- Working in partnership with other organizations or individuals to link resources, events and opportunities to enhance sustainability.

The wider Dog and Cranberry Lake community consists of permanent and seasonal shoreline property owners, commercial operators, residents of the township and city and those who visit the lake for hunting, fishing, boating and nature appreciation activities and include transient boaters on the Rideau Canal as the navigation channel traverses Cranberry Lake. While most of these are not members, the Association regards them as valued stakeholders and does its best to make them aware of our mission.

The Association has an active program of membership engagement through an annual newsletter, tree sales, email notifications, special events and the annual general meeting and is a member of the Township Lakes Ecosystem Advisory Committee and the Lake Networking Group. A major objective of the Association is to increase membership to over 50% of the property owners.

2. Values and Issues

2.1 Introduction

While the lake stewardship plan is primarily focused on addressing environmental issues, it needs to be responsive to the values and issues identified by the lake community as well.

In the Summer of 2022, the DCLA conducted a survey of members and other stakeholders and a total of 35 individuals participated, with 22 of those individuals being members of the DCLA. Many respondents were permanent residents (70%) with the other respondents being seasonal residents (30%). Of the respondents, 83% were from Dog Lake and 17% were from Cranberry, with 55% being above the 21+ year mark. In reviewing survey results, many participants indicated that water quality, protection of wildlife, reduced development and respect for the environment were a top priority in their hopes for the future of the lakes.

Participants identified the special characteristics of the two lakes that they valued. These include the variety of natural shorelands, access to the Rideau Canal, wildlife sighting opportunities, undeveloped islands, scenic beauty and generally good swimming conditions. When asked to identify what they valued the most, water clarity, presence of wildlife and birds, peace and tranquility and properly maintained septic systems ranked highest. Participants stated that aquatic plants, fishing tournaments, algae blooms and invasive species were most likely to affect their enjoyment and character of the lakes.

Finally, participants offered a number of additional comments and observations that reinforced the general view that the natural character of the lakes need enhanced protection. Specifically, respondents felt that there needs to be more community involvement in the Association, no net loss of environmental values with new development, better control over agricultural runoff and septic system inspections.

The following provides a more detailed description of the values, hopes for the future, issues, and potential actions that were identified by individuals that responded to the lake survey. The order of these issues and actions does not indicate priorities, and the list does not reflect a consensus among community members on the issues and actions. Instead, it provides a list of the matters that the community would like to have considered in the preparation of the State of the Lake Report and the Lake Stewardship Plan. The planning committee will consider these comments and ideas together with the observations made in this State of the Lake Report when developing the Lake Plan. A follow up survey will be conducted next year in association with the release of the draft lake stewardship plan in order to ensure that the Association's priorities align with the values and issues as identified by the community.

2.2 Values to be considered

Values are the natural, social, physical, and economic elements that are important to our enjoyment and connection with Dog & Cranberry Lake. These values are linked to the reasons why people live, work, and play in the watershed. The key values that were identified from the survey results include:

1. Presence of Wildlife & Birds
2. Peace & Tranquility
3. Water Clarity
4. Natural Shorelands
5. Properly Maintained Septic Systems
6. Swimming
7. Canoeing & Kayaking
8. Sense of Community
9. Power Boating
10. Limited Night Lighting

This result is similar to surveys conducted by the Association in the past.

2.3 Hopes for the Future

The survey asked respondents to tell us what they hoped for the future of our lakes. The key hopes that were identified were as follows:

1. Improved water quality, less algae blooms
2. Protection of the natural state of the lakes and surrounding shorelands
3. Public awareness of wildlife habitats and spring nesting requirements
4. Healthy fish population
5. Fewer large homes and better control over development.
6. Find ways to of dealing with eurasian milfoil

2.4 Issues and actions to be considered

The following issues and actions were identified by individuals that participated in the survey. The Lake Planning Committee will consider these when confirming the recommended actions in the Lake Plan.

Issues identified by respondents

The questionnaire sought to determine what activities and conditions affected the enjoyment and character of the lakes.

The predominant issue is water quality and algae blooms. Aquatic plants, particularly eurasian milfoil was felt to have a significant impact on the use and enjoyment of the lakes. The presence of Invasive species was felt to have a moderate impact. Speed/noise of power boats, amount of boat traffic and fishing tournaments were felt to have a significant to moderate impact among a majority of respondents. A majority of respondents felt that waterfront development has a significant to moderate impact while a substantial number feel that it has little impact.

Actions to be considered in the Lake Stewardship Plan

The respondents had numerous suggestions for addressing the issues, along with other recommendations. These are summarized as follows:

1. More control over development in order to protect the natural and scenic character of the lakes
2. Municipal leadership to preserve the natural environment and prevent vegetation removal
3. Better co-ordination between the Township of South Frontenac and the city of Kingston

4. Reduce nutrient inputs from farms and septic systems
5. More community involvement through the Dog and Cranberry Lakes Association in decisions about the future of the lakes
6. Inventory and protect wildlife habitat and fish spawning areas
7. Ban big fishing tournaments
8. Limit the number of fishing tournaments
9. Mandatory septic system inspections.
10. Limit the number of new houses

3.Characteristics of Dog and Cranberry Lakes

3.1 Location

Dog & Cranberry Lakes are located approximately 30 km northeast of the City of Kingston and form part of the Rideau Canal National Historic Site, a heritage waterway connecting Kingston and Ottawa. All of Dog Lake and the western side of Cranberry Lake are within the former Township of Storrington which now forms part of the Township of South Frontenac. The east side of Cranberry Lake is within the former Township of Pittsburgh, now within the City of Kingston (**Map XXX**). The boundary between the two municipalities follows the navigation channel of the Rideau Canal.

3.2 Cataraqui Watershed Characteristics

Dog & Cranberry Lakes are part of the Cataraqui River watershed, and are situated in the lower reaches of the Cataraqui River. The Cataraqui River is the largest watershed within the Cataraqui Region Conservation Authority (CRCA), and generally flows in a southwesterly direction emptying into Lake Ontario at Kingston. The Cataraqui River Watershed consists of a drainage area of approximately (**ha, km²**), with an approximate length of (**km**). The primary feature of the watershed is the numerous lakes many of which form part of the Rideau Canal system from Newboro to Lake Ontario. Furthermore, the area of the Cataraqui Watershed occupied by Dog and Cranberry Lake falls within a UNESCO designated area of high biodiversity and unique ecological features.

As well there are a number of lakes that feed into the system, most notably Devil and Loughborough Lakes. Both Dog and Cranberry Lakes have a high to very high watershed position meaning that there are a large number of lakes further upstream. More upstream lakes means more influence from natural conditions and human activities. Cranberry Lake has 119 upstream lakes while Dog Lake has 22.

Approximately **XX** of the watershed is forested, of which **xx** is forest interior, **xx** of the stream-side cover areas is forested. Protection of forest habitats and healthy aquatic environments are supported by forest cover between 30% and 50%. The northern half of both lakes are within the Frontenac Arch, underlain by pre-Cambrian bedrock while the southern portion is within the Napanee Limestone Plain, an area of Ordovician limestone

3.3 Lake Characteristics

3.3.1 Dog Lake

Dog Lake is a distinct body of water west of Cranberry Lake. It is separated from Cranberry Lake by a long and narrow peninsula that terminates at a wide channel called the Fiddlers Elbow that joins the two lakes. Dog Lake receives water from Loughborough Lake via Milburn Creek, a few small streams and from Cranesnest Lake located at the northern corner of the lake. The outlet of Dog Lake is through the Fiddlers Elbow. In reality Dog and Cranberry Lake form one large body of water with some common characteristics.

The lake has two distinct basins. The northern basin is generally deep and largely retains its original configuration prior to the construction of the Rideau Canal. The ancient glacial origin of Dog Lake can be seen in its deepest sections where the glacier carved out a deep basin to a depth of 50 metres. The southern portion, roughly from the northern entrance to the Long Reach is almost entirely “drowned land” and is thus quite shallow with an average depth of 5 metres, except for a deeper trough near the middle. The northern basin is classified as a cold water environment, the southern basin is classified as warm. The northern basin is classified as mesotrophic while the southern basin is eutrophic. Section 9.4 of this report describes trophic status of the lakes.

Although not apparent to many as it is far removed from the navigation channel, Dog Lake is part of the Rideau Canal National Historic Site, the bed of which is federal crown land administered by Parks Canada. Water levels are maintained within a range of 0.5-meters in the winter and late spring, and 1.5-meters during the early spring and late summer due to changes in evaporation rates, precipitation variability, and other climatic factors.

Dog Lake is located on the Frontenac Arch with an underlying geology of granite and sandstone. The west side of the north basin is generally steep with a number of towering cliffs north of Knapp Island. The east side and much of the south basin is generally flat with some agricultural land amongst the rocky outcrops. Overall it is heavily wooded imparting a natural character to much of the shoreland. There are a number of small islands scattered throughout the lake, most of which are undeveloped.

Dog Lake has a considerable amount of residential waterfront development widely distributed around the lake, (330 developed residential waterfront lots) with the exception of those shorelands that are too steep and rugged or adjacent to very shallow wetlands. The two concentrations of intensive development are the west side of the Long Reach and the Maple Hill subdivision located along the south east side of the south basin. Elsewhere scattered development is located along a number of cottage lanes on the west side generally south of Knapp Island and along the east side of the north basin with access from Carrying Place Road. The northwest shore of the north basin, north of Knapp Island is virtually undeveloped as are large sections of the south basin. Scattered active and abandoned farmland is located along the east side of the north basin and along the south shore of the south basin.

Public access to Dog Lake is at the "Shipyards" boat launch near the municipal day use and beach at Gilmour Point. There are two places offering accommodation to the public: Burnt Hills Resort at the north end of the lake and Serenity Bay on the east side of the lake.

3.3.2 Cranberry Lake

Cranberry Lake is a long rather narrow warm polymictic (too shallow to develop thermal stratification) lake located east of Dog Lake. Hydrologically, it forms a portion of a very large body of water consisting of Whitefish Lake, Little Cranberry Lake both upstream, Cranberry Lake and Dog Lake between Jones Falls and Upper Brewers Lockstations. The Brass Point Bridge is recognized as the northern end of the lake and it extends southward to a distinct basin south of the narrow channel at Melody Lodge a distance of **xxx** km. The Fiddlers Elbow, a wide shallow channel west of the south basin of the lake, provides access to Dog Lake. Little Cranberry Lake forms the major source of incoming water, with only a small amount entering the lake from Dog Lake and Leo Lake. The outlet of the lake is at the Round Tail, where the Cataraqui River forms a wide channel leading southward to Upper Brewers Lockstation. Cranberry Lake is uniformly shallow and warm. The portion of the lake generally north of Beaupre Island is mesotrophic, while the southern portion is eutrophic.

An interesting feature of Cranberry Lake is the former pre canal original Cranberry Lake north of Beaupre Island and the original course of the Cataraqui River meandering from the Round Tail to the narrows at Melody Lodge and beyond to Dog Lake. Both are deeper than the surrounding drowned lands and are visible on the bathymetric map. **(Figure xx)**

The navigation channel of the Rideau Canal runs from Brass Point Bridge, east of Beaupre Island and then to the Round Tail and along the Cataraqui River to the basin above the locks. The most prominent feature of the lake is Beaupre Island in the centre of the lake. This 95 ha.

island is located in the middle of the north basin. The lake has a number of small islands in both basins, 4 of which have modest seasonal cottages.

Much of the land surrounding the south basin exhibits a low relief while the north basin has varied topography. Steep cliffs are situated north west of Beupre Island and also along the east shore north of the Round Tail. Most of the shoreland is heavily wooded, imparting a natural character to much of the lake. There are four areas of active agricultural land use: a farm in a bay on the west side opposite Beupre Island, a large field north east of Beupre Island and east of Big Island, a field adjacent to the trailer park at Brass Point Bridge and another on the opposite shore.

Most of the shoreland is privately owned with the exception of the Van Neil Woodland, a 23 acre property on the east side of the lake near the entrance to the Fiddlers Elbow owned by the Rideau Waterway Land Trust, along with the following federal crown lands being Beupre Island and adjacent Sister Islands group, the west side of the channel leading to Upper Brewers Lockstation, and a strip of land on Cranberry Lake south of the Round Tail. The ownership of the three islands in the south basin is unclear and may very well be federal crown land.

Within the Township of South Frontenac there are 89 waterfront residential lots. In the City of Kingston there are 17 waterfront residential lots. The southern basin is virtually undeveloped with the exception of two properties in the southeast corner and a cottage adjacent to the Van Neil Woodland. In the north basin most of the residential development is along the west shore with a concentration south and north of Melody Lodge, a large lot condominium development in what is referred to as Cranberry Cove, and a scattering along the west shore extending to the agricultural field adjacent to Knapps Brass Point Camping. On the east side, a group of residential properties along Leo Lake Road is located along a deep bay east of the northern tip of Beupre Island and on the east side of the channel leading to Upper Brewers Lockstation. Knapps Brass Point Camping, Summerland Rideau and Melody Lodge are the three trailer parks on the lake. Upper Brewers Lockstation is a popular day use area and provides a boat launch, docking for transient boaters and washrooms.

The very low and scattered nature of shoreland development, interesting views and vistas, the presence of numerous islands, the varied topography, wetlands, woodlands and active agricultural operations combine to create an overall environment with very high scenic quality.

3.4 Cataraqui Region Conservation Authority Lake Reporting Dashboard

The Cataraqui Region Conservation Authority has created an online lake reporting dashboard that provides access to lake specific information and resources to learn about the character of the lakes, their level of vulnerability to various types of impacts and what can be done to mitigate cumulative impacts that compromise lake health. The information found on the 13 tabs will help to answer two key questions about the lakes: What is the lake like? and How impacted or vulnerable is the lake? This is accomplished by considering both the character of the lake and it's watershed or catchment area, as well as the current level of impact. An aggregate score (rank) provides an overview of the condition of each lake parameter.

Interpreting final score:

- A lower score means the parameter(s) are stable or moving to support a state that is desirable.
- A higher score means the parameter(s) are changing to support a state that may be less desirable; more lake ecosystem stressors are present and further investigation is needed.
- The final score is an average of all contributing parameters that have been rounded up to the nearest whole.

Each lake is unique. However, understanding more about the characteristics of the lake itself, its place within the watershed, as well as human influences provide insights about what conditions can be expected and whether lake health could be at risk. This summary is to characterize and identify vulnerabilities for the lake. It is an educational resource that presents relative rankings based on a combination of provincially applied watershed report card thresholds (i.e., wetland and forest cover) and scientific principles (e.g., more upstream lakes increase the likelihood for higher levels of pollution). The lake reporting results are provided below along with a discussion. It should be noted that the rankings/score is subject to change over time and interpretation.

3.4.1 Lake Reporting Results for Dog Lake

Dog Lake North

	Rank	Class
Watershed Position	3	High
Flushing Rate	1	Low
Water Control	2	Moderate
Thermal Class	2	Moderate
Forest Cover	0	Very Low
Wetland Cover	0	Very Low
Surrounding Development	4	Very High
Invasive Species Exposure	3	High
Harmful Algae Blooms	4	Very High
TP Trend	1	Low
Final Score	2	Moderate

Dog Lake South

	Rank	Class
Watershed Position	3	High
Flushing Rate	1	Low
Water Control	2	Moderate
Thermal Class	1	Low

Forest Cover	0	Very Low
Wetland Cover	0	Very Low
Surrounding Development	4	Very High
Invasive Species Exposure	3	High
Harmful Algae Blooms	4	Very High
TP Trend	1	Low
Final Score	2	Moderate

Discussion

The parameters for both the south and north basin indicates that the lake is generally healthy although there are some concerns regarding water quality, invasive species and development. The TP trend of 1 does not appear to match with a very high score for harmful algae blooms so a modification of this parameter may be in order upon a review of water quality data. The low score of 0 for forest and wetland cover reflects the amount of woodland and generally good state of the wetlands around the lake.

3.4.2 Lake Reporting results for Cranberry Lake

Cranberry Lake		
	Rank	Class
Watershed Position	4	Very High
Flushing Rate	0	Very Low
Water Control	4	Very High
Thermal Class	1	Low
Forest Cover	0	Very Low

Wetland Cover	0	Very Low
Surrounding Development	3	High
Invasive Species Exposure	2	Moderate
Harmful Algae Blooms	2	Moderate
TP Trend	1	Low
Final Score	2	Moderate

Discussion

The very high score for watershed position and water control reflects the lake's location at the lower end of the Rideau Canal and that water levels are controlled. This is not necessarily a negative factor. Although the score for surrounding development is high, this is mitigated by the extensive amount of undeveloped shoreland, especially in the southern basin of the lake. The low score of 0 for forest and wetland cover reflects the amount of woodland and generally good state of the wetlands around the lake. The score for algae blooms and invasive species exposure accurately summarizes the situation for these two parameters. However, the low TP trend may have to be revised as there is a marked difference between the south and north basins of the lake. A further breakdown of the lake into north and south basin may be in order to more accurately report on the lake reporting parameters for Cranberry lake.

3.5 PHYSICAL CHARACTERISTICS OF DOG & CRANBERRY LAKE

Physical Characteristics	Dog Lake Measured Value	Cranberry Lake Measured Value
Latitude	44°429	44°438
Longitude	76°334	76°307
Surface Area (km ²)	964 HA	650 HA
Shoreline Perimeter (km)	59 KM	14.3 KM
Average Depth (M)	5.79 M	2.60 M

Max Depth (M)	50 M	5.50 M
Assigned Depth (M)	33.68 M	6.65M
Littoral Zone Area (%)		
Total Lake Volume (m3)	55.4 x 10 ⁶	96.4 x 10 ⁶
Total inlets	2	2
Total outlets	1	1
Water Level Fluctuation (m)	.5 M	.5 M
Flushing Rates (Times per year)		
Response Time (Months) (Time required for complete flush)	.61 years	.03 years
pH		8.0

3.6 Landscape Character

As part of its decision to include the Rideau Canal onto the World Heritage List, UNESCO’s World Heritage Committee recommended that, *“following the completion of the study of the visual setting of the canal, consideration is given to strengthening its visual protection outside the buffer zone , in order to ensure the visual values of the setting are protected alongside environmental values.”*

Visual values are the sum total of what we perceive in a landscape, in essence what is the character of the landscape. In Europe, many landscapes are highly valued for their aesthetic, historic or natural characteristics. Think of the Cotswolds and the Lake District in England or the Swiss Alps and Burgundy in Europe. These are iconic places, highly valued as cultural sites and tourism destinations.

The Rideau Canal possesses a distinctive character as well. The Rideau Canal is a 200 km. corridor that is characterized by a variety of lockstations, urban and agricultural landscapes, heritage districts, wetlands, woodlands, and scenic shorelands which collectively create the Canal’s unique and distinctive heritage environment. It is an iconic Canadian landscape.

In response to the World Heritage Site recommendation, Parks Canada produced the *“Rideau Corridor Landscape Strategy* which was a large scale landscape character assessment of the Rideau Corridor, to identify key features and values along the waterway, in order to support

more effective planning and management of the landscape. The following excerpt describes the concept of landscape character.

