APPENDIX A

Sandy Lake – Sackville River Regional Park
Planning vision

Recommended boundary of Sandy Lake - Sackville River Regional Park in community context

Municipal land ownership in area of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park boundary

Municipal Land ownership

APPENDIX B

http://sandylake.org/1971-pb-dean-environment-report/

Sandy Lake / Sackville River section

From page 6.

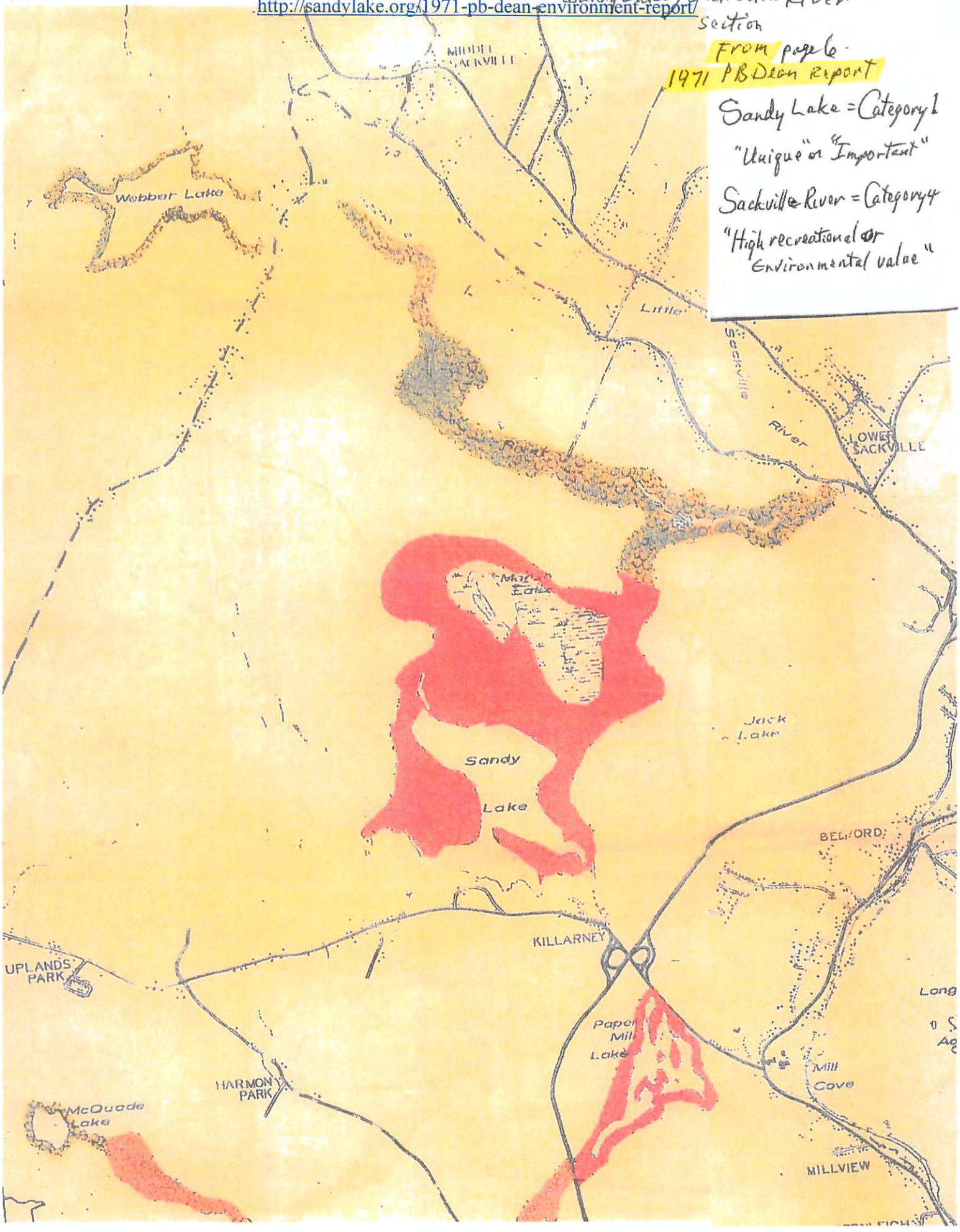