Landscape character may be defined as the distinctive and recognizable pattern of elements in the landscape that give a locality its 'sense of place'. It is not the intention of a landscape character assessment to define what is better or worse, but rather to identify and classify the attributes using both mapped data and objective analytical tools together with subjective perceptions of the landscape as viewed by resident and visitors. Through the landscape character assessment the landscape types are better understood and the important values are recorded in a manner that enables more thoughtful strategies for conservation and management. By considering the landscapes of the Rideau Corridor today, how they came to be and how they may change in the future, the Landscape Character Assessment will help ensure that future development is respectful of the valued views and landscapes that make up the Corridor and consider ways to protect and even improve or enhance them.

Specifically, the Landscape Character Assessment serves to: act as an information resource for multiple stakeholders, ranging from all levels of government to property owners and businesses; promote better understanding of the significance of the Rideau Corridor; and, recommend planning and management strategies that will help conserve the unique character of the Rideau Corridor and assist in building sustainable communities. - Rideau Corridor Landscape Strategy

The following excerpt from “An Approach to Landscape Character Assessment” by Natural England further defines landscape character assessment and the benefits.

Our landscapes vary because of, amongst other variables, their underlying geology, soils, topography, land cover, hydrology, historic and cultural development, and climatic considerations. The combination of characteristics arising from these physical and socio economic influences, and their often complex interrelationships, makes one landscape different from another. Landscape character may be defined as a distinct and recognisable pattern of elements, or characteristics, in the landscape that make one landscape different from another, rather than better or worse.

Landscape Character Assessment (LCA) is the process of identifying and describing variation in the character of the landscape. It seeks to identify and explain the unique combination of elements and features (characteristics) that make landscapes distinctive

This process results in the production of a Landscape Character Assessment. As the European Landscape Convention acknowledges, “the landscape is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of outstanding beauty as well as everyday areas.” . All landscapes matter to someone. By setting down a robust, auditable and transparent, baseline Landscape Character Assessment can not only help us to understand our landscapes, it can also

assist in informing judgements and decisions concerning the management of change. The involvement of people in the process of LCA is key. Both communities of place and communities of interest must be engaged in LCA.

Landscape Character Assessment can be used to inform: policy development; local, neighbourhood, community or parish plans, and place-making; green infrastructure plans and strategies; waterways strategies; design briefs; project design and masterplanning; landscape impact and visual impact assessments (often as part of an Environmental Impact Assessment); sensitivity and capacity studies; landscape designations including National Park and Area of Outstanding Natural Beauty designation etc.

Benefits of Landscape Character Assessment include, it can:

- 1. establish a robust evidence base linked to place;*
- 2. provide baseline evidence at the appropriate scale to inform a range of decisions;*
- 3. present a holistic approach to the whole geographic area, rather than focusing on special or protected sites or features;*
- 4. form an agreed spatial framework of landscape character areas, or types, to which different policy options / applications and decisions can be applied;*
- 5. integrate socio-cultural and natural considerations (for example landscape and ecosystem services) and provide an understanding of how a place is experienced, perceived and valued by people; and*
- 6. identify the key characteristics that together create a sense of place and the unique character of an area.*

Dog and Cranberry Lake together possess a variety of landscapes that create a distinctive sense of place and contribute to the heritage character of the Rideau Canal. A landscape character assessment would be able to identify the distinctive landscapes of the two lakes along with recommendations to protect their characteristics.

Parks Canada will continue to provide leadership in protecting the values of the world heritage site as stated in the management plan:

The multi-jurisdictional representatives of the Rideau Corridor Landscape Strategy continue their collaborative working relationship through semi-annual meetings of the Steering Committee and Planners Technical Advisory Group to identify and protect the values of the World Heritage site, its buffer zone and setting, through further analysis, recording, and public consultation, and appropriate federal, provincial and municipal legislative, regulatory and educational tools.

3.7.1 Algonquin Land Claim Agreement

In 2016, the Algonquins of Ontario, the federal and provincial governments ratified an agreement in principle to settle a land claim to 36,000 sq. km. in Eastern Ontario. The land claim includes Dog and Cranberry Lakes.

Under the Agreement-in-Principle:

- land will not be expropriated from private owners
- no one will lose existing access to their cottages or private property
- no one will lose access to navigable waterways
- no new First Nation reserves will be created as part of the treaty
- approximately 4% of the Crown land in the claim area is proposed for transfer
- the vast majority of the Crown land base will remain open to all existing uses
- after transfer, Algonquin lands will be subject to municipal jurisdiction, including the same land use planning and development approvals and authorities as other private lands
- land transfers will:
 - restore historically significant sites to the Algonquins
 - contribute to the social and cultural objectives of Algonquin communities
 - provide a foundation for economic development for the region

<https://www.ontario.ca/page/algonquin-land-claim>

3.8 Recommendations for Lake Plan Actions

- Encourage and participate with Parks Canada to undertake a landscape character assessment as it will contribute to our stewardship mandate, contribute to the protection of the visual values of the Rideau Canal and serve as a model for other similar studies along the Canal.

- Encourage the Township of South Frontenac and the City of Kingston to incorporate the results of the landscape character assessment into their Official Plans along with supportive policies.
- Publicly support the objectives of the world heritage site as it pertains to protecting the visual values of the Canal shorelands.

4. National and International Designations

Dog and Cranberry Lakes form part of the Rideau Canal and Frontenac Arch Biosphere Reserve, with four designations. Understanding and preserving the values associated with these designations presents both challenges and opportunities for the Association, shoreland residents and all levels of government. These designations should be regarded as positive, as a way through which the Association can contribute to the goals of these designations through the lake stewardship plan.

4.1 Rideau Canal National Historic Site

The Rideau Canal was designated a national historic site in 1925. It was redesignated in 1967 and again in 2011. The following is the 2011 wording:

The Rideau Canal was concluded to be of national significance because:

- *Built between 1826 and 1832, it is the best preserved canal from the great canal-building era in North America that is still fully operational: its historic structures and environment speak to its ingenious design, construction, and military purpose, as well as to its social and economic functions.*
- *It exemplifies cutting edge canal design due to Lieutenant-Colonel John By's innovative slackwater approach, which created a navigable route from natural waterways and lakes on a scale previously unseen in North America, and because it was one of the first canals in the world engineered specifically for steam-powered vessels.*
- *Its construction through more than 200 kilometres of what was characterized as bush, swamps, and lakes was a monumental feat. Each year, as many as 5,000 to 6,000 workmen assembled at over two dozen worksites. The great majority of the labourers were Irish and French Canadian, toiling under the supervision of contractors and the Royal Engineers. Working primarily with hand tools and in extremely difficult and dangerous conditions, these labourers and skilled craftsmen, such as Scottish stonemasons, endured disease and injury, with large numbers dying during the canal's construction.*
- *In the aftermath of the War of 1812, when relations with the United States were tense, it was built to serve as a military canal and represented a fundamental component of Britain's*

defences in the interior of North America, safeguarding the supply lines between Montréal and Lake Ontario by providing an alternative and more defensible route to that along the St. Lawrence River.

- *It contributed significantly to the social and economic development of Upper Canada/Ontario prior to 1850, when it was a key artery for the movement of goods and people in and out of the colony. After that time, it continued to be of local commercial importance until the 1930s; since then it has served as a popular recreational route.*

Source: Rideau Canal Management Plan

The Canal consists of federal crown lands under the administration of the Parks Canada Agency consisting of the lockstations and associated lands, a number of islands and the bed of the Canal up to the controlled high water mark. The Rideau Canal is managed as a national historic site and recreational waterway under a variety of Acts and Historic Canal regulations. The Rideau Canal Management Plan sets strategic direction for the management and operation of the Rideau Canal National Historic Site by articulating a vision, key strategies and objectives.

The following excerpts from the management plan are relevant to the mission of the Dog and Cranberry Lakes Association and the Lake Stewardship Plan.

Vision Statement

The freshwater ecosystems of the Rideau Canal and the broader watersheds are connected, healthy and resilient in the face of invasive species and climate change, and waterfront and tourism development is managed in a way that minimizes its impacts. Through ongoing cooperation and collaboration as stewards of these lands, Parks Canada and its partners, communities and residents value, conserve and protect the special cultural and natural heritage resources and scenic character of the canal corridor's waters and lands.

Objective 1.2 The terrestrial and freshwater ecosystem of the Rideau Canal is better understood, conserved and protected.

Targets

- *Biodiversity is protected by developing and implementing a species at risk site action plan by 2025.*
- *Over the next ten years, Parks Canada continues to support the work of academic institutions, such as those undertaking Natural Sciences and Engineering Research Council of Canada research projects and programs.*

- *Visual assessment of all shorelines along the entire waterway is completed within the next five years to inform shoreline and in-water permitting, planning and environmental management*

Objective 1.4 Relationships with partners and stakeholders are developed and strengthened to manage the Rideau Canal in a coordinated and collaborative way.

Targets

- *The multi-jurisdictional representatives of the Rideau Corridor Landscape Strategy continue their collaborative working relationship through semi-annual meetings of the Steering Committee and Planners Technical Advisory Group to identify and protect the values of the World Heritage site, its buffer zone and setting, through further analysis, recording, and public consultation, and appropriate federal, provincial and municipal legislative, regulatory and educational tools.*
- *By 2023, an inter-governmental consultative body is established to more effectively manage areas of overlapping federal, provincial and municipal jurisdiction on the Rideau Canal.*
- *By 2023, a community consultation group is established to more effectively engage and collaborate with partners, stakeholders, organizations and associations with shared interests along the Rideau Canal.*

Objective 3.1 Administrative tools are modernized to comprehensively and effectively address the complexities of an operational canal.

Targets

- *An analysis of gaps in the current statutory, regulatory and policy framework is completed, and needed improvements within the Agency's control are identified by 2024.*
- *Compliance and enforcement capabilities are improved by establishing by 2023 in-house law enforcement capacity and through enhancing partnerships with other law enforcement agencies with jurisdiction.*
- *A review of in-water and shoreline works policies is completed by 2025, and changes that strengthen the protection of cultural and natural resources are implemented by 2026.*

Objective 3.4 Water management decisions are made using a system-wide approach based on high quality, systematic, regularized data collection.

Targets

- *The water monitoring network continues to be modernized through the on-going exploration and development of new tools and methodologies, such as hydrological modelling, and their integration into decision making is reviewed on an annual basis.*
- *A formal communications protocol for communicating Parks Canada water management information to the public and stakeholders is in place by 2024.*

4.2 Rideau Canal World Heritage Site

The following excerpt is from the Rideau Canal Management Plan.

In 2007, the Rideau Canal National Historic Site, along with Fort Henry National Historic Site and the Kingston Fortifications National Historic Site in Kingston, was inscribed as Canada's 14th and Ontario's first World Heritage site. It is considered of outstanding universal value by UNESCO for being the best-preserved slackwater canal in North America, and the only one dating from the great North American 19th century canal-building era that still operates along its original route with most of its original structures intact. It is also recognized as a significant example of a canal used for military purposes associated with a significant stage in human history – that of the fight to control the north of the American continent.

When it inscribed the historic sites on the World Heritage List, the World Heritage Committee addressed requirements for protection and management by recognizing a 30-metre buffer zone surrounding the inscribed property. While not part of the site itself, the buffer zone provides the site with an added layer of protection. On the Rideau Canal, the buffer zone extends 30 metres inland from the shoreline of the waterway, and corresponds with the 30-metre minimum development setback from water stipulated in the zoning by-laws of all 13 municipalities along the canal.

- *The multi-jurisdictional representatives of the Rideau Corridor Landscape Strategy continue their collaborative working relationship through semi-annual meetings of the Steering Committee and Planners Technical Advisory Group to identify and protect the values of the World Heritage site, its buffer zone and setting, through further analysis, recording, and public consultation, and appropriate federal, provincial and municipal legislative, regulatory and educational tools.*

Parks Canada has had some success in influencing the development of Official Plan policies to implement the intent of the designation requirement for protection of the visual values of the Canal. The draft Official Plan for the Township of South Frontenac contains a section committing the Township to protect the visual character of the shoreland through appropriate land use and development policies.

4.3 Rideau Canal Canadian Heritage River

In 2000, the Rideau Canal, Tay Canal and the Rideau River in Ottawa was designated as the Rideau Waterway Canadian Heritage River for its human heritage and recreational values. These values include elements of the national historic site, its historic setting, the wide range of water-based recreational activities, and water quality suitable for recreation.

4.4 Frontenac Arch Biosphere Reserve

Dog and Cranberry Lake and surrounding subwatershed lie completely within the boundaries of the Frontenac Arch Biosphere Reserve (FABR) (Map #). The intersection of the Frontenac Arch and the St. Lawrence River Valley forms one of the greatest transition zones of the continent. The Frontenac Arch is a distinctive granite ridge connecting the Adirondack Mountains in the United States to the Canadian Shield. The FABR is an area encompassing over 2,700 square kilometers of significant natural and ecological features. The FABR received designation as an UNESCO World Biosphere Reserve in 2002 as an acknowledgment of the unique environmental, historical and cultural values of the region. The Frontenac Arch Biosphere Reserve contains five forest regions and has been described as one of the most bio-diverse regions in Canada due to the unique and rare habitat it provides for numerous plant, fish, bird and animal species classified as 'Species at Risk' (FABN, 2011). The topography of the FABR consists of steep, rocky slopes and ridges, typical of the Canadian Shield in alternation with dense mixed and coniferous forest systems, numerous inland lakes and watercourses, as well as wetland valleys. Additionally, the Frontenac Arch serves as a funnel for movement and dispersal of wildlife including wide ranging mammals.

The UNESCO Biosphere Reserves were initially established in response to environmental concerns. Environmental concerns specific to the Frontenac Arch Biosphere Reserve include loss of habitat and significant wetlands; competition for Species at Risk due to exotic and invasive species; climate change related impacts; and industrial point source and non-point source pollution in the St. Lawrence River.

The Frontenac Arch Biosphere Reserve operates as a not-for-profit and non-regulatory network, called the Frontenac Arch Biosphere Network (FABN). This network includes partnership between more than 80 regional organizations, including representatives from key sectors such as tourism, business, conservation, agriculture, historic preservation, scientific research and education. Although the FABN does not have authority over land or water use within the reserve, it does complement local and regional initiatives. The FABN focuses on reconnecting a fragmented landscape into a regional network of governance in order to ensure sustainability efforts take a more inter-connected approach as a top priority (FABN, 2011).

4.5 Recommendations for Lake Plan Actions

- Establish and maintain an ongoing relationship with Parks Canada and the Frontenac Arch Biosphere Reserve to identify means through which the Association can contribute to the achievement of the conservation and education goals of the world heritage site and the biosphere reserve. Specifically the attainment of Objective 1.2 of the Rideau Canal Management Plan and the participation in a community consultation group to provide public input.

5. History of Dog and Cranberry Lakes

5.1 Natural & Human History

Twenty-thousand years ago, during the last period of continental glaciation, this area was under 1.5 km of ice with the overall landscape depressed by 175 metres. By 14,000 years ago, the glaciers were in retreat as the earth's climate warmed up. About 13,000 years ago, this area was underwater as part of Lake Iroquois, an enlargement of Lake Ontario due to glaciers blocking the St. Lawrence outlet. By 12,000 years ago this area was starting to appear as it does now, with the land rebounding (isostatic rebound) with the weight of the glaciers removed.

It is unknown exactly when humans first appeared in this area, but archaeological evidence in the area of Lower Rideau Lake points to at least 10,000 years ago. The initial post-glacial climate would have been sub-arctic, with the largest game animal being caribou. As the climate warmed up, caribou were replaced by moose and then by white-tailed deer, which became a favourite of indigenous hunters. Lakes such as Dog (only the deep basin portion existed in that era) and Loughborough were good fishing grounds. Marshy areas, such as the Cranberry Marsh, supported various plants, including lily roots, cattail roots, and wild rice, all harvested by indigenous peoples.

A few thousand years ago, the indigenous tribal groups that we know today were starting to form. These were distinguished by different cultural practices and linguistics. Some remained as hunter-gatherers, some started to do agriculture. Trade was occurring between groups with the Rideau route (Ottawa to Gananoque) one of the main canoe travel routes.

Travel was by foot on established trails and by canoe. Initially water travel was by dugout canoe and then about 3,000 years ago, the birch bark canoe was invented, allowing for much easier and extensive water travel. In the pre-canal era, there was no direct water connection between the Rideau/Gananoque watershed and the Cataraqui watershed. The area now occupied by Cranberry, Little Cranberry and Whitefish lakes was mostly a flood plain, above water in the

summer. The indigenous travel route from Lake Ontario to the Rideau Lakes was up the Cataraqui River, then more a meandering creek, to its headwaters in Loughborough Lake and then to Hart Lake and from there into Opinicon Lake. Surveyor Lewis Grant described the route in 1795 as “Half a day’s journey from Kingston to the Gananoque [Opinicon Lake] in canoes – a great number of rapids and Carrying Places on this Creek.”

5.2 First Nations Occupation of the Rideau and Cataraqui watersheds

There were three main groups that made use of the Dog and Cranberry lakes area, the Mississauga, the Algonquin and the Haudenosaunee (aka Iroquois). It is a very complicated story since land usage overlapped and changed over time.

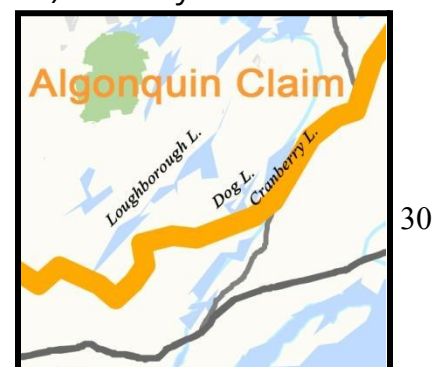
The Algonquin lived on the Upper Ottawa River and traditionally made use of this area as hunting and gathering grounds, establishing hunting and fishing camps and then taking the bounty from that back to their communities on the upper Ottawa.

The Haudenosaunee (aka Iroquois) was a confederacy made up of several groups, a commonality is that they were practising agriculture and lived in houses (generally family/clan groupings in a longhouse). The group in this region were the Mohawk. They were involved in trade, moving through this region. There were conflicts with other groups, often Algonquin since their land usage overlapped.

In the late 1600s, the Ojibwa (Mississauga) came into this area from the north, settling along the northern shores of Lake Ontario (formerly Iroquois/Mohawk).

Jumping to 1783, the Governor of Québec (which then included today’s Ontario and Québec), Frederick Haldimand, was looking for additional land to settle United Empire Loyalists. He tasked Captain William Redford Crawford with negotiating with indigenous groups for the use of the land. In October 1783, the area of Cranberry and Dog lakes became part of the “Crawford Purchases.” The original documents have been lost, but one purchase, from the Mississauga, was for land between Brockville and the Bay of Quinte, extending inland “as far as a man can travel in a day.” This is generally assumed to be about 50 km, putting Dog and Cranberry lakes (~25 km north of Lake Ontario) well within the area of this purchase. Crawford also made a purchase from the Onondaga for the central and northern part of the Rideau

There were two problems with this. One is that these were purchases not treaties and the other is that the Algonquins were left out. This was likely just an oversight, the southern area was believed to be Mississauga territory and prior to that Iroquois (Mohawk) territory. The actual Crawford purchase agreements have been lost and when treaty



settlements started in earnest, the Algonquins argued that it was their traditional land.

Presently the area of Dog and Cranberry lakes is under an Algonquin land claim, a large area in Ontario covering 36,000 square kilometres. In 2016, an agreement in principal was reached between the Algonquin and the Province of Ontario. Final negotiations are ongoing.

5.3 The Construction of the Rideau Canal

Today it is difficult to imagine Dog and Cranberry Lakes as anything other than two large placid lakes. But 218 years ago in 1805, these lakes did not exist as we know them today. Instead, picture a narrow creek not more than 15 metres wide connecting the rapids at what would soon become Brewers Mills to Dog Lake, then only the northern basin. Cranberry Lake was then a small lake north of Beupre Island and formed part of a vast wetland stretching from the narrows at Melody Lodge to the Whitefish River south of Jones Falls a distance of 14 km. Beupre Island was perhaps twice as large as it is today and the islands nearby not much more than a few rocky outcrops in a sea of waving bullrushes and cranberry bushes. This marsh was not passable by canoe except in the spring. Native people followed the Cataraqui Creek to what is now the southern basin of Dog Lake, and then Millburn Creek to Loughborough Lake and finally a creek to Lake Opinicon. The original Cataraqui watershed consisted of Loughborough and Dog Lakes, the Cataraqui River and a few tributaries. The lakes north of Jones Falls were once part of the Gananoque watershed. With the construction of the Canal, this drainage system was disrupted and the water diverted southwards into the Cataraqui watershed. The Cataraqui watershed as we know it today is largely as a result of the construction of the Rideau Canal.

The Rideau Canal is a direct result of the tensions that persisted for a long time between Great Britain and the United States. It had its origins in the American Revolution or War of Independence, depending on where you live. Although the Treaty of Paris in 1783 ended hostilities, it did not establish a lasting peace between the two countries. Rising tensions culminated in the War of 1812 and the invasion and occupation of Upper Canada by American forces. The war exposed the vulnerability of the military supply lines along the St. Lawrence River to enemy attack. A more secure route was needed far from the St. Lawrence River to ensure that the military installation at Kingston would not be cut off in the event of another conflict. A military canal along the Ottawa River and then along the Rideau and Cataraqui Rivers appeared to be the most logical route.

The main proponent of the Canal was the Duke of Wellington, the hero of the Peninsular campaign in Spain against Napoleon and afterwards twice Prime Minister. The Duke's Profile, a rock outcrop with an uncanny resemblance to a human head, and the Court of the Duke located

on the east side of the channel near the Round Tail were so named in honour of his role in championing the construction of the Rideau Canal.

In 1816 and then in 1823 two detailed surveys of a possible route were conducted. These provide sufficient information on the route and work required to construct a canal linking the two watersheds. It should be remembered that this was not to be a canal in the traditional manner of canal building in Great Britain. There, canals were narrow excavations across the landscape along with sections making use of existing rivers. The locks were narrow and long with towpaths to pull the canal boats along with horses. In contrast, the Rideau Canal was a radical new design, that being a “slackwater canal”, since Colonel By saw the use of steamboats which didn’t require a towpath. This type of canal design took advantage of natural watercourses, lakes, marshes and topography to avoid and minimize excavation. To implement this design, Colonel By had to build higher and longer dams to inundate marshes and drown out rapids. This resulted in a series of impoundments along the entire length of the Canal with very little excavated canal, the most notable in downtown Ottawa and the isthmus at Newboro.

The best example of a “slackwater” impoundment is the massive lake between Upper Brewers Lockstation and Jones Falls Lockstation that includes Dog and Cranberry Lakes that was once a vast marsh with only two small natural lakes. This impoundment had its origins as a huge mill pond created by the construction of a mill and dam at Whitefish Falls near present day Morton in 1805. This inundated much of the Cranberry marsh, but once the miller realized that he was losing water southwards, he built a dam at the Round Tail at the outlet of Cranberry Lake.

In 1816, Royal Engineer Joshua Jebb, who surveyed the Rideau Route that year, noted that the Round Tail dam raised the water by 6 feet (1.8 m). That dam, in conjunction with the original Morton mill dam, started to flood the area and made the area between Jones Falls and Upper Brewers navigable by canoe. It became known in that era as the Drowned Lands.

When civilian surveyor Samuel Clowes surveyed this area in 1823-24, he proposed that the two mill dams (Morton & Round Tail) be left to maintain the impoundment, since it would be far less expensive than doing a canal cut from Upper Brewers to Jones Falls. This is a slackwater technique. It had been previously used by British engineers on the Göta Canal in Sweden (1810-1832) and Colonel By, as a royal engineer, was well familiar with this technique, applying it to the entire Rideau system.

5.3 The Upper Brewers Lockstation and Brewers Mills

In order to provide adequate depth for navigation through the Cranberry Marsh, Colonel By decided to build a higher and longer dam than was originally planned. Subsequently, after more

detailed surveys, two locks with a total lift of 5.3 m were constructed at Brewers Mills, along with a weir dam that raised the water level by 5.5 metres, a 500 metre canal cut leading to a basin above the locks and two earth embankments on both sides of the locks.

The mill dam at the Round Tail was used as a coffer dam during construction and was never removed, a bypass channel was excavated in order to keep the dam intact. It was flooded by the completion of the canal dam at Upper Brewers. While the rise at Upper Brewers is about 5.5 metres, the overall level of Dog and Cranberry lakes has been raised by about 5.2 m (17 ft) due to the topographic difference in channel depth.

In 1838, after the Rebellion in Upper Canada, the British military, concerned about vulnerability of the Canal to American attack, started to build a series of defensible lockmasters houses or block houses at the lockstations. At Upper Brewers Lockstation the small one story stone house was built in 1844 on the knoll with a commanding view of the locks and its surroundings. It was occupied by Canal staff until 1968. In 2008 it was leased to a private individual as a summer residence.

A prerequisite of settlement was the saw and grist mill. These were felt to be so important to the settlement of the region that the Crown built a saw and grist mill at Cataraqi Falls now Kingston Mills in 1784. As the land along the Furnace Falls Road (Highway 15) became occupied in the years thereafter, John Brewer was granted the right to build mills at two sets of rapids on the Cataraqi River north of Kingston in 1819. At Upper Brewers, he built a saw and grist mill soon thereafter. These two mills served the growing population for a number of years.

The chronological sequence at Upper Brewers is a bit unclear. Colonel By hired John Brewer to be the contractor for this section and initially had him clearing a channel through the Cranberry Marsh. He also bought the mills from Brewer, with the original intent to remove them due to the initial placement of the two locks, which were to be in the main channel. A bywash was to be constructed to the west. But at some point, By flipped his plans, to a canal dam in the main channel, just upstream of Brewer's mill dam, and his locks in the excavated bywash cut. The two locks were initially planned to be placed at the head of the cut, but were later moved to the bottom, the configuration we see today. This left the mills intact, although it's unclear if they were in use during canal construction.

With the canal completed, the community started to grow. In 1834 there were about a dozen houses. By 1835, there was both a grist mill and a sawmill operated by James Mathewson, perhaps the original mills. But by 1845 things were not going well and due to non-payment of rent, the Ordnance Department took over possession of the mills, now mostly in ruin.

Fortunes rose in 1851 when William Anglin and his partner Normal Fox who built a large sawmill. The community at that time was becoming a sizeable settlement, with a general store, post office, saw mill, and was an established centre for boat-building. A cheese factory was established in 1890 at the same time as the sawmill was closed. A large house that later operated as a hotel was built nearby and a grist mill was built on the site of the present day powerhouse in the 1890's. In 1939 these two buildings were burned down to make way for the hydro generating station, built by the Gananoque Light and Power Company. The hydroelectric plant is now operated by Portage Power.

On the west side of the Upper Brewers' basin, hidden behind cedar trees is a large houseboat (now a private residence) known as "The Ark." The original name for this houseboat was the "Wenona" and it was owned by Otto Rohr of Rochester, N.Y. It was towed to this location sometime between 1900 and 1915 (it shows up in a 1915 photo of Upper Brewers). It has not been occupied for a number of years and is slowly rotting away.

The Upper Brewers Lockstation saw few changes for well over a century. The only changes were the wooden swing bridge over the lower lock, a lockmasters office in the current parking lot and a canalman's house further south of the locks both built in the 1930s. The modernization drive of the 1970s severely compromised much of the historic character of the site. The wooden swing bridge was removed and replaced by a high level bridge further south, and a new lock office was built into the embankment on the east side of the locks replacing the frame lock office. Despite these modifications, the site retains a unique charming character, owing largely to the combination of the locks, topography, vegetation and views towards the river and beyond.

5.4 Settlement and development of the Dog and Cranberry Lakes Area

The most striking aspect of the settlement of the area is the time span over which it occurred. East of Cranberry Lake in Pittsburgh Township settlement commenced soon after 1810 whereas around Dog Lake in Storrington Township it occurred about 30 years later. The reason for this is manifold. Pittsburgh Township, because it was located along what was referred to as "The St. Lawrence Front", was surveyed in 1788. This allowed settlement to proceed, for without a survey, land could not be granted by the Crown. Soon thereafter, in 1798 a road was established into the backcountry from Kingston to Furnace Falls, now Lyndhurst, by a group of speculators behind the establishment of the Lansdowne Iron Works, the first iron furnace (foundry) in Ontario. This road allowed settlers to occupy the lands adjacent to the road and then spread further east along the concession roads. This road is now Highway 15. Finally, the land east of the Cataraqui River was generally more productive and level in contrast to the Canadian Shield landscape west of Dog Lake.

Throughout the region, the landscape is dominated by the prevailing geology that dramatically influenced the settlement history. In general, the landscape becomes noticeably more rugged northwards and is characterized by heavily wooded ridges, steep terrain, and rock outcrops along with irregular shaped fields often appearing to be quite productive. This is quite evident along Highway 15 where the large fields south of Joyceville give way to the heavily wooded ridges and productive agricultural land in the form of scattered fields.

Settlement in the area west of Dog Lake in Storrington Township generally commenced in the 1840s and it was not until the 1850s that the more remote parts of the township were opened up for settlement. While generally unsuited to the staple-grain economy of the early nineteenth century, pockets of clay lands were able to sustain small-scale livestock operations with the switch to dairy-farming in the late-19th century. This form of agriculture persisted into the mid-20th century but, as the cheese factories upon which they depended closed, their market disappeared and the dairy era came to an end. A few converted to beef cattle operations or else were abandoned altogether.

This transition is represented in the surviving farm buildings, all of which appear to be late-19th to early 20th century, consisting of the ubiquitous raised dairy barns that are either vacant or accommodate beef cattle. Most of the farm-houses are large wood-frame structures and are generally in poor condition reflecting the lack of income or need to maintain them.

Exploitation of the forest resources, especially white pine, resulted in the construction of a saw mill at Battersea in 1816. The town was established in 1840 and by the 1880's it was a thriving backcountry village with mills, a store, church, school, cheese factory and a number of houses. As the mills closed in the 20th century as well as the cheese factory in the 1960's, Battersea declined and gradually assumed a rundown appearance. In recent years, Battersea like many other small villages has become a retirement centre as young families have generally gravitated to Kingston and elsewhere.

Sunbury had its origins in the 1850s as a small cross-roads village at the intersection of the Battersea and Washburn Roads. A post office was established there in 1864, it was chosen as the seat of township government in 1868, and it soon attracted a church, Orange Hall, blacksmith shop, and school. The village provided the surrounding community with services well into the 20th century but most of those functions have now disappeared, except for two stores, and a fire-hall. A few 19th century houses still exist and the original form and function of the rural crossroads village is still evident. This fine stone church south of the crossroads has been converted into a residence as has been a school east of the village. Nearby two small stone houses represent the prosperity of the wheat era in Ontario in the decades after initial settlement.

Despite the challenges posed by the topography, and isolation, the presence of pockets of reasonably good arable land led to the development of a subsistence rural economy based on dairy and mixed farming. After the period of initial settlement in the 1840s and 1850s, the dairy economy shaped the landscape of much of the region. Cheese factories, often owned by a co-operative of farmers, were able to convert the raw milk into cheese that could be stored without refrigeration. The distinctive raised dairy barns made their appearance as well as frame and brick farmhouses most built after 1870. These farmsteads are still visible everywhere around Dog and Cranberry Lake. The small scale dairy industry largely disappeared by the 1960's owing to health regulations and production costs. Vestiges of this agricultural landscape are still very much evident in the form of abandoned dairy barns and fields especially along Burnt Hills Road, Carrying Place Road. On areas with high quality soils, such as along Sunbury Road and Milburn Road, the iconic dairy barn has been replaced by very large dairy barns and silos with vast fields. In many instances the original farmhouses have survived.

The development of the waterfront recreational landscape is generally associated with the improvements to the road system in the period after World War I. By the 1920s a section of the Furnace Falls Road was incorporated into the provincial highway system as Highway 15 and subsequently upgraded with a concrete surface. A remnant of this road is still visible adjacent to the cemetery north of the intersection of Highway 15 and County Road 34.

Local county roads were also upgraded to render them passable to motor vehicles. A modest influx of tourists then took place. Melody Lodge on Cranberry Lake was the first full service lodge and likely established in the mid 1920s. The lodge had a boathouse at the basin at Upper Brewers Lockstation so that their clients would not have to make the long journey across the Brass Point Bridge and along Carrying Place Road that would have been no more than a rough trail. A number of cottages were built at the same time. The most prominent is the cottage on Beaupre Island built in 1923-24. Another early cottage from the same period is located on the west shore north of Melody Lodge.

On Dog Lake, the development of cottage properties was much slower owing to poor road access. Generally it occurred about 20 years later after the war and accelerated in the 1950's. On both lakes the spread of summer home development has been gradual and tied to the improvements in the road network and proximity to these roads. On Dog Lake during the 1950's and 1960's a number of cottage lanes were established thereby providing access to shorelands that were previously inaccessible. A pattern of small seasonal cottages on small lots thus developed that persists to this day especially along the Long Reach on Dog Lake and lanes such as Hideway Lane. In recent years as the township required larger lots and greater setbacks from the shore, the development pattern has become more dispersed. This is evident in the new development called Pine Point along the north shore of Fiddlers Elbow.

5.5 Places of historic interest around Dog and Cranberry Lakes

St. Barnaby Roman Catholic Church and associated buildings

A church and a substantial rectory were built in 1872 and that same year a plan of subdivision for a substantial village was registered, but it was never developed. Today, St. Barnaby Church, together with its burial ground, rectory, parish hall, convent and school complemented by a large number of old trees, constitutes one of the most attractive and historically significant cultural landscapes in the area. The cemetery is the resting place for many of the Irish settlers who came to the backwoods of Pittsburgh Township in the 1840's.

Brass Point Bridge

Situated at the narrows between Cranberry and Little Cranberry lakes, this long wooden bridge with a swing span to allow for boat traffic along the Rideau Canal was originally constructed in 1887. Replaced a number of times over the last 150 years, it is a rare surviving example of wooden swing bridge along the Rideau Canal, many of which have been replaced by high level concrete spans.

Cottage on Beupre Island

As noted earlier, Beupré Island is the centerpiece of Cranberry Lake. The island was occupied by a farmstead possibly as early as the 1840's as much of the island was suitable for agriculture. Over half of the island was under cultivation by 1925 as the following aerial photo taken in that year shows.



By the late 19th century, a new owner of the island proceeded to cut all the white pine which was floated to the sawmill at Brewers Mills. When that owner died in 1919, his estate sold the island to a Mrs. Rathburn from Montreal.

The cottage at the southern end of the island was built in 1923-4 in the arts and craft bungalow style that was popular in many urban areas at the time. The cottage along with the outhouse, storage building and maid's cabin is a rare surviving example of a complex of buildings from the early years of cottaging on the Rideau Canal. A farmstead consisting of a dairy barn, house and outbuildings located at the middle of the island was built at the same time. It supplied milk to the cheese factory at Brewers Mills for several years, but gradually declined as its island location made it impractical to continue.

The island was acquired by Parks Canada in 1978 in order to preserve it primarily as a habitat for the eastern grey snake or black rat snake. Parks Canada neglected the buildings on the island until 2007 when it granted a lease of the cottage and associated outbuildings to a private party for use as a seasonal residence. The cottage has been conserved and is a landmark on the lake. Watson reports in Watson's Paddling Guide to the Rideau Canal that the restored cottage received the 2015 Peter John Stokes Award for heritage preservation.

Melody Lodge

Melody Lodge is located southwest of Beaupré Island on the western shore of Cranberry Lake and close to the VanNiel Woodlands (see below). It has offered cottage, camping, fishing, boating and marina services for many years. The main lodge, which remains largely intact, was built in the 1920s and reflects the style of that period. The establishment of the lodge corresponds with the establishment of the provincial highway system in the post-World War I era and the paving of Highway 15, which provided access to Kingston and Highway 2 and the railway connections at Kingston to the east and west.

Fishing Camp on the Long Reach

At the northern end of the Long Reach on Dog Lake on a long narrow island is the site of a group of frame buildings possibly dating from the pre war period. It appears to be largely intact and authentic and thereby may be a rare surviving example of this type of recreational settlement. More information is needed to assess its historical significance.

Other Places of Historic Interest

There are a number of small seasonal cottages scattered around the two lakes that date from the pre world war two period. While some may have sufficient integrity and authenticity to qualify as heritage structures, a comprehensive survey of such places needs to take place in order to assess their heritage value.

Carrying Place Road

Carrying Place Road runs from Burnt Hills Road along the length of the peninsula between Cranberry Lake and Dog Lake. It is named for the portage route that existed between Cranberry Marsh and Dog Lake. The route was at the narrowest point between the two bodies of water (just southwest of the current Serenity Bay Resort at 4187 Carrying Place Road) and would run in the current configuration of the lakes from a small bay on Cranberry Lake located due west of the southern tip of Beaupré Island across the road to Dog Lake. The cottage owned by the late Pat and John Beers on Dog Lake (which has since been sold a couple of times but remains in place) was the site of the carrying place and was so named.

5.6 Recommendations for Lake Plan Actions

- Encourage the Township of South Frontenac Municipal Heritage Committee and the City of Kingston Heritage Planning staff with assistance from the Association to undertake an inventory and assessment of buildings and other cultural heritage resources that may have potential for municipal designation under the Ontario Heritage Act.

- Encourage owners of buildings of historic interest to conserve the heritage values of their property through stewardship and/or official designation under the Ontario Heritage Act.
- Through the Dog and Cranberry Lakes Association website and other means, raise awareness of the unique heritage values of the Rideau Canal as a national historic site and world heritage site.

6. Climate, Climate Change and Lake Impacts

6.1 Description of Local Climate

The broad climatic region of the area can be described as a cool, humid climate, moderated in part by Lake Ontario. This moderating affect is not likely significantly strong due to the distance from the shores of Lake Ontario. Climatic data for this part of southern Ontario are summarized in Table 5.1.

INSERT TABLE 5.1 HERE

Canadian climate normals data (1981-2010) for the nearby (<10 km) Meteorological Service of Canada Hartington IHD Station (44°25', 76°41') are presented in Figure 5.1 and Table 5.2. This climate station lies at approximately the same latitude as Dog and Cranberry Lakes and no major topographical features lie between the station and the two lakes therefore climate data should serve as representative.

Table 5.1 – Climatic Data of the Region

INSERT TEMPERATURE AND PRECIPITATION GRAPH

INSERT TABLE 5.2 TEMPERATURE NORMALS BAR CHART

6.2 Climate Change

Global warming has been occurring and will continue to occur and understanding the local impacts on the Dog and Cranberry Lake area, environment, wildlife, and water characteristics is crucial to the development of future actions.