1971 PB Dean Report

Sandy Lake = Category 1

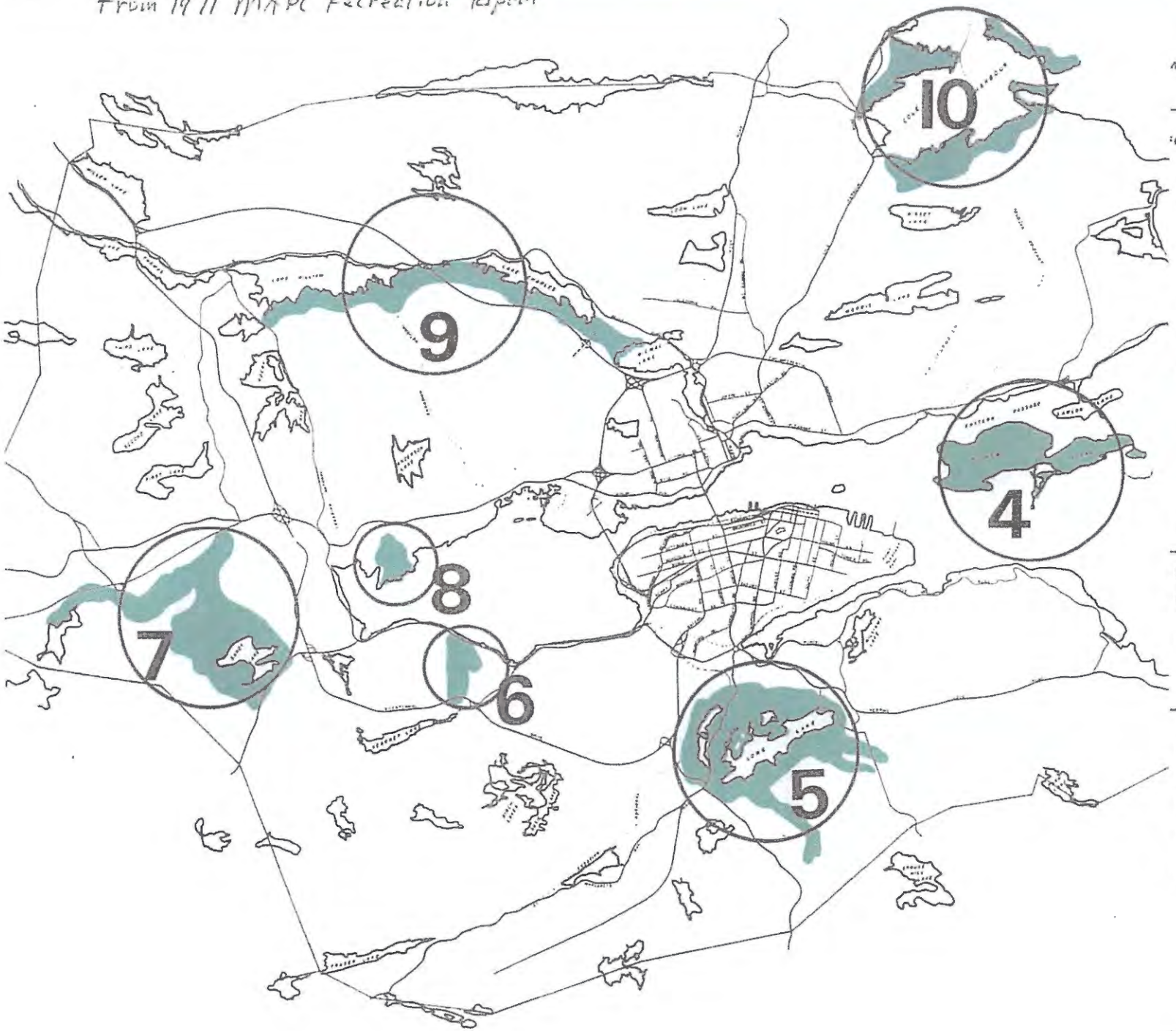
"Unique" or "Important"

Sackville River = Category 4

"High recreational or Environmental value"



From 1971 MAPC "Recreation" Report



MAPC

METROPOLITAN AREA PLANNING COMMITTEE

FOLIO	LOCATION
4	McNAB ISLAND
5	LONG LAKE, CHAIN LAKE WATERSHED
6	HEMLOCK RAVINE
7	MARSH & SANDY LAKES, SACKVILLE FLOOD PLAIN
8	ADMIRAL COVE
9	LAKE WILLIAMS & LAKE CHARLES
10	COLE HARBOUR