As the average temperature of Dog and Cranberry Lake is expected to increase by 1 °C, several municipalities, in conjunction with the provincial government, have begun to develop climate change adaptation strategies for their respective watersheds.. Climate change adaptation strategies involve the assessment and evaluation of the risk of climate change impacts on a particular watershed, estimation of future scenarios and vulnerability, development of risk reducing adaptation measures, and implementation of adaptive measures. Dog and Cranberry Lake may benefit from reviewing adaptation strategies developed for other watersheds and implementation of adaptive measures that have proven successful in other regions.

Climate change has been predicted to exert numerous impacts including contribution to more frequent severe weather events, higher intensity rainfall, and more frequent and prolonged drought and more ice- free days. Additionally, changes in climate are predicted to affect the distribution of flows in surface watercourses including reduced flow and levels in streams, rivers, lakes and groundwater. Furthermore, climate change will likely result in an increase of 30 ice-free days on the lakes by 2050. Dog Lake will likely experience increased periods of thermal stratification in the summer months and its thermocline may also deepen. (A reduction in wetland and marsh habitat is also predicted to occur as a result of climate change, which is of particular importance to Dog and Cranberry Lake due to the numerous wetlands within the area.

Since 1948, the average annual temperature in Ontario has increased by as much as 1.4°C, as reported by Natural Resources Canada. The warming trend is predicted to persist, with most significant increases in temperature occurring within the winter months. It has been proposed that within Ontario higher air temperatures have the potential of leading to overall reductions in lake volume, warmer surface waters, longer ice-free periods, increased growing seasons, and greater risks of hypoxia (Dove et al., 2011), which is a deficiency of oxygen in the water. Additionally, climate change may alter spring freshet timing, affect groundwater dynamics, and modify stream flow patterns.

<https://www.google.com/url?q=https://theconversation.com/what-climate-change-means-for-southern-ontario-and-quebec-166920&sa=D&source=docs&ust=1676228251664933&usg=AOvVaw1aMjc0LmAWD-W0fl4iSDnA>

6.3 Impact of Climate Change

Climate change and associated warming temperatures and erratic weather patterns are predicted to exert changes on the environment, wildlife, human populations, and water characteristics.

Species ranges are shifting, and trophic dynamics are being altered as a result of climate change. Some of these changes are likely to occur in and around Dog and Cranberry Lake. Some changes are evident today, for example, the abundance of black-legged ticks. Increases in water temperature have the potential to influence the demographics of fish species

populations which will favour increases in warmwater fish species (e.g., bass, sunfish) abundances. Increases in pathogens are predicted to coincide with water temperature increases affecting human health. Global warming is also expected to contribute to reduced water quality and increased water treatment costs, an additional impact on human health.

Increased temperatures as well as reduced flows from the surrounding subwatershed are predicted by climate change modeling and may cause a reduction in the flushing rate of Dog and Cranberry Lake. A reduction in flushing rate may cause an increase in nutrient levels within the lake that in combination with increased air and water temperatures may lead to more weed and algal growth. Finally, more windy days will result in more wave action that will disturb sediments, increase shoreline erosion and reduce ice cover.

Reduced flow as well as an overall lowering of water levels would likely impact boating and fishing activities on Dog and Cranberry Lake. Lowering of water levels would expose additional shoals creating navigation and docking issues and will also affect water access to some waterfront properties by creating shallow areas. Some properties are already experiencing this issue when the water is drawn down in the fall. Climate change will exacerbate the challenge faced by water managers trying to accommodate various interests. The increased frequency of extremes from climate change will increase the likelihood of conflicts among these interests.

Shorter winter ice periods would affect winter recreational activities including ice fishing and snowmobiling. At the lake level, as changes in climate occur, continued and increased monitoring of environmental characteristics such as water quality, fisheries status, and wildlife abundance and diversity will become ever more important to identify threats to the natural environment prior to significant disturbances. Local stewardship actions such as reducing nutrient inputs, preserving and restoring riparian vegetation, inspecting and upgrading septic systems, and reducing overall impact on the natural environment may help to buffer against impacts associated with climate change.

Collectively and collaboratively, the Dog and Cranberry Lake community may be able to reduce the negative impacts associated with climate change through responsible land use practices, local stewardship actions, continued and increased monitoring of environmental characteristics and education of the community.

6.4 Recommendations for Lake Plan Actions

- Encourage local stewardship actions (such as reducing nutrient inputs, preserving and restoring riparian vegetation and natural watershed functions, maintaining and upgrading septic systems) to help buffer against impacts associated with climate change.

- Promote farming best management practices within the entire subwatershed to reduce erosion and contaminated runoff entering lakes.
- Promote stormwater best management practices within urban and rural areas.
- Promote the maintenance of, and where needed, rehabilitation of natural wetlands and increasing forest cover and preserving and restoring headwater areas to increase water conservation and storage within the subwatershed.

7.0 GEOLOGY AND SOILS

The geological setting and rock type underlying and surrounding a lake are very important in determining the chemical character of a lake, as groundwater quality is highly influenced by both the type of rocks and soil permeability within the lake's catchment area.

Generally, shield lakes located entirely on the Precambrian Shield are sensitive to acid rain, possess less ability to adjust to pH changes, and are often low in calcium limiting the ability for fish and other organisms to flourish. Lakes located entirely on carbonaceous rocks, such as limestone and calcite, generally exhibit sufficient buffering capacity and can maintain a relatively stable pH level. Lakes located on carbonaceous rocks are also usually high in calcium content and provide organisms the necessary chemical elements to thrive. However, lakes of this nature also supply conditions suitable for the existence of zebra mussels.

Frontenac County, along with many of the other counties 'fronting' Lake Ontario, consists of two distinct geologic characteristics. The northern portion is Precambrian bedrock of the Canadian Shield topography while the southern region is limestone bedrock of the St. Lawrence Lowlands laid down by ancient seas.

Within the Cataraqui Region, limestone formations are prevalent in only two watersheds: Millhaven Creek and Collins Creek. The balance of lake-dominated watersheds is located on the Frontenac Arch, an uplifting of the Canadian Shield. Lakes in regions of granite (Canadian Shield) typically tend to have lower alkalinity and reduced buffering capacity. When thinking about water quality, the alkalinity and soil pH of a lake has a cumulative effect on water quality results. pH indicates whether the water is acidic, neutral or basic, but not the buffering capacity of the water. Buffering capacity is the ability of water (or compound) to resist a change in pH. Alkalinity tells you the buffering capacity in the basic pH range of the water. This region is a transition zone where lakes still benefit from lower alkalinity as a result of the overlying soils that have been influenced by nearby sedimentary rocks.

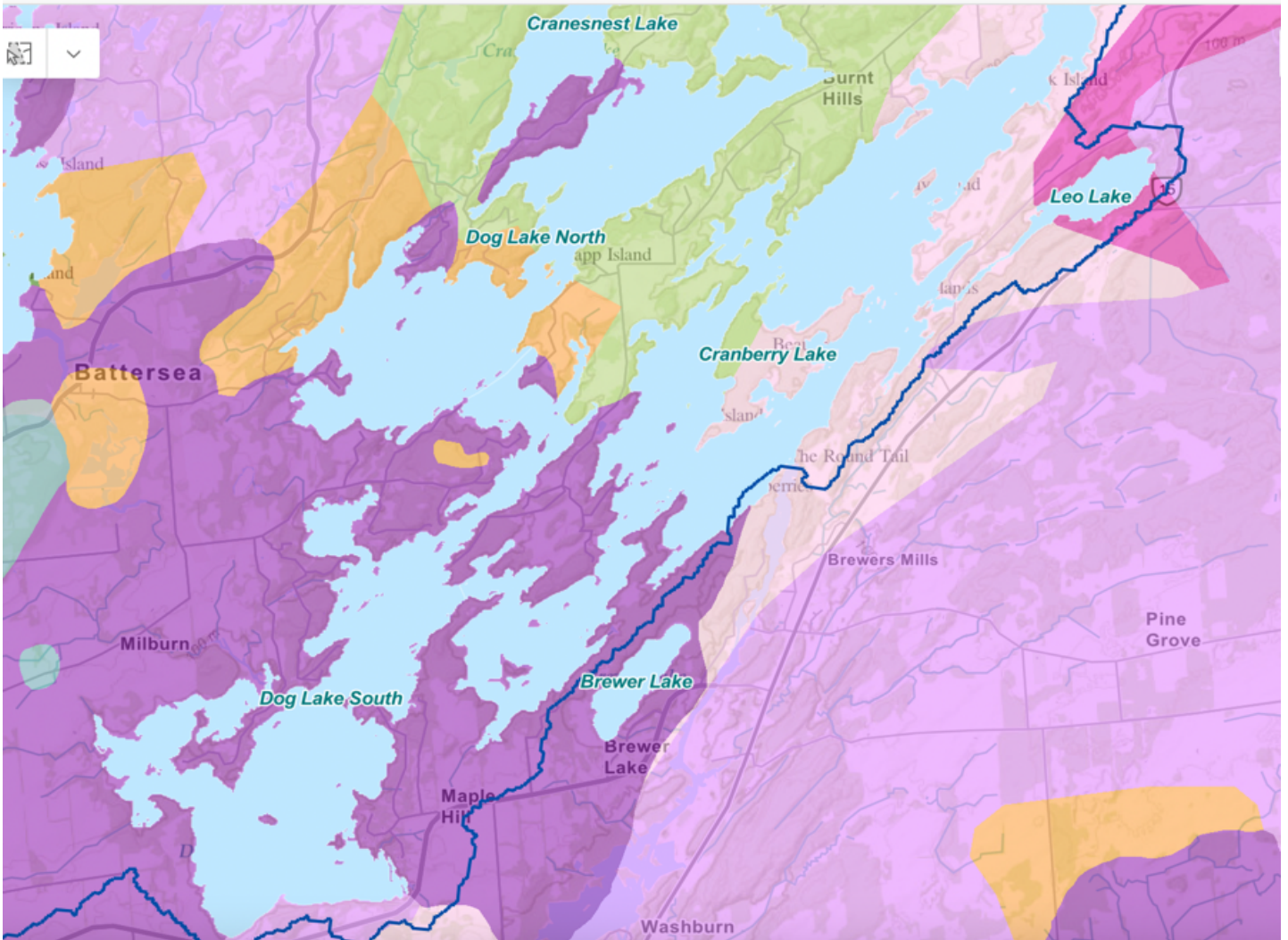


Figure 2: CATAWAQUI REGION Conservation Authority Bedrock Geology of Dog & Cranberry Lake Sub-watershed

Figure # shows the bedrock types that surround the Dog and Cranberry Lake area. The Lakes are primarily surrounded by bedrock types of late/early felsic plutonic rock, and clastic/carbonate metasedimentary rocks.

CRANBERRY LAKE	DOG LAKE
Percentage Bedrock Type within Catchment Area	
31% Late felsic plutonic rocks	27% Late felsic plutonic rocks

24% Carbonate metasedimentary rocks	24% Gull River
16% Clastic metasedimentary rocks	15% Clastic metasedimentary rocks
8% Gull River	12% Potsdam

Soil Structure

As water flows to the lake, whether overland or subsurface, its speed and quality are influenced by the soils. For example, soils with higher permeability allow water to soak in more easily reducing surface runoff and erosion potential but increasing the risk of surface pollution entering the groundwater. Additionally, some soil types retain more phosphorous helping to reduce this nutrient input to lakes from upland sources like septic systems.

Soil depths and how easily water can soak into the ground to reach underlying groundwater sources are important factors for watershed hydrology and groundwater pollution potential. Much of the Cataraqui Region has thin soils over fractured bedrock. This presents an environment where any pollution on the surface can quickly make its way to the groundwater which flows toward lower elevations like lakes.

The characteristics of native soils are influenced by the types of rock that are proximate to the area and the legacy of glacial drift. Dog and Cranberry Lakes primary geological bedrock type in the lakes' catchment area is classified by the CRCA Lake Reporting Dashboard as being late felsic plutonic rocks, with soils that consist of silt loam and rock land. The two lakes have a relatively moderate/low soil permeability and medium/high phosphorus retention. Figure #2 shows the different types of soil classifications in the two lakes catchment area.

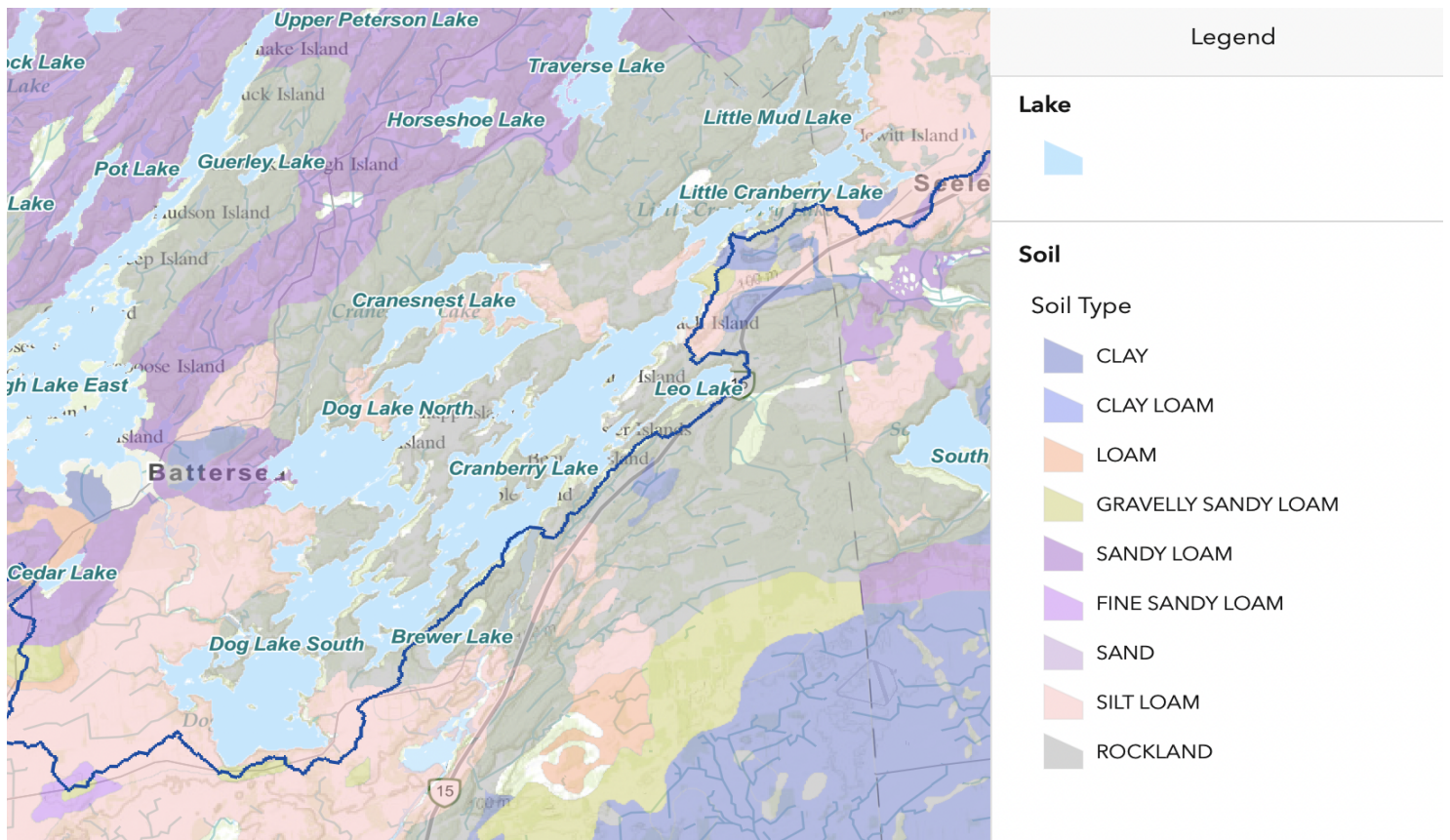


Figure 3 CRCA; Bedrock Geology of Dog & Cranberry Lake Sub-watershed

Calcareous soils would be expected to be present in this entire area, and this is further supported by the alkalinity concentrations and pH levels of Dog and Cranberry Lake water.

Permeability = moderate to low, Phosphorus Retention = medium to high

Primary Soil Type % within Lake Catchment Area	
CRANBERRY	DOG
47% SANDY LOAM	31% SANDY LOAM
18% WATER	23% ROCKLAND
14% ROCKLAND	17% WATER
11% LOAM	16% LOAM

Phosphorus Attenuation in Soils

The degree to which phosphorus may be attenuated in soils has been the subject of considerable scientific debate over the past several decades, and is of importance because phosphorous levels in the lake are an important determinant of water quality. Recent studies have demonstrated that septic system phosphorus may be attenuated in the long-term at some sites on the Canadian Shield. The attenuation of septic system phosphorus is controlled by the processes of adsorption and mineralization. Whereas adsorption only slows down the movement of the septic phosphorus plume, mineralization (or mineral precipitation) of phosphate with aluminum, and to a lesser extent iron, is more permanent under most conditions.

8.0 Water Management

Dog and Cranberry Lakes form part of a very large body of water comprising 4 lakes between Jones Falls and Upper Brewers Lockstations. The water level of this large body of water is managed by Parks Canada for several reasons including:

- Public safety including mitigation of flooding;
- Protection of:
 - environment, fisheries, wildlife habitats
 - water supplies
 - navigation
 - recreation
 - hydro generation

In the context of water management on the Rideau Canal, “Cranberry Lake” refers to the connected water bodies of Cranberry, Whitefish and Dog Lakes. Water levels and flows from Cranberry Lake are managed by the following control and impoundment structures: Morton Dam Overflow Spillway and Waste Weir, Upper Brewers Outer Earth Dam and Waste Weir and Upper Brewers Lock 43 East and West Earth Dams.

The complexities of these multiple and interconnected considerations dictate the need to monitor and manage water continuously throughout the year.

Between January 1st and March 1st, the rule curve is decreased on Cranberry Lake from 98.30 to 98.10 in preparation for flood storage during the spring freshet. Water level and flow conditions prior to January 1st along with snowpack surveys completed during this time will determine if levels deviate from the rule curve.

March to May is spring freshet season, dam operations and the target water level are a function of snow on the ground and the amount of precipitation received and/or forecasted. If snow

amounts are high in the beginning of March, Cranberry Lake will be further lowered (by either increasing hydro output or by pulling stop logs). If snow amounts are low, then the water level of Cranberry Lake will be increased (by reducing hydro output or putting stop logs back in).

Between May 1st and June 1st Cranberry Lake will reach its full navigation level of 98.65 CGD. From June 1st to October 15th the rule curve declines from 98.65 to 98.30 CGD. Historically, levels often deviate lower than the rule curve as inflow is reduced or shutoff from Sand Lake while flow is maintained out of Cranberry Lake to keep up the Lower Brewers reach and Colonel By Lake.

After October 15th the rule curve remains stable at 98.30 CGD until January 1st. Historically, the water level will be lower than the rule curve by October 15th and will be increased during the months of November and December to meet or exceed the rule curve. As the upper lakes are drawn down to winter level the water is held in Cranberry Lake to raise the level and facilitate hydro generation at the Upper Brewers generating station.