NOTE: AREAS APPROX. TO SCALE

N

1 MILE

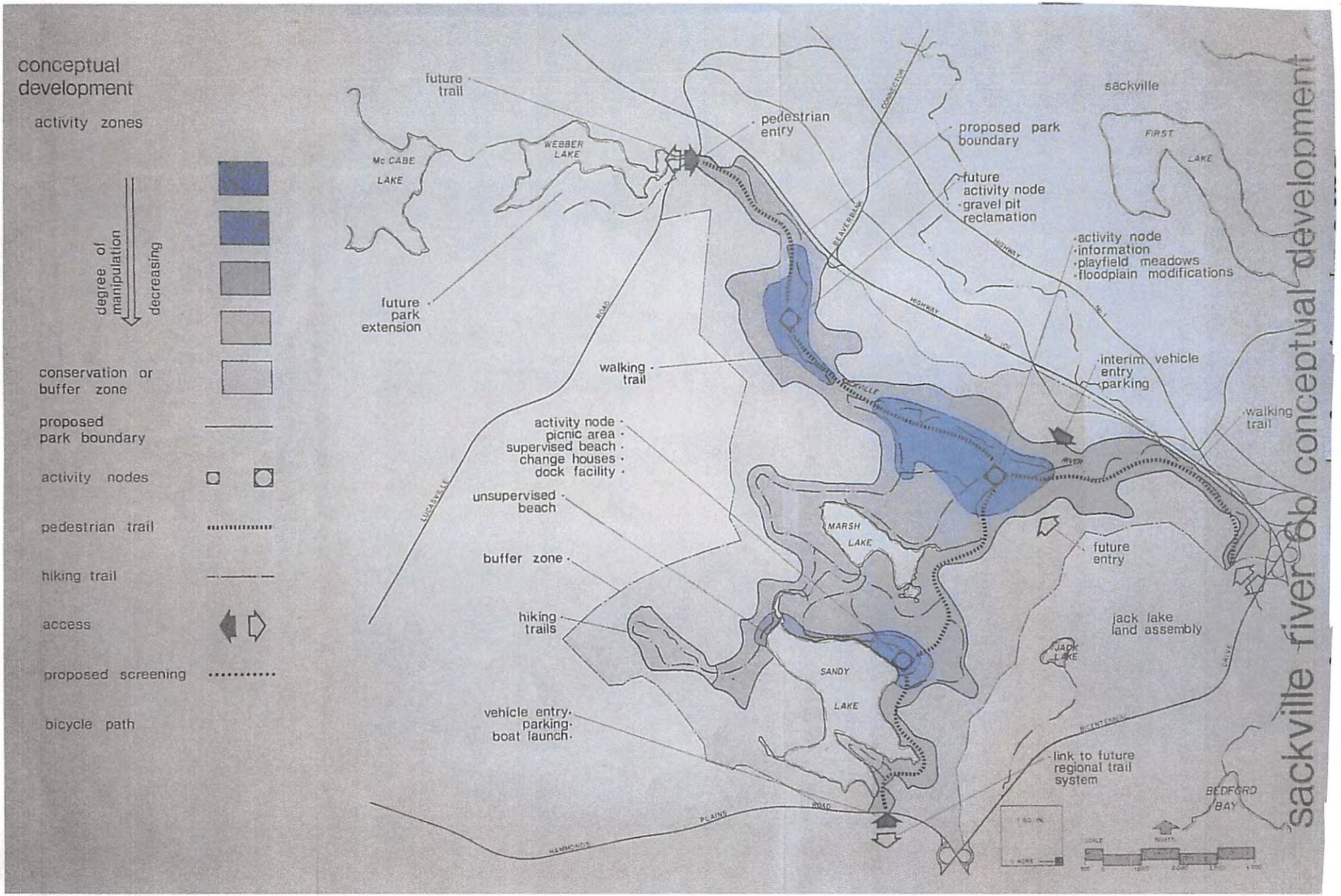
RECREATION WORK GROUP REPORT (DECEMBER 1971)

PETER JACOBS: CONSULTANT

METROPOLITAN PARKS, TRAILS & NICHES

PARK PROPOSALS FOLIO'S 4–10

APPENDIX C http://sandylake.org/1979-halifax-dartmouth-regional-parks-report/



A Collection of Studies done in the Sandy Lake, Bedford, Area

The studies listed add to the Ecological, Recreational and Cultural knowledge of the area. *We did not do a complete article search. This list is compiled from information we had at hand.*

1971, *Natural Environment Survey: A Description of the intrinsic Values in the Natural Environment Around Greater Halifax-Dartmouth.* Dean P. and D. Lister, Canadian Wildlife Service, Dept. of Indian Affairs and Northern Development, Dept. of Fisheries and Forestry. Identified 7 important natural areas to preserve in Greater Halifax-Dartmouth. http://sandylake.org/1971-pb-dean-environment-report/

1971, MAPC (Metro Area Planning Committee) *Recreation Work Group Report*. Proposed 7 Regional Parks for Hfx-Dartmouth. (McNab Island, Long Lake, Chain Lake watershed, Hemlock Ravine, Marsh and Sandy Lakes, Sackville Flood Plain, Admiral Cove, Lake Williams & Lake Charles canal complex, Cole Harbour. http://sandylake.org/1971-mapc-recreation-report-on-7-regional-parks/

1972, MAPC *Water Quality Survey for Selected Metropolitan Lakes*. Description, lake and water quality.

1973, *Natural Land Capability: Halifax-Dartmouth Metro Area. NS*. Dept of Municipal Affairs.

1974, *Ecological Reserves in the Maritimes: Region 7: NS. NB. PEI. Halifax.* Canadian Committee for the International Biological Programme – Conservation Terrestrial Communities Subcommittee.

1975 Halifax-Dartmouth Regional Development Plan defines and separates regional parks and development areas, including the 7 proposed regional parks.

1979, July, Hfx Dart MAPC *Regional Parks Report*, by Parks Advisory Group, identifies 7 proposed Regional Parks – the same as in 1971 but with more detail and Marsh and Sandy Lakes, Sackville Flood Plain park name changed to Sackville River Regional Park. It includes Sandy, Marsh and Sackville River corridor as before, but with a protective buffer around the area. The boundaries and conceptual maps contain half of Jack Lake as part of the buffer area. https://sandylake.org/wp-content/uploads/2018/02/1979-Halifax-Dartmouth-Regional-Parks-Full-Report.pdf.

1982 *Bedford Zoning Bylaws* created to protect land around particularly Sandy Lake from development

1983, Water quality study of Sandy Lake and Bedford Town. Detailed Area Study of Sandy Lake area.

1984, *Natural History of Nova Scotia.* Simmons, L. et. al. NS Department of Education and Department of Natural Resources.

1984, *An Experiment On The Feasibility Of Rehabilitating Acidified Atlantic Salmon Habitat In Nova Scotia By The Addition Of Lime.* W.J. White, W.D. Watt, C.D.Scott, Department of Fisheries and Oceans. (At a time when the entire southern end of the province was losing fish because of acid rain from the US northeast, the scientists dumped industrial levels of limestone into the lake to learn about adjusting pH.)

1986*, Jack Lake Environmental Evaluation Final Report.* CMHC and NS Dept. of Housing. Contains a detailed environmental assessment. http://sandylake.org/document-gallery/

1986, *Canadian Wildlife Service, NS Wetlands Atlas*. Environment Canada.

1988, *Sackville River Historical Research- Environmental Planning V*, NS. Coakley, M., College of Art and Design, Halifax.

1988, *Main Sackville River Watershed Project*. Koenig, M., Environmental Planning, NSCAD.

1989, *A Draft inter-Municipal Planning Strategy for the management of the Sackville River Basin.* Environment Planning Studio IV, NS College of Art and Design, Halifax.

1989, *The Scenic resources of Nova Scotia: A Macro-Scale Landscape Assessment.* Millward, H. and Dawn Allen, Dept. of Geography, Halifax.

1990, April 23, Reconvened session Bedford Town Council: Recreation Advisory Commission requests "environmental study of the sandy Lake watershed area" before use of the Bluewater Lot is developed.

1990, Assessment *of Atlantic Salmon (Salmo Salar, L.) Habitat in the Sackville River, NS, 1986, Canadian Manuscript Report of Fisheries and Aquatic Sciences No. 2059.* Cameron, J.D., Fisheries and Oceans Canada, Halifax.

1990, *Correspondence and reports from the Sandy Lake Area Residents association with the Bedford Water Advisory Committee*, Feb. 25.

1992, A *Quiet Place in the white Man's world*. Edwards, T., Bedford Magazine, October, p.6.

1993, Hammonds *Plains the First 100 Years*. Evans, Dorothy Bezanson, Bounty Print Ltd.

1993, Summary*: Parks and Protected Areas Systems Planning. Lynds, A.,* Nova Scotia Dept. of Natural Resources.