Reducing the water level provides storage for snow melt and the spring freshet thus reducing the flooding potential. In the spring the lakes are filled to the high end of their summer range at 98.65.

The lakes are never overfilled as this may result in flooding of docks, low lying areas and waterfowl nests. Throughout the summer the water level drops gradually as a result of evaporation, although heavy rainfall events can suddenly increase the water level dramatically. This happened in 2017 when heavy rainfall in mid summer closed the canal to navigation for a week or more in some areas.

The powerhouse at Upper Brewers Lockstation operates during the fall drawdown and during the spring freshet and at other periods of the year when there is an excess amount of water for navigation. Normally the powerhouse is shut down during much of the navigation season from mid May to mid October. Only during periods of high water will it operate during the summer as was the case in 2014, 2017 and 2019. Portage Power meets with Parks Canada and the CRCA before and during spring freshet to plan for flood mitigation procedures. The relationship among the agencies and Portage Power is characterized as co-operative and productive.

Virtually all of the water entering Dog and Cranberry Lakes comes from the upstream lakes of the Cataraqui watershed. Loughborough Lake is the only lake not on the Rideau Canal that is directly upstream of Dog Lake. Water levels on Loughborough Lake are controlled by the Battersea Dam in the village of Battersea, and by a dam on Hart Lake located at the end of Loughborough Lake Creek. This small stream eventually empties into Lake Opinicon.

Portage Power operates both the Battersea and Hart Lake dams. In 1957, Gananoque Light and Power, now Portage Power, was granted permission to build a dam at Hart Lake to control the water level of Loughborough Lake. This allowed water that previously flowed through the Battersea dam and Millburn Creek to Dog Lake to be diverted to Lake Opinicon thereby increasing the amount of water available for the four hydro-electric generating stations at Jones Falls, Upper Brewers, Lower Brewers and Kingston Mills. This normally only occurs in the spring and fall when the water level on Loughborough Lake is above the high end of its range. During the summer the dam is virtually shut down in order to maintain a constant water level on Loughborough Lake. The dam is only opened in the summer to pass water in excess of the normal range. This rarely occurs owing to the high evaporation rate on Loughborough Lake and virtually no feeder streams.

Portage Power allows sufficient water to pass through the Battersea dam for minimum flow on Milburn Creek. There is no agreement in place to establish a minimum flow. Redirecting water during the spring and fall through the Battersea dam would not improve water quality in Milburn Bay as the algae growth occurs largely in the summer when there is no surplus water on Loughborough Lake.

8.1 Recommendations for Lake Plan Actions

- Provide DCLA members with any pertinent information about water levels as provided from time to time by Parks Canada.

9.0 Water Quality

9.1 Introduction

'Good' water quality ranks as the most important value identified by the community, and maintaining or improving water quality is the most important issue needed to be addressed by the Lake Stewardship Plan. Although there are natural processes that will affect the quality of our surface water, the most significant impacts usually result from human activities. Shoreland development, reduced shading along shorelands, faulty or inadequate septic systems, agricultural and residential runoff from the land, will all contribute to a reduction of water quality. Excess levels of nutrients (from fertilizers, septic seepage, and other sources) leads to increased growth of aquatic plants, algae blooms, and changes to the overall ecology of the water. This is why it is important to measure water quality over the years, to put in place best management practices to reduce ongoing impacts and if deterioration is observed, to take remedial action.

At the same time, the legacy of the construction of the Rideau Canal resulting in the inundation of large areas of nutrient rich land, the resultant shallow warm water environment, resuspended nutrients in the sediment and decaying aquatic vegetation, along with nutrient inputs from surrounding natural and anthropogenic sources have resulted in the high levels of total phosphorus evident today. While best management practices could reduce loadings from the catchment area, it is highly unlikely that these would result in a marked improvement in water quality. Perhaps the best that can be expected would be a future state in which harmful algae blooms no longer occur and the total phosphorus trend is stable or slightly declining.

9.2 Historical Perspective

The water quality of Dog Lake, particularly the southern basin, has been a concern for local residents and government agencies for over 40 years. Local residents can never remember a time when the lakes did not “turn green” in the late summer. This is a function of water depth, temperature, legacy nutrients in the sediment and nutrient loading that results in annual algae blooms. A study of the water quality of Dog Lake conducted in 1988, now 35 years ago provides an instructive historical perspective on the issue of water quality. It is included here to demonstrate that progress has been made to improve water quality .

In 1988, responding to concerns expressed by the Dog Lake Cottagers Association and others, the Ministry of the Environment, the Ministry of Agriculture and Food, and the Cataraqui Region Conservation Authority collaborated to address the issue of very high bacterial counts and Total phosphorus (TP) readings in the south basin of Dog Lake. Three sources of nutrient were examined: septic systems, farms and tributary streams. An intensive period of field surveys, water sampling in the lake and tributary streams, septic system inspections and agricultural questionnaires took place in 1989 and 1990. The study found that agricultural practices at a number of farms adjacent to Dog Lake and tributary streams, primarily Milburn Creek, resulted in elevated bacteriological and Total Phosphorus readings. A survey of 217 septic systems revealed that 75% were satisfactory and only 12% being substandard. No systems were direct polluters. It was concluded that septic systems were not a major source of nutrients. In contrast, livestock with direct access to the lake and Milburn Creek along with improper manure storage and application were determined to be the major contributor to extremely high bacteriological, total phosphorus and chlorophyll a readings. The data collected confirmed a eutrophication problem long recognized on Dog Lake. Since then, the implementation of environmental farm plans, and changing agricultural land uses have significantly reduced nutrient loadings into Dog Lake.

9.3 Monitoring Water Quality

In 2016 DCLA commenced an annual sampling program under the auspices of the Ministry of the Environment, Conservation and Parks Lake Partner Program. The Lake Partner Program is a province-wide, volunteer-based, water-quality monitoring program. Volunteers collect total phosphorus samples and make monthly water clarity observations on their lakes. This information will allow the early detection of changes in the nutrient status and/or the water clarity of the lake due to the impacts of shoreline development, climate change and other stresses. Approximately 800 active volunteers monitor Secchi depth and total phosphorus at 728 locations in the lakes across Ontario.

Volunteers from the Lake Association collect samples from xxx locations (xxxxxx), monthly from April through to October. At the time of sampling, the volunteers take a reading of temperatures and of water clarity using a Secchi disk as well as samples that are sent to MOECP's lab where they are analyzed for level of Total Phosphorous. The two parameters of water clarity and total phosphorous, when measured regularly with consistent sampling and lab analysis, will provide a trend line of water quality. Total phosphorus concentration are ideally used to interpret nutrient status in Ontario lakes, since phosphorus is the element that controls the growth of algae in most Ontario lakes. Increases in phosphorus will decrease water clarity by stimulating algal growth. In extreme cases, algal blooms will affect the aesthetics of the lake and/or cause taste and odour problems in the water.

9.4 Description of Lake Trophic Status

Trophic status is a useful means of classifying lakes and describing the general lake condition in terms of the biological productivity of a lake. The classification typically includes three levels of trophic status (Table 9.1). Low trophic status, or oligotrophic, indicates excellent water quality, typical of the coldwater lakes on the Canadian Shield, with clear waters and low levels of aquatic vegetation and algae. Mesotrophic status is good water quality, typical of many of the lakes of Eastern and Southern Ontario; waters are less clear, and moderate levels of vegetation and algae growth can be expected. Eutrophic status is a state to be avoided, typical of highly enriched lakes, sometimes caused by man-induced conditions; eutrophic conditions include heavy growth of vegetation, and frequent algae blooms. The trophic status of a lake depends on a number of factors including depth, size, drainage area, lake turnover rate, and presence and type of vegetation. Not all lakes can be oligotrophic. Some lakes are naturally more nutrient rich and their status should be protected.

Lakes with less than 10 µg/L TP are considered oligotrophic. These are dilute, unproductive lakes that rarely experience nuisance algal blooms. Lakes with TP between 10 and 20 µg/L are termed mesotrophic and are in the middle with respect to trophic status. These lakes show a broad range of characteristics and can be clear and unproductive at the bottom end of the scale or susceptible to moderate algal blooms at concentration near 20 µg/L. Lakes over 20 µg/L are classed as eutrophic and may exhibit persistent, nuisance algal blooms.

Trophic classification offers a practical guideline for approximating the productivity level of a lake. These levels have been used by MOECP in the past as benchmarks beyond which water quality should not deteriorate. For example, if a lake measured phosphorous at mesotrophic levels (between 11 and 20 µg/L), the water quality objective was to maintain levels below 20

Table 9.1 Lake Trophic Classification

Lake Trophic Status	Description	Total Phosphorus (mg/L)	Chlorophyll a (mg/L)	Secchi Disk Depth (m)
Excellent (Oligotrophic)	Lakes with low nutrient levels, minimal algae present. Water is often clear and cold with sufficient oxygen levels in the entire water column throughout the year; often supporting cool to cold water fisheries.	10mg/L	2mg/L low algae density	5 m
Good (mesotrophic)	Lakes with moderate nutrient levels, algae present. Water is often less clear with greater probability of lower oxygen levels at lower water levels.	11 to 19 µg/L	< 2 µg/L-low algal density	3.0 - 4.9 m

Poor (Eutrophic)	Lakes with high nutrient levels, abundant algae, regular algae blooms. Water has poor clarity, especially in summer months when algae blooms and plant growth peaks. Oxygen levels are greatly reduced in lower water columns throughout the year.	≥20 µg/L	> 4 µg/L- high algal density < 2.9 m	< 2.9 m
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Three measurements of water quality that can be used to establish the overall condition/trophic status of a lake are:

Phosphorous is a natural-occurring element in our surface waters, and is necessary for plant growth in a healthy ecosystem. However, phosphorous levels can be elevated through the activities of shoreline development, land clearing, and agriculture. Phosphorus moves into the water from different sources – natural, human-induced, and internal.

Phosphorus is often the limiting factor for biological growth in freshwater systems when compared to more abundant elements like carbon, hydrogen, nitrogen, oxygen and sulphur (Wetzel, 2001). However, in environments with excess phosphorus input, growth of aquatic plants and algae may increase to levels that become a concern for both aquatic life and recreation. This is often referred to as the “productivity” of the lake. Phosphorus can enter lakes from atmospheric deposition, runoff from adjacent upland and wetland areas, and nutrient cycling within the lake. Fertilizers, human and animal wastes, plant matter, and the natural weathering of rocks and soils all contribute phosphorus. In addition, internal changes to lake water quality such as reduced oxygen and pH, as well as organism movement, can trigger the release of phosphorus from bottom sediments into the water. The total amount of phosphorus entering a lake depends on the surrounding bedrock geology, soil type, and vegetation. Changes to soil acidity alter the ability of phosphorus to be retained on the upland areas surrounding lakes versus leaching into the lake (see Acidification for more detail). Soil type and the concentration of metal ions such as aluminum and iron determine how easily and how much phosphorus can be bound to the soil, or conversely enter a lake environment. Soil quality, acidity, nutrient concentrations, and ultimately a lake’s productivity levels are variable. Total phosphorus is measured in our lakes, as this includes all forms of the nutrient (i.e., dissolved and bound).

Total Phosphorus in Dog and Cranberry Lakes

Results from sampling over a number of years for both lakes has concluded that both lakes can be classified as generally eutrophic although there are variations. For example the deeper north basins of both lakes are only slightly eutrophic whereas their southern basins are both highly eutrophic. Sampling undertaken in 2022 by the Ministry of the Environment, Conservation and Parks in Dog Lake at two locations (middle of both north and south basins) and the southern basin of Cranberry were 13 ug/L and 26 ug/L respectively which usually means the formation of occasional algae blooms. Between 2018 and 2020, 12 samples taken at the north end of Dog Lake at the Burnt Hill bridge for the Lake Partners program averaged 22 u/L. The southern basin yielded extremely high TP samples in excess of 85 u/L at the south end of the lake and a reading of 142 in Milburn Bay. A recent study by the Queen's University's School of Urban and Regional Planning (SURP) has found that the Northern basin of Dog Lake is mesotrophic to slightly Eutrophic while the southern basin is eutrophic, largely due to its shallower depth and the high amounts of nutrients found at the bottom of the lake in this area.

Cranberry Lake has substantially less TP sampling data. The data that does exist shows that the lake north of Beupre Island is generally mesotrophic with TP of 26u/L at Tiny Island in 2018, while the southern basin is eutrophic. This corresponds with visual observations of the two basins over ten years in which it was observed that water clarity improves towards this part of the lake and that the southern basin experiences an algae bloom yearly. Queen's University's SURP has classified Cranberry Lake as Meso-eutrophic, further supporting this data.

The 2022 by MECP sampling showed that total phosphorus concentrations in the lake bottom were very high at 71 and 38 ug/L respectively. With high TP in the bottom waters, from the sediments or the accumulation of years of composting algae and macrophytes (aquatic plants), there is a high risk that the upper part of the lake will get an infusion of TP when the lake mixes throughout the water column. This along with the shallow nature of much of the area of both lakes, compounded by wind and wave action results in a higher risk of algae blooms.

Water clarity, is measured by use of a Secchi disk. The Secchi disk is a black and white metal disk that is lowered into the water until it can no longer be seen, at which point the measurement is taken. Water clarity is determined by measuring how far down sunlight can penetrate into the water by lowering a Secchi disk into the water and measuring the deepest point that it is visible. The larger the number, the clearer the water, as the number represents the depth to which the Secchi disk is visible. The Secchi disk depth indirectly indicates the amount of algae/phytoplankton, suspended soil sediments, and other

materials in the water column. These materials are naturally found in our lakes, but if their levels are high, light will not be able to penetrate to deeper levels of the lake, reducing the photosynthesis rates of aquatic vegetation, which reduces oxygen levels, affecting the health and survival of fish and other aquatic life.

While water clarity can help to determine water quality status, water clarity should not be considered a reliable measure of water quality in the absence of other data. The presence of zebra mussels, which entered Dog and Cranberry Lakes in approximately 2001, is a contributing factor to increased water clarity, as this invasive species eats the plankton that floats in the water, thereby clarifying the water column.

Chlorophyll a is the green pigment contained in algae and aquatic plants that is used in the process of photosynthesis. The Chlorophyll a concentration is used to measure the abundance of algae and potential plant growth in the water, and is directly related to the amount of nutrients available. In addition to using a Secchi disk to measure water clarity, 'Chlorophyll a' can be used to measure the abundance of algae and potential plant growth in the water, and is directly related to the amount of nutrients (particularly phosphorous) that are available. If the concentration of Chlorophyll a is high, then it can be assumed that the nutrient levels in the water are high as well, promoting growth of the algae. High concentrations of algae and vegetation can also cause oxygen depletion in the lake. As the algae and vegetation die off, the decomposition uses up available oxygen; if there are more organisms the amount of oxygen needed for decomposition increases. Measuring levels of Chlorophyll a is not routine today, as more precise water quality results are available through measuring Total Phosphorous levels.

Algae and Blue Green Algae

Algae, and associated algae blooms, are natural elements of the aquatic ecosystem in a lake, but may be considered a nuisance when in high concentrations, or when blooms become excessive, rendering water unpleasant for swimming and boating. In addition to the direct effects of algae, high concentrations of algae and aquatic vegetation can cause oxygen depletion in the lake. As the algae and vegetation die off, the decomposition of this vegetative matter uses up available oxygen. Reduced oxygen will have a negative effect on fish and other aquatic organisms. One particular type of algae, blue-green algae, can be more than a nuisance. Certain types of the algal species referred to as 'blue-green' may emit a toxin that makes water unusable for any purpose. Conditions that encourage blooms include: sufficiently high levels of phosphorous in water or sediments; calm

weather; strong sunlight; high air and water temperatures; and relatively shallow water. There may also be a link to increased ice-free periods. While both Dog and Cranberry Lakes experience algae blooms each year, there are no hard data to suggest that these are increasing in number or intensity. Some years are better than others, in 2022 algae blooms on both lakes were reported to be virtually absent.

Blue Green Algae (Cyanobacteria) Blue-green algae (cyanobacteria) often thrive in areas where the water is shallow, slow moving and warm, but can be present in deeper and cooler water. Some forms of blue-green algae can produce toxins that can be harmful to human health. Symptoms can include itchy, irritated eyes and skin. If swallowed symptoms can include headaches, fever, diarrhea, abdominal pain, nausea and vomiting. Beach closures at the Gilmour Point public beach occur periodically. Blue green algae is also observed at the basin above the Upper Brewers Locks where the lack of water movement and wind create ideal conditions for cyanobacteria.

The first observation that a blue-green bloom (harmful algae bloom) is occurring is visual. Lake residents/fishermen usually call the District office to report a sighting of what they think is a blue green bloom. The duty officer will get the call and usually follow-up with the person reporting a possible bloom. The duty officer will assign it to an Environmental officer (EO) in charge of that area. The EO will likely visit the lake and may take one of our Surface water staff with them. They will take a sample of the bloom and send it to the MECP lab in Toronto where it will go to the Algae Identification Group. They will then run four tests to determine the presence of a harmful algae bloom.

If a Harmful Algae Bloom is suspected or confirmed, the EO will notify the local health unit, the local Municipality, and the CA of the occurrence. The local Health Unit makes the decision on whether notification, or further notification, of the public is required, and what actions should be taken to notify the public of health risks associated with the blooms (e.g. drinking water advisory, beach closures).

Harmful algae blooms have been confirmed on the southern basin of Dog Lake for many years, whereas they are less common on the northern basin, the last being confirmed in 2019. There are fewer on Cranberry Lake, but that does not mean that they are absent.

Data from the Ministry of the Environment, Conservation and Parks confirms that blue green algae blooms have been a fairly regular occurrence. On Cranberry Lake, blue green algae blooms have been confirmed 4 times since 2012. On Dog Lake, there have been 4 confirmed and numerous possible blooms since 2010. Most have been in August, coinciding with increased human reporting and warmer water during the summer.

Dissolved Oxygen

The concentration of dissolved oxygen (DO) in the water column is a critical factor for the survival of fish and other aquatic fauna. The temperature/oxygen regime determines the type of fish species that can be supported in the lake environment. As the temperature of the water rises, the amount of dissolved oxygen in the water decreases, which affects the survivability of fish deeper in the lake. This is particularly important for cold water fish species such as lake trout, which spend summer months in the depths of the lakes. Both Dog and Cranberry Lakes support a warm and cool water fishery (coolwater species include yellow perch and pike; and warmwater species include bass, sunfish, etc.). These fish species are more tolerant of low oxygen levels than coldwater fish species. Guideline levels have been established by the Ontario MOECP for warmwater fish, as a part of the Provincial Water Quality Objectives. Coolwater fish would require a higher level of dissolved oxygen at lower depths, at least 5 mg/L.

Dissolved oxygen levels were recorded for Dog and Cranberry Lakes in August 2022. The results showed that there is sufficient dissolved oxygen near the surface in the shallow areas of the two lakes for warm and cool water fish and then a rapid decline at 10 metres in the southern basin of Dog Lake and at 4 metres in Cranberry Lake. The dissolved oxygen profile for the deep northern basin of Dog Lake shows very good DO concentrations down to 40 metres except for a significant drop between 7 and 19 metres. This type of dissolved oxygen profile is called a negative hetrograde profile. A negative hetrograde oxygen curve indicates a zone of oxygen depletion occurring in the metalimnion (thermocline) This is likely due to excess oxygen consumption by trapped algae and/or zooplankton due to a change in temperature in this zone of the lake that prevents the movement of plankton which consume oxygen in this area.