1994, *Towards the Identification of Environmentally Sensitive Areas for Environmental Management: A Case Study in the Sackville River Watershed, Nova Scotia*. Rhea D. Mahar thesis. Sandy Lake is rated as the second most valuable Environmentally Sensitive Area between Bedford Basin and Mt Uniacke. Old Quarry Corridor of the Sackville River is third. https://smu.ca/academics/departments/rhea-d-mahar.html

1994, *Field Surveys.* Mahar, RD.

1995, Sandy *Lake Vegetation Survey and Trail Design,* for the Town of Bedford to aid in and complete the trail design and layout for the area. Basic Elements Ecological Enterprises.

2001, *Environmental Inventory of Sandy Lake, Marsh Lake and Jack Lake*. DalTech and NSCAD Environmental Planning: This was a study of the environmental attributes of the Sandy Lake, Marsh Lake, Jack Lake area "that impact water quality, to analyze the information, and to develop a synthesis of this knowledge to understand how to maintain water quality in the valued habitats of wetlands and watercourses."p.ii https://cdn.dal.ca/content/dam/dalhousie/pdf/faculty/architecture-planning/school-of-planning/pdfs/studentwork/SandyLake/environment01.pdf

2001, February, Sandy *Lake Park Environmental Review*. EDM Consultation Report

2002, Issues *of Urban and Rural Fringe*. DalTech and NSCAD Environmental Planning: This study based on Sandy Lake, Bedford, had three objectives: "1. To review and document the pressures for growth in the urban/rural fringe locally and nationally, and to consider the key approaches being used to respond. 2) To examine demographic and economic trends in the urban/rural fringe of HRM. 3) To examine land use and transportation patterns on the urban/rural fringe of HRM." P.1 http://sandylake.org/wp-content/uploads/2018/02/2002-NSCAD-Issues-of-Urban-and-Rural-Fringe.pdf

2002, *Sandy Lake Community Profile*. DalTech and NSCAD Environmental Planning: This study explored the impacts of development on a community located on the urban fringe. It researched urban growth pressures, demographics, land us patterns (both historical and current), transportation patterns, and community perceptions of the landscape of Sandy Lake, Jack Lake, and Marsh Lake area. http://sandylake.org/wp-content/uploads/2018/02/2002-NSCAD-Sandy-Lake-Community-Profile.pdf

2002, *A Water Quality Analysis*. DalTech and NSCAD Environmental Planning: This report, created by senior Environmental Engineering students from Dalhousie University in 2001-02, involves the examination of Sandy Lake and surrounding area creation of baseline data including dissolved oxygen, pH, total suspended solids, a bathymetric map of the lake, total and fecal coliform, as well as other water quality parameters. http://sandylake.org/wp-content/uploads/2018/02/2002-DALTECH-A-Water-Quality-Analysis.pdf

2002, *Suggestions for managing Development,* DalTech and NSCAD Environmental Planning: This study integrates the information found in the Urban Fringe document and examines the outcomes of different types of development and consequences of each on the Sandy Lake area. http://sandylake.org/wp-content/uploads/2018/02/2002-NSCAD-Suggestions-for-Managing-Development.pdf

2002, *Policy Review and Recommendations,* DalTech and NSCAD Environmental Planning. (This document is missing.)

2004 Bedford West development Subwatershed Management Plan. Contains ecological information on the Sandy Lake area.

2014, October, Sandy Lake Conservation Association *Response to AECOM report*, to accompany the August 2014 *AECOM Sandy Lake Watershed Study* (both were posted on the HRM website) www.sandylake.org

2015, August, *The Off-site Parkland Dedication Request* contains a Conceptual Map for acquiring 160 acres of watershed west of Marsh Lake and the city's rationale for acquiring watershed west of Sandy and Marsh Lakes. http://legacycontent.halifax.ca/council/agendasc/documents/150804ca1114.pdf

2016, *Bedford Land Use Bylaw - A*rchaeological sites identified on lands west of Sandy Lake, Jack Lake, tributaries, and Sackville River. Also includes 1983 5-acres on public road ongoing bylaw.