Bacteriology

High levels of certain bacteria can cause illness in swimmers, so monitoring beaches and swimming areas for bacteria is relevant from a human health perspective. The Provincial Water Quality Objective (PWQO) uses *E. coli* bacteria as the parameter to measure, as this bacterium is present in human or animal fecal matter. Water is considered to be safe for swimming if the level of *E. coli* bacteria is less than 100 counts/100 ml of water, based on the geometric mean of 5 samples.

Kingston Frontenac Lennox and Addington Public Health (KFLAPH) is responsible for sampling and testing beaches in their area of jurisdiction. KHLAPH follows protocols based on the 'Beach Management Guidance Document' of the Ministry of Health and Long-Term Care. HFLAPH has regularly sampled and tested for E. coli at Gilmour Point, as this is a public swimming area. Their sampling consists of five samples taken once weekly from the Victoria Day weekend through to Labour Day. Results from the years xxxxxx indicate that the water at The Point is safe for swimming. All weekly mean results for those 4 years were below the threshold for swimming except on one occasion.

pH and Calcium

The PWQO's require maintenance of the water's pH in a range of 6.5-8.5 to ensure a healthy aquatic ecosystem (neutral pH is 7.0 and lower levels indicate higher acidity). Calcium is an element that naturally occurs in the environment and helps to 'buffer' pH levels in the water, or to reduce the level of acidity of the water. Lakes with low calcium levels, typical of Canadian Shield lakes, will have difficulty buffering the impacts of increased acidity such as from acid rain. Calcium is also important in many aquatic ecosystems, as it is required, to varying degrees, by all living organisms.

9.5 Recommendations for Lake Plan Actions

- Continue annual sampling of Dog Lake and analyse for water clarity (Secchi disk depth) and total phosphorous – under the Lake Partners Program.
- Establish a sampling program on Cranberry Lake through the Lake Partners Program
- Establish a sampling program for sodium and chloride levels in Dog Lake at the bridge on the Burnt Hills road at the northern end of Dog Lake and promote 'best management practices' to mitigate the impact of salt application. An effective sampling program would also include bacteria, Total Suspended Solids, oil and grease, and water flows.
- Continue measuring timing of ice-on/ice-off on Dog Lake, initiate on Cranberry lake.
- Continue to advocate among the community and the township to establish a septic inspection program.

- Continue to advocate for the need for applying 'best management practices' on surrounding farmlands, and means to implement the BMPs.
- Promote new development and redevelopment that will result in a net environmental benefit.
- Establish a long term relationship with the Beaty Water Research Centre and other academic institutions to encourage scientific research that could enhance our understanding of the nutrient cycle.

10.0 Natural Environment

10.1 Introduction

The location of Dog and Cranberry Lakes at the southern edge of the Frontenac Arch in conjunction with various natural features surrounding the lake (such as wetlands, marshes, and large areas of littoral zone), produce conditions for a biodiversity of plants and animals. The geological boundary also explains the lake's character and changes in land cover within the natural environment of the surrounding catchment area. The more populated region to the south and east of the lakes have been cleared and developed for agricultural purposes while areas to the west remain relatively dense coniferous and mixed forest systems. The Dog and Cranberry Lake Association Survey revealed that natural environment-related values or issues were of top priority to survey respondents. The natural environment of the lakes and shoreland contributes strongly to the key values identified by the Dog and Cranberry Lakes community.

10.2 County of Frontenac Natural Heritage Study 2012

The County of Frontenac identified the need to undertake a Natural Heritage Study (NHS) in order to achieve a sustainable future through implementation of the Integrated Community Sustainability Plan (ICSP). A Natural Heritage Study is a comprehensive evaluation of all natural heritage features such as wetlands, forest cover and wildlife habitat including the connectivity of such features. The evaluation and mapping of natural features occurred at the regional scale across the county although linkages to areas outside of the county were also considered important. Numerous goals of the Natural Heritage Study undertaken in 2012 were identified by the County of Frontenac including but not limited to:

- To increase the understanding of natural heritage features and systems;
- To develop land use planning information and policies that identify, protect and enhance natural heritage features and systems in a manner that meets or exceeds provincial requirements;
- To encourage and facilitate private stewardship, partnerships and public education; To protect animal and plant community relationships; and
- To recognize linkages between natural heritage features and systems.

The development of the Natural Heritage Study was undertaken by a private consulting firm and involved cooperation between representatives from the Townships, Ministry of Municipal Affairs and Housing, Ministry of Natural Resources, Frontenac Stewardship Council, Conservation Authorities as well as public input. Natural linkage areas within Frontenac County were identified utilizing Geographic Information System (GIS) habitat suitability modelling in order to identify areas of high quality habitat that possess the potential to reconnect or maintain connections between natural heritage features. The modelled natural linkages were observed to be indicative of real world conditions through field surveys. The NHS study further identified and recommended policies to maintain, enhance or restore the natural heritage systems of Frontenac County (Frontenac County, 2012). Mapping produced by the County of Frontenac Natural Heritage Study Final Report provides several observations regarding natural heritage features and linkages within the Dog and Cranberry Lake area (Map 10.3). These natural linkages, along the shorelines, provide local level wildlife corridor functions to a variety of species including mammals, waterfowl, reptiles and amphibians. The Natural Heritage Study undertaken by the County of Frontenac establishes solid information for protecting natural heritage features and systems within the Dog and Cranberry Lake area. An update of the study is expected to take place in the next few years. The Dog and Cranberry Lakes Stewardship Plan will be amended with information from that study .

10.3 Shoreland and Littoral Zone

Shorelands and littoral zones are referred to as the 'ribbon of life,' and are areas of high biological activity and diversity that are extremely sensitive to degradation of the natural environment. Littoral zones provide essential spawning and nursery habitat for warmwater fish species in addition to providing habitat for amphibians, mammals and waterfowl. The lakeshore also provides a local level wildlife corridor function. Sporadic areas of sandy shoreland are often utilized by nesting turtles, including painted turtles and snapping turtles. Shoreland alterations, including tree and natural vegetation removal, will reduce overall available habitat and inhibit wildlife migration to the lakeshore. Simple actions such as maintaining natural shorelines and renaturalization of manicured

shoreland may benefit wildlife and increase the overall available habitat surrounding the lake.

The shorelands of Dog and Cranberry Lake are a mixture of developed residential and a few commercial lots as well as substantial areas of naturally vegetated land. Although substantial areas of shoreland have natural vegetation to the water's edge, some areas of the lake shoreland have been cleared of natural vegetation and have been replaced by manicured lawn. Areas of the Dog and Cranberry Lake shoreland devoid of trees and shrubs to the water's edge would benefit from renaturalization utilizing native plant species. Both private and public lands may benefit from active planting of the shoreline or from simply designating a buffer strip that will not be mowed, allowing the shoreland to return to its natural state through successional growth. Public parks or lands with manicured lawns to the water's edge present an excellent opportunity for renaturalization both as a demonstration site to private landowners and as an education tool for the public.

10.3.1 Cranberry Lake: State of the Shoreland and Littoral Zone

In 2021, the Association asked Watersheds Canada to undertake a survey of the state of the shoreline of Cranberry Lake through the *Love Your Lake* program. *Love Your Lake* is a shoreline evaluation program designed to encourage lakefront property owners to take proactive steps toward improving lake health by creating and maintaining healthier shorelines. The survey consisted of a comprehensive evaluation of the characteristics of each property by a trained Watersheds Canada staff member over a four day period during the summer of 2021. The data was tabulated and summarized and the confidential results for each property were sent to each owner. This provided each property owner with a clear picture of the state of their shoreland along with recommendations to create or maintain healthy riparian zones.

The summary for Cranberry Lakes discovered that the shoreland is generally in a natural state. Of the 118 properties on Cranberry Lake, 108 were classified as natural and/or regenerative. Only 10 were classified as manicured, developed or degraded. Of the 12 properties that had a recommendation to create a shoreline buffer and the 42 properties that had a recommendation to expand their current buffer, it was noted that it would be difficult for 32 of these properties to create a 30 m wide buffer. This may be due to the close proximity of a structure, cliff, rocky terrain or other factors that would make planting a buffer difficult.

The survey found that there are 73 residences on the lake. On many properties (60%), the houses were set back 30 metres or more. There are still quite a few lawns around the lake, although 53 properties have no lawn at all. Overall there is little erosion, and only few paths and erosion control structures that were deemed to be problematic. The survey found that most of the upland is forested with a variety of habitat features for mammals and birds. Eighty

properties have fallen trees, stumps and branches in the water that provide habitat for turtles. Almost all properties have emergent, submergent or floating vegetation in the littoral zone.

The conclusion that the Cranberry Lake riparian zone is largely in a natural state is borne out by the very low level of development apparent to the observer. Cranberry Lake is among the least developed and most natural of all the lakes along the Rideau Canal. Efforts by property owners to remediate issues identified in the survey will only further enhance the natural value of the lake environment.

10.3.2 Dog Lake: State of the Shoreland and Littoral Zone

The Love Your Lake survey of Dog Lake was carried out in the summer of 2022. A total of 413 properties were surveyed along the 73 km. of shoreline. There are 328 properties that can be classified as natural and regenerative. Only 87 properties can be described as a combination of manicured, developed or degraded. Of the 13 properties that had a recommendation to create a shoreline buffer and the 192 properties that had a recommendation to expand their current buffer, it was noted that it would be difficult for 176 of these properties to create a 30 m wide buffer. This may be due to the close proximity of a structure, cliff, rocky terrain or other factors that would make planting a buffer difficult. There are 319 residences on Dog Lake with 60% set back 30 metres or more. The remainder are 10 metres or less from the shoreline. About 50% of the properties have no lawn at all while there are 60 lawns to the water's edge.

Overall there is little erosion, and only few paths and erosion control structures that were deemed to be problematic. The survey found that most of the upland is forested with a variety of habitat features for mammals and birds. Many have fallen trees, stumps and branches in the water that provide habitat for turtles. Almost all properties have emergent, submergent or floating vegetation in the littoral zone.

As a general observation, the riparian zone of Dog Lake is largely in its natural state although there are quite few properties where intensive shoreland development has taken place.

10.4 Significant Natural Areas and Features

Natural features are interdependent and function as a system to maintain biological and geological diversity, ecosystem services, and species populations. Natural features include areas such as; significant wetlands, fish habitat, endangered and threatened species habitat, wildlife habitat, conservation reserves and Areas of Natural and Scientific Interest (ANSI).

Dog and Cranberry Lake and the surrounding catchment area have diverse natural features integral to the healthy functioning of the ecosystem as a whole. Shoreline vegetation and wetland areas provide value to both wildlife and humans through: stabilizing shorelines from erosion and loss of property; providing fish and wildlife habitat; minimizing the impacts of flooding; reducing carbon dioxide from the atmosphere and water; filtering contaminants; and creating privacy.

10.5 Forest Cover

Dog and Cranberry Lakes are located within the southeastern portion of the Great Lakes-St. Lawrence Forest Region. The Great Lakes-St. Lawrence forest is the second largest forest region in Ontario covering approximately 20 million hectares of Ontario. This forest region is bordered to the south by the Deciduous Forest Region, and is an area of transition between the coniferous and broad-leaved deciduous regions (Ontario, 2016). The Great Lakes-St. Lawrence forest region commonly contains areas in which coniferous trees such as white pine, red pine, hemlock and cedar intermix with deciduous broad-leaved species including yellow birch, sugar maple, red maple, basswood, white elm and red oak. A large majority of the forest in the region is unevenly aged, meaning that a wide variety of age classes can be found within the same group of trees. The forest types adjacent to the lakes are reflective of the underlying rocks and soils as well as the agricultural and forestry activities of the past two-hundred years.

The remaining forest cover around Dog and Cranberry Lakes is a legacy of the settlement history of the area combined with the influence of geology, topography and soils. This resulted in a patchwork of woodlands and fields throughout the area. Overall, when viewed from the lakes the shoreland presents a heavily wooded appearance especially virtually all of the southern basin of Cranberry Lake, most of the east shore of the north basin of Cranberry Lake, and along the west and northern shore of Dog Lake.

The largest and most intact woodland is the peninsula located between the channel leading northwards from the lockstation and the east shore of Cranberry Lake south of the Round Tail and encompasses all of Brewer Lake. The west side of Dog Lake from Milburn Bay to the north end of Dog Lake is largely intact other than a few small abandoned fields. Other significant woodlands include Beaupre Island and the Van Neil Woodland.

Very Low	Great than 11.5%
Low	8.5 to 11.5%
Moderate	5.5 to 8.5%
High	2.5 to 5.5%
Very High	Less than 2.5%



More Forest Cover / Less Vulnerable

Less Forest Cover / More Vulnerable

Cranberry: Low; 40% deciduous, 49% land forest area

Dog; Low: 37.4% deciduous, 45% land forest area

Overall, the Dog & Cranberry lake catchment area is very well forested, providing a setting for the lake that improves water quality, reduced water temperatures, enhances water storage, naturally regulates streamflow and protects biodiversity. There has been no assessment of the state of the woodlands, and the presence of any particularly noteworthy woodlands of scientific interest. A few shagbark hickory have been observed on Beaupre Island. The Van Neil Woodland which is a largely intact mixed forest and Beaupre Island are the only two protected woodlands.

10.6 Wetlands

Wetlands provide various environmental services for the surrounding area and ecosystems including maintaining ground water quantity, filtering contaminants, maintaining lake water levels, reducing erosion and sedimentation rates, and providing important habitat and food for fish and wildlife. Wetland soils have high moisture content, which reduces soil respiration, limiting the amount of carbon dioxide released back into the environment. Wetlands also provide habitat for numerous species of wildlife, including more than one-third of Canada's Species at Risk. Wetlands are utilized for breeding, spawning, rearing young, shelter, and protection by a variety of species. Wetlands also provide important wildlife passageways between various habitat types. Wetlands within the lakes' subwatershed both evaluated and unevaluated provide important environmental services including water purification, critical wildlife habitat, and provide opportunities for nature appreciation and recreation.

The Ontario Ministry of Northern Development, Natural Resources and Forestry (MNRF) maintains the Ontario Wetland Evaluation System (OWES), a system designed to evaluate and rank the relative value of wetlands for land use planning purposes. Through OWES a wetland can be classified as Provincially Significant (PSW), meaning that it possesses features and functions which warrant special protection policies under development/land use planning processes. Municipalities may also designate and zone wetlands that are not evaluated under OWES as locally significant so that they too are protected from certain development activities.

Dog and Cranberry Lake and surrounding subwatershed is home to numerous wetland areas and types. A substantial proportion of the lakes' subwatershed area contains ponds, swamps and marshes. Numerous other unevaluated wetlands lie scattered throughout the catchment area and provide important environmental services. Wetlands both unevaluated, regionally significant, and provincially significant within the Dog & Cranberry Lake subwatershed likely improve the overall water quality of the lake.

Lake vulnerability and impacts are lower for those with more wetland cover in their catchment areas. Thresholds for the rankings below are consistent with the Conservation Ontario Watershed Report Card.

Very Low	Great than 11.5%	 <p>More Wetland Cover / Less Vulnerable</p> <p>Less Wetland Cover / More Vulnerable</p>
Low	8.5 to 11.5%	
Moderate	5.5 to 8.5%	
High	2.5 to 5.5%	
Very High	Less than 2.5%	

Cranberry & Dog Lake catchment areas has a Very low vulnerability and has excellent wetland cover; it helps to provide a setting for the lake that improves water quality, enhances water storage, naturally regulates streamflows and boosts biodiversity (Map#).

Primary land type = 39.9% deciduous

Wetland percent = 12.9%

Wetland area= 102.2M km²

Dog Lake

Primary land type = 37.4% deciduous

Wetland land = 13.6%, area 30.4m km²

Although the inundation of the Cranberry Marsh by the construction of the Rideau Canal destroyed a vast and likely highly important wetland ecosystem, it did create a new aquatic ecosystem consisting of marshes and swamps that persist to this day. These are mainly in the form of wetlands in deep bays dominated by cattails, water lilies and other aquatic plants and extensive fringe wetlands bordering shallow areas of the two lakes. Most notable are the two wetlands on the east side of Beaupre Island, the mouth of the Leo Lake Creek, the deep bay in the northern basin of Cranberry Lake, west of Huntbach Lane and a number of fringe wetlands along the shore of the south basin of Dog Lake. These wetlands appear to be healthy and not under threat from development. A major potential threat is from phragmites, an aggressive reed that can rapidly overwhelm native emergent wetland vegetation.

There has not been any comprehensive inventory and evaluation of the wetlands on Dog and Cranberry Lake. Such a process would provide valuable information on the characteristics of wetlands, vulnerability to their integrity, habitat for species at risk, and classification for protection and adjacent land use planning purposes.

10.7 Aquatic Vegetation

Aquatic vegetation performs an important role within the ecology of the lake environment by providing vital food sources and habitat for both aquatic and terrestrial wildlife. Conversely, aquatic vegetation can also become detrimental to the environment in excessive amounts, and a nuisance to recreational activities.

Aquatic vegetation will grow where there is adequate sunlight, nutrients, and water quality. There are several different types of aquatic vegetation, which can be broken down into two categories: algae and vascular plants. Algae may be either single celled or multi-celled species, while vascular plants are those with a true plant structure, having a stem, leaves and roots. Vascular plants may be divided into further subsections including emergent vegetation, submergent vegetation and floating vegetation. Emergent vegetation is rooted in the lake bottom but has stems and leaves which can rise above the water surface. Submergent vegetation resides entirely under the water surface, although they may have some floating leaves, or flower stems that rise above the surface. Floating vegetation is rooted in the lake bottom but has leaves and flowers that float on the water surface, and typically grow in areas protected from wave action.

Aquatic vegetation provides many important services to the lake environment, including oxygenating the lake water, taking up available nutrients from the water, filtering sun radiation through photosynthesis, and providing food sources. All types of aquatic vegetation provide habitat to fish, amphibians, waterfowl, reptiles and invertebrates, critical for the early life stages of many organisms. The presence of aquatic plants also aids in shoreline and lake bottom stabilization. However, native fauna is usually better adapted to the habitats created by native flora, so species may be less successful or even die in the habitats created by foreign and invasive aquatic vegetation. Stabilization is accomplished through buffering the effects of wave action in the near shore area, and from the network of roots provided by the plants that hold and stabilize the lake's sediment and shoreline soils.

While there are a variety of native submergent aquatic plants, the predominant species is eurasian watermilfoil. Dog and Cranberry Lake is an ideal habitat as it is shallow, warm and nutrient rich. Eurasian watermilfoil is a perennial aquatic plant that grows under the water surface. Its leaves are feather-like with 12 or more thin segments (native milfoil has 11 or fewer

leaf segments). Eurasian watermilfoil is most commonly found in water 1-3 m deep (~3-10 ft) in lakes, rivers, and ponds, but can occur at depths up to 10 m (~33 ft). Found in acidic or alkaline waters, this plant blooms small reddish flowers that rise above the water in red tangled stems in July and August. Eurasian watermilfoil may grow in thick, dense mats that crowd out native species, reducing biodiversity, and deoxygenate water when decomposing, killing other aquatic species. It can also cause damage to boat motors, negatively impact fishing and swimming, and increase suitable mosquito habitat.

Over the years, eurasian milfoil has become the dominant form of submergent vegetation on both lakes except in the two deep basins on Dog Lake. While it is a manageable nuisance most of the time, in some years, when conditions are ideal, it forms dense impenetrable mats as was the case in 2019 on Cranberry Lake. Since nutrients are a limiting factor, it is unlikely that there will be any significant decrease in eurasian milfoil in the future.

10.8 Species at Risk

Species at Risk (SAR) are flora and fauna that have been identified as being at risk of disappearing from Canada, by Provincial and/or Federal legislation, through either loss of suitable habitat or population decline. The Canadian Government established the *Species at Risk Act* (2002) (SARA) to provide protection to wildlife at a national level. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was established in 1977, to provide a scientifically sound classification of wildlife species at risk of extinction (Government of Canada, 2009). With the establishment of SARA, COSEWIC was designated as the independent body of experts responsible for identifying and assessing wildlife species considered at risk, for the federal government to consider for protection under SARA. The Ontario Provincial Government also has legislation in place to protect at risk species; the *Endangered Species Act* (2007) (ESA) identifies species at risk, protects the species and their habitats, and promotes stewardship activities aimed at the protection and recovery of the listed species (Government of Ontario, 2007).

The legislation and committees involved in the protection of Species at Risk, classify the species into categories; extinct, extirpated, endangered, threatened, and special concern. Listed species may have a different status in different areas of the country, depending on population size and habitat. For the purposes of this report, species that have been listed under federal or provincial legislation have been included.

Common stressors for lake ecosystems include invasive species, development, and climate change. While wildlife sightings are good confirmation of presence, if suitable wild areas are preserved and enhanced, these at-risk populations will grow. It is important to conserve

shoreline vegetation and woody debris and reduce pollution to maintain healthy aquatic communities. Taking steps to naturalize the critical ribbon of life will make a difference to wildlife, including species at risk (Cataraqi Conservation, 2022).

Ontario Species at Risk Categories of at-Risk Status	
Extirpated	Lives somewhere in the world, and at one time lived in the wild in Ontario, but no longer lives in the wild in Ontario.
Endangered	Lives in the wild in Ontario but is facing imminent extinction or extirpation.
Threatened	Lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it.
Special Concern	Lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.

(Ontario, 2017)

Table # lists the species that have been identified within the Dog and Cranberry Lake watershed through previous biological inventories undertaken by the Cataraqi Conservation Authority and partners. Additional Species at Risk may be present in the area and some species listed may not be currently present although listed in various databases.

Common & Scientific Name	Status
Bobolink (<i>Dolichonyx oryzivous</i>)	Threatened
Cerulean Warbler (<i>Setophaga cerulea</i>)	Threatened
Eastern Meadowlark (<i>Sturnella magna</i>)	Threatened
Henslow's Sparrow (<i>Ammodramus henslowii</i>)	Endangered
Wood Thrush (<i>Hylocichla mustelina</i>)	Special Concern

Reptiles & Amphibians	
Eastern Milksnake (<i>Lampropeltis triangulum</i>)	Currently Not at Risk
Gray Ratsnake (<i>Pantherophis spiloides</i>)	Threatened
Eastern Musk Turtle (<i>Sternotherus odoratus</i>)	Special Concern
Northern Map Turtle (<i>Graptemys geographica</i>)	Special Concern
Snapping Turtle (<i>Chelydra serpentina</i>)	Special Concern
Blanding's Turtle (<i>Emydoidea blandingii</i>)	Threatened

10.9 Invasive and Nuisance Species

Flora and fauna species that have been introduced to an area, but originate from other parts of the world, can be detrimental to the health of an ecosystem. Some non-native species can become well established in the new environment, and disrupt the native species, at which point they are classified as invasive species. Invasive species can out-compete native species for resources, such as food and habitat, and introduce new diseases and parasites. Invasive species will often take over, or invade an area upon introduction, often because they have no known enemies in their new environments. Some species, such as Eurasian Milfoil, can form colonies so thick they disrupt recreational activities, such as boating and swimming, by choking navigation channels and popular swimming areas. Invasive organisms reduce the biodiversity of an area by crowding out native species through predation, parasitism, disease, and competition.

Roadsides are often the first place where invasive plants become established. Navigation channels are popular routes for boat travel from near and far and boat launches provide lake access for boats that may not have been cleaned of invasive plants parts / seeds or small invasive species. There is a very limited window when an invasive species arrives in a new environment to act and prevent a population from establishing. Earlier detection and action are key to successful invasive species control (Cataraqui Conservation, 2022).

The ranking outlined in the table below is based on the following to account for risk factors that can be measured with available desktop datasets. A final score up to five is assigned. Quantification of the relative risk of invasive species exposure that accounts for road

proximity, navigation channels and boat launches. Each of the three exposure components are scored separately and then averaged for each lake. ’

Score	Rank	Factor 1: Roads		Factor 2: Navigation Channel	Factor 3: Boat Launches
		Proximity (m)	Length (m)		
0	Very Low	More than 1,000	To qualify for inclusion, the length of road must be at least 5% of lake shoreline length. The closest road meeting the minimum length threshold is used to classify.	No	0
1	Low	300 to 999		Direct boat travel to the lake from another lake with a navigation channel is possible, but only with a small boat or canoe.	One boat launch with roadside parking
2	Moderate	150 to 299		Direct boat travel to the lake from another lake with a navigation channel is possible.	More than one boat launch with roadside parking
3	High	10 to 149		A navigation channel passes through only a small section of the lake(e.g., a bay)	One boat launch with dedicated parking
4	Very High	Less than 10		A navigation channel traverses the lake	More than one boat launch with dedicated parking
Invasive Species Exposure Score = Average of the 3 Factor Scores					

Cranberry Lake has a ranking of 2 and experiences relatively moderate exposure to close roadsides, boat launches or navigation channels. Invasive species introduction is possible from these and other sources such as gardening and from upstream lakes and rivers, as well as from wildlife. Dog Lake has a ranking of 3 with relatively high exposure to close roadsides, boat launches or navigation channels. Invasive species introduction is possible from these and other sources such as gardening and from upstream lakes and rivers, as well as from wildlife. Listed below (Table #) are invasive species that are either already present or possess the potential of spreading to the Dog and Cranberry Lake area.

<u>Species Type</u>	<u>Common & Scientific Name</u>
Terrestrial Plants	Garlic mustard (<i>Alliaria petiolata</i>)
	Smooth brome (<i>Bromus inermis</i>)
	Coltsfoot (<i>Tussilago farfara</i>)
Animal, Aquatic	Zebra mussel (<i>Dreissena polymorpha</i>)

	Spiny waterflea (<i>Bythotrephes longimanus</i>)
Aquatic Plants	Eurasian water-milfoil (<i>Myriophyllum spicatum</i>) Purple Loosestrife (<i>Lythrum salicaria</i>)

Zebra Mussels

Zebra mussels are currently found within the Dog & Cranberry waterbody and are believed to have colonized the lake since the early 2000's. Zebra mussels may exert a great impact on the lake ecosystem. Since they are filter feeders, they will remove sediment and suspended particles from the water column, in the process increasing water clarity. Increased water clarity will mean that sunlight will penetrate deeper into the water, increasing vegetation growth in the lake. Zebra mussels have undoubtedly affected the water quality, clarity, and chemistry of Dog & Cranberry Lake and may have already reached a stable population within the lake.

Spiny Water Flea

Spiny water flea is found in the Great Lakes and in more than 100 inland lakes in Ontario. Because their main diet is zooplankton, they reduce food supplies for small fish and the young of sport fish such as bass and yellow perch. They are easily spread between waterbodies on angling equipment, in bait buckets, in live wells and bilge waters. Spiny water flea introductions can result in an average of 30 to 40 percent decline in native populations of zooplankton, many of which feed on algae. This decline in zooplankton allows for increased growth of algae and possibly the production of algal blooms. They also affect recreation angling, as their tail spines catch on fishing equipment, making it difficult to reel in lines.

European Common Reed – *Phragmites australis* ssp *australis*

Invasive species may exert a greater impact on lake and watershed ecology in the future, with disruptions that may be evident to residents and end up having an associated economic cost. The European common reed or invasive *Phragmites* is an aggressive plant that spreads quickly and outcompetes native species for water and nutrients. This plant species grows well in areas of standing water and releases toxins from its roots to hinder the growth of and kill surrounding plants (Ontario Invading Species Awareness Program, 2016). Furthermore, by altering habitat structures, the introduction of this species can have various negative



impacts on native fauna. The European common reed is an example of a prominent invasive species that spreads quickly on its own, or through inadvertent introduction. This invasive plant species is very difficult to control and, when established along shorelines, may screen people's views of the lake. A sighting of invasive Phragmites reported on June 30, 2023, to the community science tool EDDMapS was verified on July 4, 2023, indicating that this species has already established itself on this lake. Furthermore, anecdotal reports indicate that it is common along the roadways of the area.



Continued monitoring and education regarding environmentally responsible boat transportation practises and invasive species identification are essential to reduce the spread of these species in the Dog and Cranberry Lake area and affect the natural environment.



Dog Strangling Vine

The name Dog Strangling Vine, refers to two invasive terrestrial plants (Black Swallowwort and Pale Swallowwort) native to Eurasia. Dog Strangling Vine thrives in open sunny areas, but can also grow well in lightly shaded areas. This species grows very aggressively up to two metres in height by wrapping itself around trees and other plants. Dense patches of this species possess the ability to outcompete and strangle plants and small trees. This vine species has invaded hillsides, stream banks, and roadsides, spreading rapidly since its seeds are easily spread by wind. Dog strangling vine may form dense stands that outcompete native plants and young trees reducing biodiversity. This species also threatens the Monarch Butterfly, a Species at Risk, as butterflies lay their eggs on the plant, but the larvae are unable to complete their life cycle and do not survive (OISAP, 2016).

Emerald Ash Borer

Of significant concern is the Emerald Ash Borer, a non-native insect that has made its way southeastern Ontario. The emerald ash borer is a green beetle native to Asia and Eastern Russia. Outside its native region, the emerald ash borer is an invasive species and is highly destructive to ash trees in its introduced range. Frontenac County lies within the boundaries of the Emerald Ash Borer Regulated Area of the Canadian Food Inspection Agency.

The presence of the Emerald Ash Borer could have a significant impact on the natural features around the lake given that ash trees are a popular ornamental tree in the cottage areas (since they are moisture tolerant) and are also a predominant species in lowland hardwood ecosystems including shoreline wetland areas. The expected loss of ash trees could provide opportunity for other invasive species such as buckthorn to take their place (OISAP, 2016).

Spiny Water Flea

Spiny water flea are found in the Great Lakes and in more than 100 inland lakes in Ontario, because their main diet is zooplankton, they reduce food supplies for small fish and the young of sport fish such as bass and yellow perch. They are easily spread between waterbodies on angling equipment, in bait buckets, in live wells and bilge waters. Spiny waterflea introductions can result in an average of 30 to 40 percent decline in native populations of zooplankton. They also affect recreation angling, as their tail spines catch on fishing equipment, making it difficult to reel in lines.

Round Goby

The round goby is a small fish that prefer waters with rocky and sandy bottoms. They feed aggressively on insects and other small organisms found on lake and river bottoms. Adult round goby eat large quantities of zebra and quagga mussels, and occasionally small fish and fish eggs. Their aggressive eating habits and ability to spawn several times each season have helped them multiply and spread quickly. The round goby's aggressive habits and rapid spread have had serious impacts on native species. The fish compete with and prey on native bottom-dwelling fish such as mottled sculpin (*Cottus bairdii*) and logperch (*Percina caprodes*). Round goby also threaten several species at risk in the Great Lakes Basin, including the northern madtom (*Noturus stigmosus*), the eastern sand darter (*Ammocrypta pellucida*), and several species of freshwater mussels. Round goby have reduced populations of sport fish by eating their eggs and young and competing for food sources. Researchers believe the round goby is linked to outbreaks of botulism type E in Great Lakes fish and fish-eating birds. The disease is caused by a toxin that may be passed from zebra mussels, to goby, to birds, resulting in large die-offs of fish and birds.

10.10 Wildlife

The presence of wildlife and wildlife habitat is important for the sustainability of the lake environment. A diverse natural environment is often what draws people from urban areas to rural lakes such as Dog and Cranberry Lake. It is important to protect these natural places both for the ecological services they provide, as well as for the intrinsic value they hold for

society. Dog and Cranberry Lake and surrounding subwatersheds are located entirely within the Wildlife Management Unit-67. Wildlife Management Units are delineated based upon geographic rather than administrative boundaries in order to allow for homogenous management of wildlife. The primary concern for wildlife management within the Dog and Cranberry Lake area and surrounding subwatershed is habitat destruction. Wildlife habitat may be lost or degraded due to a variety of factors including timber harvesting, mining activities, lakeshore development, and shoreline alterations.

- Cranberry Lake: American Eel, Barn Swallow, Bobolink, Cerulean Warbler, Eastern Meadowlark, Eastern Milksnake, Eastern Musk Turtle, Gray Ratsnake (Frontenac Axis population), Henslow's Sparrow, Midland Painted Turtle, Northern Map Turtle, Snapping Turtle, Wood Thrush
- Dog Lake: American Eel, Blanding's Turtle, Bobolink, Eastern Meadowlark, Eastern Milksnake, Eastern Musk Turtle, Gray Ratsnake (Frontenac Axis population), Henslow's Sparrow, Midland Painted Turtle, Northern Map Turtle, Snapping Turtle, Wood Thrush

Mammals

The Dog and Cranberry Lake is home to numerous species of large and small mammals. Dog and Cranberry Lake lies within one of the most bio-diverse regions in Canada due to the unique and rare habitats it provides for numerous plant, fish, bird and animal species (FABN, 2011). Previous biological inventories and local residents within the area have identified a variety of small and large mammals listed in the following table xxxx

table of mammals

Birds

The diverse environment surrounding Dog and Cranberry Lake provides habitat to numerous bird species. Some bird species occupy the lake for the entire year, while others are seasonal occupants, either during their breeding season or during migration. Wetlands provide exceptional habitat for waterfowl, during migration staging, molting, and breeding. Wetlands and open water also provide good habitat for other water or near shore birds, providing nesting locations and food sources to species including the Osprey and Common Loon. The Dog and Cranberry Lakes vicinity and surrounding catchment area are home to numerous bird species. Previous biological inventories and local residents within the area have identified numerous bird species listed below (Table xx).

Reptiles and Amphibians

The diverse habitat surrounding the shores of Dog and Cranberry Lake, from wetland areas to upland forest provide suitable habitat for a number of reptile and amphibian species. Due to their sensitivity to suitable habitat, several amphibian species are considered keystone species and are reflective of the overall ecosystem health. Previous biological inventories and observations by local residents have identified numerous reptile and amphibian species listed below (Table xxx)

Within the past two decades, there has been a noted decline in global frog populations. The decline of amphibian populations and the loss of biological diversity has been linked to climatic and landscape changes, such as acid rain, greenhouse gases, habitat loss, stream channelization, and effluents leaching into wetlands. Amphibians are particularly at risk because they require both healthy aquatic and terrestrial habitats to fulfill life-cycle requirements. Turtle and snake species populations have also experienced decline because of habitat loss due to development encroachment, road traffic, and direct persecution. Many turtles lay their eggs in-ground nests, which are heavily predated by both terrestrial and aquatic mammals. Along gravel roadsides and trails, adult turtles are often killed by on-coming traffic prior to or after the laying of eggs. The gravel substrates comprising many lanes around the two lakes provide vast areas of suitable habitat for nesting of various turtle species including the Snapping, Painted and Blanding's turtles. Turtles burrow into shoreline sediments, bottoms of ponds, and other warm places where temperatures remain above freezing (typically at 4°C) during winter hibernation. If drawdown exposes these warm places to freezing and drying air temperatures, burrowed animals could become frozen in the lake's sediment. Snakes on the other hand are often injured or killed purposefully because of fear and misidentification.

The Dog and Cranberry Lake area is home to a rare and threatened snake species, the Gray Rat Snake. The Gray Ratsnake is also known as the Black Ratsnake or the Eastern Ratsnake. This snake species is non-venomous, and is Ontario's largest snake, able to reach lengths up to 2 meters. The snake is known to occur only in a portion of eastern Ontario. Threats to the Frontenac Axis population of Gray Ratsnakes include the loss and fragmentation of suitable habitat as well as direct persecution by uninformed individuals. Several other threats pose risks to the Gray Ratsnake population including motor vehicles and the destruction of suitable hibernation sites (Ontario, 2016)

10.11 Observations – Natural Environment

- Dog and Cranberry Lake contains a strong biodiversity of plants and animals, partly because it lies at the boundary between limestone bedrock and granite of the Frontenac Arch.
- The Love Your Lake Program surveys of both Dog and Cranberry Lake has concluded that their riparian zones are very healthy with the vast majority being either natural or regenerative.
- The area south and southwest of the lakes have been cleared of dense forest systems and are primarily developed for agricultural purposes while areas to the north on the Canadian Shield remain relatively dense undeveloped coniferous and mixed forest systems with a few scattered fields
- Dog and Cranberry Lake contain substantial areas of wetlands none of which have been evaluated.
- Dog and Cranberry Lake contains a relatively high number of species and community types as well as numerous Species at Risk
- Dog and Cranberry Lake lies completely within the Frontenac Arch Biosphere Reserve, which has been described as one of the most bio-diverse regions in Canada.
- Dog and Cranberry Lake contain a number of invasive species and are vulnerable to more invasions

10.12 Recommendations for Lake Plan Actions

- Conduct a thorough inventory of flora and fauna especially wetlands
- Conduct an inventory of bass nesting sites.
- Conduct a littoral zone habitat survey
- Undertake monitoring and research of Species at Risk and Invasive Species
- Conduct an evaluation of unevaluated wetlands under the Ontario Wetland Evaluation Service (OWES) to determine provincial and regional significance.
- Provide information and education to property owners about the protection and rehabilitation of shoreland areas.
- Work with Watersheds Canada for shoreline naturalization. <http://watersheds.ca/our-work/the-natural-edge/>
- Encourage Parks Canada to establish a boat-washing station at the boat launch at Upper Brewers Lockstation to reduce the spread of invasive species into and out of Cranberry Lake and the commercial resorts on both lakes.
- Establish an intensive education program re. invasive species
- Monitor the spread on phragmites and take action to remove small patches before they become larger.

- Monitor for other invasive species that may spread to Dog and Cranberry Lake and report sightings immediately.
- Quantify lower order tributary vegetative buffers would be ideal to include as it would help to ID areas for restoration.
- Continue the Annual Plant Sale to encourage gardening with native plants.
- Take steps to remove invasive species when appropriate, acquiring permits as needed and taking into consideration the best management practices for the species.
- Conduct a near-shore in water survey with help from Cataraqui Conservation to better understand the current distribution of plant species along the shoreline and provide data for future comparison.

11. FISHERY

Lakes can host a variety of warm, cool and cold-water fish. Each fish species has its own habitat requirements with some making use of shallow areas dominated by aquatic plants and soft sediment while others rely on clear rocky areas. In addition to larger fish, there are a variety of minnows supplementing the food chain along the shallow shoreline areas. Maintaining a natural shoreline and nearshore area is critical for fish survival. Making changes upland, in connecting streams or in the lake itself all impact the lake environment and the fish that live there. Some common activities are listed below which are known to have negative effects like warming the water, removing needed habitat, degrading water quality and reduce overall fish health.