2016 - ongoing, *A natural history perspective of the forests, wetlands and surface waters of Sandy Lake (Bedford) & Environs. www.sandylakebedford.ca*

2017 & 2018 breeding seasons, *Species of interest to Federal and Provincial conservation bodies observed on surveys conducted on the lake areas of the proposed Sandy Lake-Sackville River Regional Park lands*, by Clarence Stevens. www.sandylake.org

2017 - ongoing, *Compiled Species List for Sandy Lake and Environs,* http://sandylake.org/research/

June, 2018, *HRM Flooding Study (National Disaster Mitigation Program)* Base of Bluewater Road is one of three areas listed as needing mitigation for significant flooding.

August 14, 2018 *Halifax Green Network Plan* is passed unanimously by Halifax City Council. SL-SR have 3 important corridors at the pinch point of the Chebucto Peninsula, and Sandy Lake is a large sub-watershed of the Sackville River Watershed, which is one of the five major natural corridors in HRM.

August, 2018 *Sackville River Floodplain Study Phase 2*. The city must not be planning to develop Sandy Lake area for 100 years because it was not included in the scope of this study.

2019 - ongoing, Water quality regular testing, deep lake readings and surface waters, including tributaries.

2019, Sandy Lake-Sackville River area's old growth Ash trees are to be included in a new undergraduate honours study on Ash tree vulnerability in the urban forest.

2020, January, *Sandy Lake – Sackville River Regional Park Planning Vision*.

2020, March, *Avian and Species at Risk Surveys of the proposed Sandy Lake-Sackville River Regional Park*, Natural Wonders Consulting Firm.

APPENDIX E

Quotes from Studies and Reports: The Sandy Lake area is identified as a unique natural area worth protecting

- **1971, April, P.B. Dean, Natural Environment Survey: A Description of the Intrinsic Values in the Natural Environment Around Greater Halifax –Dartmouth**, classified Sandy Lake and Marsh Lake as a Category 1 area: *"...consists of natural assets that are unique in the Halifax-Dartmouth area or important on a regional or provincial scale. This category includes important wildlife habitats and ecologically rich or fragile areas."* p.6 Dean Report
"Since this lake and its surroundings comprise one of the finest landscape units in the metro area, a large parcel of land has been suggested to protect the lake from adverse development and so that public access and use may be assured. This lake was designated Class 3 for recreation in Canada Land Inventory Recreation Capability Survey and as such received the highest rating of any inland site around the metro area." P. 49 Dean Report
"This area should be reserved immediately for public use before it is irreparably damaged by adverse developments ... Since the land need not be developed (for park) *immediately, considerable flexibility is available in bargaining with owners. It should be emphasised that this is a prime park land-nature reserve site in an excellent landscape setting."* p. 50

- **1971, MAPC Re-creation Report:** *"...to preserve for urban use and enjoyment an unusually clear fresh water lake as well as a productive marsh habitat for wildlife."* P 57-58

- **1994, Towards the Identification of Environmentally Sensitive Areas for Environmental Management: A case Study in the Sackville River Watershed**, Rhea D. Mahar: Sandy Lake rated second out of forty environmentally sensitive sites in the Sackville River Watershed, between Mount Uniacke and the Bedford Basin.
"Sandy Lake, nearest Bedford is probably the one of the finest lakes in the study area. Rolling hills with mature white pine, hemlock, spruce, maple, birch, and beech overlook the sandy beaches." p. 44

- **2002, DalTech and NSCAD Environmental Planning Departments produced six reports that studied environmental attributes of Sandy Lake related to potential development pressures:**
"Years of minimal development have allowed the lake to maintain its natural quality and most of its wildlife species." P. 33, Sandy Lake Community Profile
"Because the outflow from this watershed joins the Sackville River, which is currently being restored as a spawning area for Atlantic Salmon, water quality in this watershed has an influence beyond its boundaries. The wetlands in this watershed help buffer the Sackville river from flooding, and the Jack Lake bog helps maintain water quality and water levels in Paper mill Lake in Bedford." P.1
"Sandy Lake is a source of drinking water and a recreational area for swimming and fishing." The mature tree stands are aesthetically pleasing and "may be a seed source to expand forest diversity." p. 1, Environmental Inventory

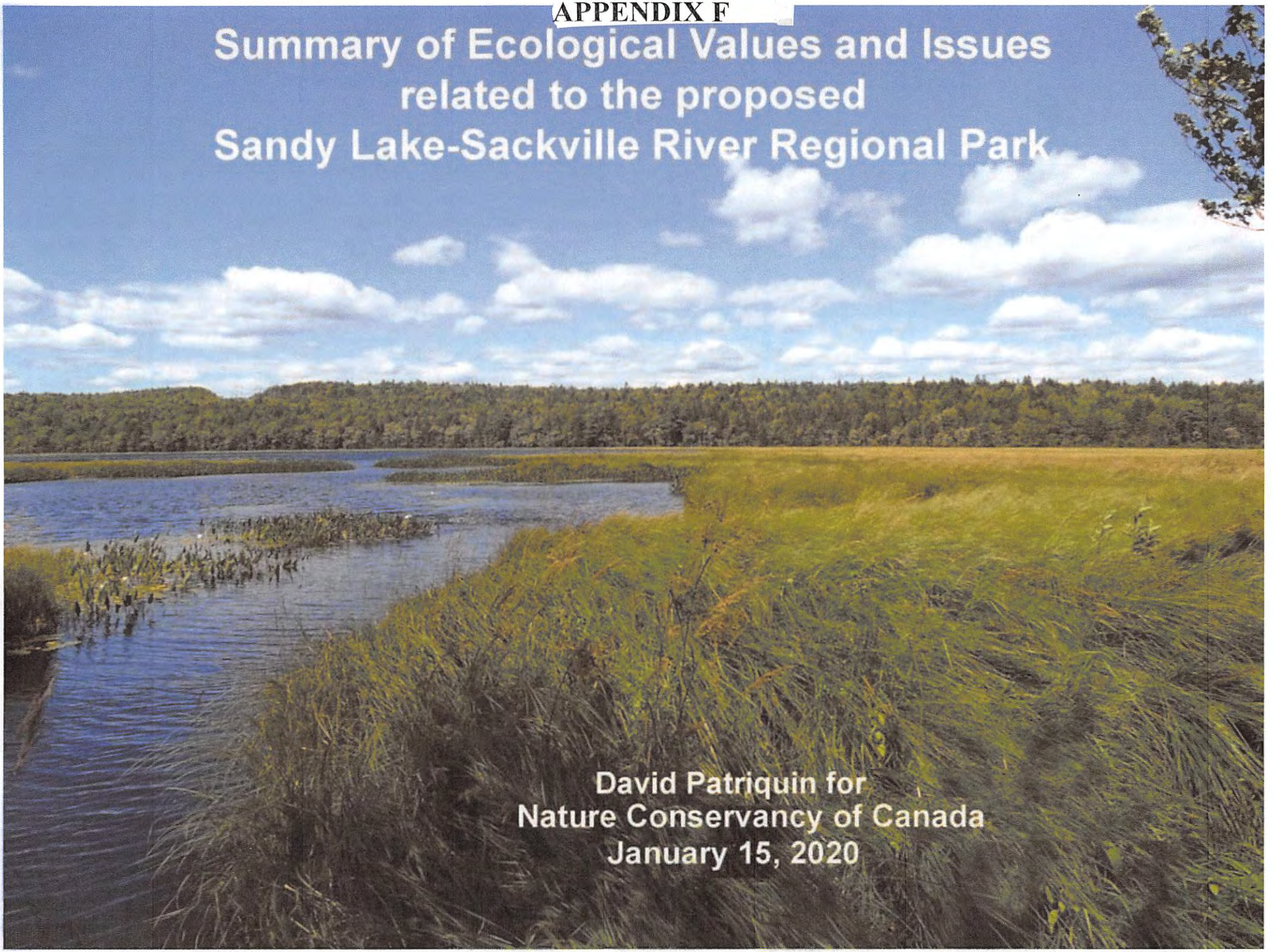
- **2015, Off-site Parkland Dedication Request.** *"This land will serve as a positive move to protect and preserve high value ecological lands associated with the Sackville River Corridor."*

- **2018 - ongoing, Forests and Surface Waters of Sandy Lake & Environs (Bedford, Nova Scotia):** Studies and surveys of the SL-SRRP area. Dr. David Patriquin states, *"I view Sandy Lake and Environs as they were viewed in 1971: an asset to all of Halifax municipality, indeed to the whole province. I see it as a very special place, complementing not replicating other major natural assets of Halifax."* www.sandylakebedford.ca

- **2019, Avian and Species at Risk Surveys of the Proposed Sandy Lake-Sackville River Regional Park**. *"Continued maintenance of this area as natural habitat is also essential for maintenance of water quality, aquatic habitat and flood amelioration in Sandy Lake to Sackville River watercourse and for the Sackville River system itself."* p. 13

APPENDIX F

Summary of Ecological Values and Issues related to the proposed Sandy Lake-Sackville River Regional Park