Upland activities:

Vegetation clearing
 Grading
 Stream and lakeside livestock grazing

In-water activities:

Removal or addition of aquatic vegetation
 Dredging
 Structure removal (i.e., rocks, logs)

The table below (table #) provides a list of fish previously caught on Dog and Cranberry Lake along with their thermal class.

Fish Species	Cranberry Lake	Dog Lake	Thermal Class
Herring (<i>Clupeidae</i>)			
Alewife	Yes	Yes	N/A
Carp & Minnows (<i>Cyprinidae</i>)			
Golden Shiner	Yes	No	Warm water
Killifish (<i>Fundulidae</i>)			
Banded Killifish	No	Yes	N/A
Pike, Pickerel and Mudminnows (<i>Esocidae</i>)			
Northern Pike	Yes	Yes	Cool water
Trout & Salmon (<i>Salmonidae</i>)			
Lake Trout	No	Yes (since extirpated)	Cold water
Rainbow Trout	No	Yes (since extirpated?)	Cold water
Splake	No	Yes	Cold water
Cisco	No	Yes	N/A
Bowfin (<i>Amiidae</i>)			
Bowfin	No	Yes	Warm water
Suckers (<i>Catostomus</i>)			
White Sucker	No	Yes	Cool water
Perches & Darters (<i>Percidae</i>)			
Yellow Perch	Yes	Yes	Cool water
Sunfishes & Basses (<i>Centrarchidae</i>)			
Smallmouth Bass	Yes	Yes	Cool water
Largemouth Bass	Yes	Yes	Warm water
Rock Bass	Yes	Yes	Warm water
Pumpkinseed	Yes	Yes	Warm water
Bluegill	Yes	Yes	Warm water

Black Crappie	Yes	Yes	Cool water
North American Catfish (<i>Ictaluridae</i>)			
Brown Bullhead	Yes	Yes	Warm water

Originally, the northern basin of Dog Lake supported a native lake trout population owing to favourable conditions. This population has largely disappeared as a result of overfishing and deterioration of water quality. The lake is now managed as a put and take splake fishery along with warm water species predominantly largemouth bass. The Ministry of Northern Development, Natural Resources and Forestry has undertaken stocking of splake in Dog Lake since 2001. Splake is a hybrid trout, a cross between brook trout and lake trout. These fish that do not reproduce naturally, are able to survive in the northern basin of Dog Lake and thus contribute to the range of angling opportunities on the lake.

Fishing for large mouth bass is the predominant angling activity on Dog and Cranberry Lakes. Conditions and habitat for bass is ideal and the population is healthy and self-sustaining. Fishing for black crappie appears to be popular in the spring. A number of fishing tournaments take place on the lake every year.

Table xxx Dog Lake stocking history

- 25,000 Lake Trout in 1935
- 25,000 Lake Trout and 1000 Small Mouth Bass in 1937
- 100 Small Mouth Bass in 1938
- 20,000 Lake Trout in 1939
- 5,000 Large Mouth Bass in 1940
- 2,000 Lake Trout and 10,000 Small Mouth Bass in 1941
- 5,000 Lake Trout and 1,000 Small Mouth Bass in 1942
- 1,000 Lake Trout in 1943
- 2,000 Small Mouth Bass in 1948
- 100,000 Pickerel and 200 Small Mouth Bass in 1949
- 200,000 Pickerel and 500 Small Mouth Bass in 1950
- 1,000 Lake Trout and 5,000 Large Mouth Bass in 1951
- 1,000 Lake Trout, 10,750 Large Mouth Bass and 400 Small Mouth Bass in 1952
- 5,000 Lake Trout and 1,000 Small Mouth Bass in 1953
- 500 Lake Trout, 1,200 Large Mouth Bass and 1,800 Small Mouth Bass in 1954
- 1,000 Lake Trout in 1956
- 500 Lake Trout and 1,200 Large Mouth Bass in 1954
- 1,000 Lake Trout in 1956

500 Small Mouth Bass in 1959
2,000 Lake Trout in 1962
950 Lake Trout in 1967
950 Lake Trout in 1968
3,000 Lake Trout in 1982
1,000 Lake Trout in 1983
5,000 Lake Trout and 4,000 Rainbow Trout in 1984
4,000 Rainbow Trout and 5,000 Splake in 1985
4,000 Rainbow Trout and 5,000 Splake in 1986
5,000 Splake in 1987
3,800 Rainbow Trout and 9,250 Splake in 1988
10,100 Splake Yearlings in 1989
10,100 Splake Yearlings in 1990
15,250 Splake Yearling in 1991
16,400 Splake Yearlings in 2001
Missing Data between 2001 and 2012 or no stocking occurred
9,000 Splake Yearlings in 2012
10,400 Splake Yearlings in 2014
25,000 Splake Yearlings in 2016
25,333 Splake Yearlings in 2018
25,000 Splake Yearlings in 2020
23,000 Splake Yearlings in 2022

Table xxx Cranberry Lake stocking history

100,000 Pickerel in 1923
300 Small Mouth Bass in 1927
1,000 Small Mouth Bass in 1939
1,000 Small Mouth Bass in 1940
12 Small Mouth Bass in 1941
1,000 Small Mouth Bass in 1942
3,000 Small Mouth Bass in 1946
3,000 Small Mouth Bass in 1948
200 Small Mouth Bass in 1949
200,000 Pickerel and 500 Small Mouth Bass in 1950
5,000 Large Mouth Bass and 2,000 Small Mouth Bass in 1951
200,000 Pickerel, 10,750 Large Mouth Bass and 600 Small Mouth Bass in 1952
2,000 Small Mouth Bass in 1953
1,200 Large Mouth Bass and 1,800 Small Mouth Bass in 1954
5,000 Small Mouth Bass 1955

Originally, the northern basin of Dog Lake supported a native lake trout population owing to favourable conditions. This population has largely disappeared as a result of overfishing and deterioration of water quality. The lake is now managed as a put and take splake fishery along with warm water species predominantly largemouth bass. The Ministry of Northern Development, Natural Resources and Forestry has undertaken stocking of splake in Dog Lake since 2002.. Splake is a hybrid trout, a cross between brook trout and lake trout. These fish that do not reproduce naturally, are able to survive in the northern basin of Dog Lake and thus contribute to the range of angling opportunities on the lake.

Fishing for large mouth bass is the predominant angling activity on Dog and Cranberry Lakes. Conditions and habitat for bass is ideal and the population is healthy and self-sustaining. Fishing for black crappie appears to be popular in the spring. A number of fishing tournaments take place on the lake every year.

11.1 Threats to Fish Population

Shoreland development

Development along the shoreline and in the water can cause harmful alteration to fish habitat. Shoreland property owners should be aware of best management practices to be followed when constructing new or replacing existing infrastructure. Permits from Parks Canada should be obtained for all in water works to ensure protection of fish habitat. Cataraqui Conservation provides information to shoreline property owners about best management practices to keep shorelines natural.

Angling Pressure and Fish Tournaments

In cooperation with local fishing guides and the Ministry of Northern Development Natural Resources and Forestry, the Dog and Cranberry Lake Association has identified a number of bass spawning areas so that fishermen can avoid these areas in the spring when fishing for other species. These locations have a sign requesting that fishing should not occur there until the opening of bass season.

Community members have indicated a concern about the impact that fishing tournaments may have on the fish population, shoreland residents and other recreational activity. However, limited information is available about past tournaments and who the organizers are. When

fishing tournaments are organized, information about expected conduct (speed limits, boat wakes, fishing near docks) should be made available to tournament organizers and distributed to participants. Recently, the Dog and Cranberry Lakes Association joined the Lakes Association Coalition on Fishing Tournaments. This group of 5 lake associations was formed 3 years ago to address concerns about fishing tournaments with a view to finding solutions.

Their goal is :

- Advocate for a balance in frequency and intensity of fishing tournament events on our lakes
- Reducing stress on fish populations
- Improving lake safety
- Reducing boat noise
- Reducing social tensions between anglers and lakefront property owners
- Collaboratively work to find solutions

Invasive Species

Invasive species have an impact on the biology of a lake and can impact fish populations. Known invasive species in Dog and Cranberry Lake include zebra mussels and Eurasian milfoil. Possible threats that may impact fish species include Spiny Water flea and Round Goby (see Section XXX Invasive Species).

11.2 Recommendations for Lake Plan Action

- Work with Cataraqui Conservation to educate shoreline property owners about the use of best management practices when constructing near the shoreline or in the water.
- Engage fishing tournament organizers to formulate appropriate rules/regulations to minimize the impact of these events on the natural environment and overall well being of the lake.
- Request that NDMNRF provide increased enforcement of fishing and ice fishing regulations.
- Undertake an inventory of fish habitat and post signs at critical spawning areas

12. Land Use

12.1 Current Land Use

The land uses found immediately along the shoreline of the two lakes include permanent and seasonal residential, agricultural, resort and vacant lands. An inventory of shoreland properties was undertaken using the property line (parcel fabric) information provided by the Township of South Frontenac (Map 12.x) and the City of Kingston. Table 12.1 illustrates the number of shoreline properties on the mainland and islands, grouped by type of zone category. The inventory included properties with 2 zones (e.g., Environmental Protection and residential) were inventoried as residential. In total there are 521 properties surrounding Dog and Cranberry Lakes within the Township of South Frontenac of which 430 are developed and 24 properties within the City of Kingston of which 17 are waterfront lots.

Table 12.1

The breakdown by lake is as follows:

Township of South Frontenac

Dog Lake

Developed waterfront lots (Zoned waterfront residential or Limited service residential):	330
Vacant waterfront lots:	78
Total residential lots:	408

Cranberry Lake

Developed Waterfront lots:	89
Vacant residential waterfront lots:	0
Total:	89

Other properties (rural, agricultural, commercial)	91
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City of Kingston

Developed waterfront lots:	17
Vacant waterfront lots	4
Other properties:	13

12.2 Potential for Development

There are two forms of development that could occur on these waterbodies - new development and redevelopment. New development refers to lot creation and building new residential, commercial or industrial buildings on vacant properties. New development requires a building permit and often a planning approval to be obtained from the Township, such as a severance application or zoning by-law amendment. Re-development includes the rebuilding or expansion of existing buildings. New development is required to conform to the following policies.

- Lot Creation - The Official Plan and Zoning By-law for South Frontenac requires a minimum of 90 m (300 ft) of shoreline frontage for new residential properties. The zoning map shows that a number of large parcels are currently zoned rural. These can be severed into a maximum of three lots, any more will require a plan of subdivision.
- Building on Vacant Lots - A lot on record either waterfront residential or limited service residential can be developed for a single family resident. Lands zoned rural can be developed as long as they meet the requirements of the zoning bylaw.
- Expansion of Existing Commercial Resorts - The 5 existing Resort Commercial Operations are at the maximum number of accommodation units permitted by the Zoning By-law and there is very limited room on these properties to permit expansion. Any increase in the number of accommodation units would require a zoning amendment.
- New Resort commercial development requires a minimum frontage of 250 ft along the shoreline, along with studies and other requirements.

Re-development - There are many opportunities for the redevelopment of existing properties on these waterbodies, including:

- Rebuilding or expansion of residential uses - The rebuilding or expansion of all existing structures can occur in accordance with the requirements in the zoning by-law (e.g., setbacks, lot coverage, etc.).
- Bed and Breakfast - BnB's are considered to be home occupations and are permitted in residential zones provided certain provisions of the by-law are met.

12.3 Official Plan and Zoning By-law

12.3.1 Township of South Frontenac

The following selective policies in the current draft official plan are relevant to the lake stewardship plan.

The Official Plan and Schedule 'A' of the current official Plan identifies land use designations along with policies to regulate development. Most of the properties adjacent to Dog and Cranberry Lake are designated as Rural. This designation allows for a variety of residential, agricultural and some commercial land uses. The lands surrounding Milford Bay and the south west corner of Dog Lake are designated as Agricultural. There is one mineral aggregate designation including and surrounding Knapps Camping trailer park on the east side of Cranberry Lake south of Brass Point bridge. There are quite a few Environmental Protection designations to protect a number of small wetlands scattered throughout both lakes.

12.3.2 City of Kingston

Official Plan Land Use Designations

The following excerpts in italics from the Official Plan are provided as a summary of land use policy for the east shore of Cranberry Lake. For more detail, refer to the Official Plan on the city of Kingston website.

Rural

Most of the land fronting onto the east side of Cranberry Lake and along the Cataraqui River is designated as Rural. The goal of this designation is :

- To protect the rural community by balancing the environmental, resource protection, community and economic objectives of land use on Rural Lands, and to permit a range and scale of uses that help to promote the long term growth and viability of the rural community.
- To protect land suitable for agricultural production from scattered development and land uses which are unrelated to agriculture.
- Limited non-farm growth is permitted in Rural Lands if it does not limit or interfere with agricultural use, agriculture-related uses, on-farm diversified uses or a broader range of rural uses, and if it meets the environmental objectives of this Plan.

There are three substantial areas of active farmland between the Round Tail and Brass Point Bridge. The goal and supporting policies strongly favour continued agricultural use of these areas. As these areas do not meet the criteria for estate residential development, there is little likelihood that they would be developed for residential use.

Waterfront Protection

The protection of a 30 metre naturalized buffer along a waterbody, also referred to as a “ribbon of life”, can help to enhance water quality, minimize soil erosion, provide plant and animal habitat, establish connectivity and wildlife corridors, and contribute to the overall health of shoreline ecosystems, particularly fish habitat. The buffer may also be used to screen views of development from the water, and to create natural spaces for passive recreation. This is intended to be a text-based policy and these lands are not required to be shown on a schedule of this Plan to receive protection under this policy. Generally, the “Ribbon of Life” and “riparian corridor”, as identified in Section 6.1.3, apply to the same lands.

Environmental Protection

Two small wetlands have been designated as environmental protection. Both are currently unevaluated.

Hamlet

Brewer’s Mills is designated as a hamlet in the Official Plan. The goal of the hamlet designation is:

To support the quality of life and amenities found in rural Hamlets, and to permit a limited amount of additional development in the Hamlets of Sunnyside, Glenburnie, Brewer’s Mills, Kingston Mills, Elginburg, and Joyceville for the benefit of residents and to assist in providing services for the nearby agricultural community.

The hamlet of Brewers Mills dates to the 1970’s when the former township of Pittsburgh Official Plan was amended to allow the creation of a plan of subdivision on lands between Brewers Mills road and Sunderland Road on both sides of Highway 15. The community consists of individually serviced lots and is mostly built out. Nine of the lots have frontage onto the Cataraqui River. A portion of the hamlet currently undeveloped is designated as significant woodland.

Rural Commercial

The goal of this land use designation is

- *To support the rural and agricultural communities, as well as the tourism industry, in providing a limited amount of larger scale commercial developments in appropriate locations.*

The Rural Commercial designation is intended to permit a variety of larger scale recreational, social and cultural uses and facilities, including golf courses, marinas, greenhouse operations, overnight accommodations, and seasonal campgrounds. Summerland Rideau is a seasonal trailer park with 80 sites, located at the north end on Cranberry Lake. There is no room for additional sites. An expansion would require an Official Plan and Zoning Bylaw amendment.

Natural Heritage “B”

Areas identified as Natural Heritage “B” will be treated as an overlay to land use designations and the land use designations. In these areas, development and site alteration will not be permitted unless it has been demonstrated that there will be no negative impacts on the natural heritage features or areas or ecological functions.

Development and site alteration are not permitted on adjacent lands to Natural Heritage “A” or “B” features shown on Schedules 7 and 8 respectively, unless it has been demonstrated that there will be no negative impacts on the natural heritage features and areas or on their ecological functions. In the review of any development or site alteration, an environmental impact assessment will be required as follows, unless otherwise directed by the City in consultation with the Cataraqui Region Conservation Authority:

- a. within 120 metres of a provincially significant wetland, significant coastal wetlands and other coastal wetlands;
- b. within 50 metres of locally significant wetlands;
- c. within 120 metres of fish habitat;
- d. within 120 metres of significant woodlands;
- e. within 120 metres of significant valleylands;
- f. within 120 metres of areas of natural and scientific interest – life science;
- g. within 50 metres of areas of natural and scientific interest – earth science;
- h. within 120 metres of significant wildlife habitat;
- i. within 120 metres of the habitat of endangered species and threatened species, and
- j. within 120 metres of habitat of aquatic species at risk, in accordance with the Species At Risk Act and as tracked by the Federal Department of Fisheries and Oceans.

The steep wooded shoreland between the developed portion of the hamlet of Brewers Mills and the wetland at the outlet of the Leo Lake Creek is designated as a significant woodland. The two unevaluated wetlands are also natural heritage features "B".

Rideau Canal World Heritage Site

Goal: To recognize and conserve the cultural heritage significance of the Rideau Canal and the fortifications associated with Kingston, and to support the important role of the UNESCO World Heritage Site as a scenic, cultural, natural and tourism resource.

A 30 metre overlay has been applied along the shoreline of the Rideau Canal, measured from the high water mark. Development and land use change within the area subject to the overlay must conform to the policies of this Section and to the overall intent and purpose of this Plan.

The intent of this Plan is to maintain and protect the diversity of natural landscapes and the scenic, natural and tourism resources related to the Rideau Canal in cooperation with other municipalities along the waterway, Parks Canada and other agencies having jurisdiction. It is also the intent of this Plan to assist with implementing the Rideau Corridor Landscape Strategy.

Generally, division of land for new residential development along the Rideau Canal will only be permitted by plan of subdivision. Severances as set out in Section 9.6 of this Plan are allowed in rare instances where it can be demonstrated that potential adverse effects on the Rideau Canal and its environs can be effectively mitigated. This can be done through a heritage impact statement or a visual impact statement and would require approval from the City in consultation with Parks Canada.

The intent of this Plan is to preserve and enhance views to and from the Rideau Canal to maintain the integrity of this unique cultural heritage landscape.

The City is committed to conserving the heritage and visual values of the world heritage site. What is needed is a landscape character assessment to identify and describe the heritage and visual values of the Canal landscape to ensure that new development will not impair its scenic and heritage character.

Zoning Bylaw

The zoning reflects the Official Plan designation. The rural zone allows for single family houses on 1 ha. lots as well as agriculture and forestry. Summerland Rideau is zoned rural commercial.

Brewers Mills is zoned Hamlet only allowing single family homes. The wetlands are zoned as environmental protection.

Analysis

The land use policies of the City of Kingston are sufficiently comprehensive to protect the natural environment and prevent large scale development. The world heritage site policies are supportive but more precise identification of the landscape characteristics would be useful when dealing with individual planning applications.

12.1 Municipal Planning and Land Use

- Continue to advocate for a tree cutting bylaw and other planning mechanisms to preserve shoreland vegetation
- Visibly support the waterfront policies in the official plan for the municipalities wherever possible
- As new research identifies features such as significant wetlands, habitats of species at risk and other natural heritage values, support amendments to the Official plan, the zoning bylaw and other land use controls to protect these features from potentially destructive development
- Work with the Township, the City of Kingston, Conservation Authority, the Nature Conservancy and the Rideau Waterway Land Trust to identify properties that have high value for conservation such as rare and endangered species, critical wildlife habitat and wetlands that could be lost through development.