David Patriquin for
Nature Conservancy of Canada
January 15, 2020

Notes to Accompany Ecological Attributes Presentation January 15, 2020. Dr. David Patriquin

Slide 2: Where – just above the neck of the Chebucto Peninsula, a significant conservation area in its own right

Slide 3: What – as described on the slide

Slide 4: What, Habitats – Forest and surface waters make up prob 90% of more of the 2000+ acres; it includes 3 lakes, Sandy Lake to Sackville River watercourse

Slide 5: It is very mixed Acadian forest. All the major tree species are well represented; and there are many pockets of Old Growth variously with hemlock, white pine, and rich hardwoods (sugar maple, yellow birch, ash) dominant. Age of Old Growth: 140 to ~211 years, relates to historical storms.

Slide 6: It includes SRA in both the terrestrial and aquatic components

Slide 7: Recreation: significant use now of lands east of Sandy Lake, many old logging roads provide natural trails. Great potential given location between Bedford and Sackville area... get people off of the wilderness trails and onto these logging roads

Slide 8: Sandy Lake is relatively deep, stratifies, supports Walter's salmon, likewise the watercourse; SRA has put digger logs in; it is Critical habitat

Major Threat– Development on west side, that area is critical for terrestrial connectivity and habitat and the watercourse for aquatic and riparian connectivity; and as aquatic habitat

Observations on S.Lake show increasing salt, marginal O2 in deeper waters; In the 50s it was Oligotrophic, now mid-mesotrophic...modelling study suggested it could be maintained as mid-mesotrophic with development; I am skeptical, but anyway we should be aiming for Oligotrophic, especially with climate warming.

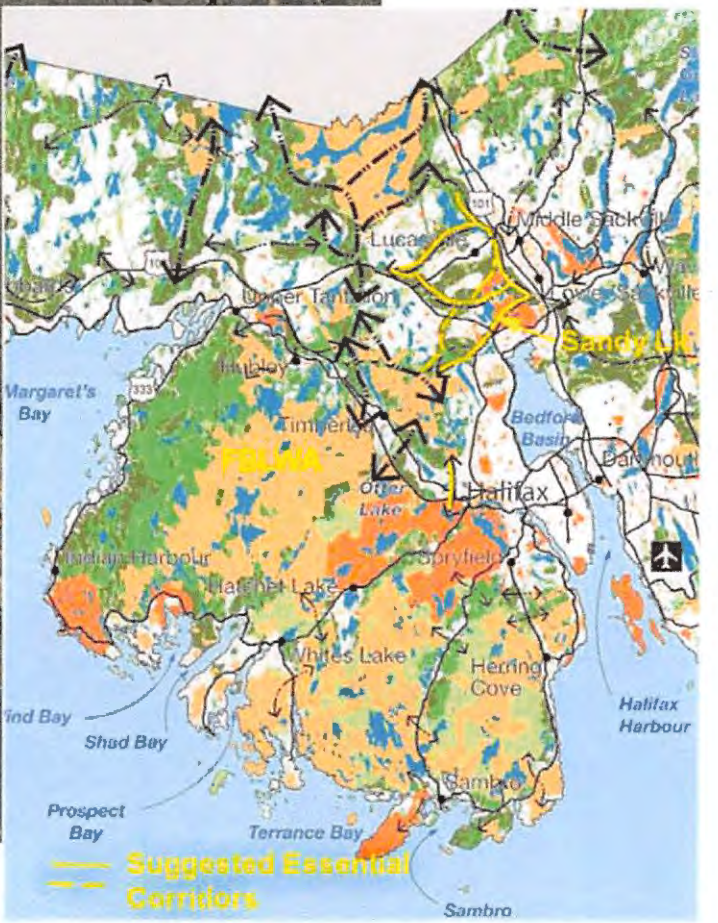
Also, Sandy lake watershed is critical for flood control Bedford area; was not modelled in recent flood plain study on assumption said author, there would be no dev at S.Lake for 100 years; not been properly highlighted

Slide 9: Connectivity. Lies at neck of Chebucto Peninsula which is a significant conservation area, by my estimate Close to 30% protected, additional 12% Crown Land...but cut off at the neck; connectivity to central and eastern mainland; stepping stones now, but all the more important

Slide 10: a current Pinch Point

Slide 11: Putting it all together, west and north for conservation, east for integrated recreation and conservation.

Where:



Chebucto Peninsuala: a significant conservation area

Modified from HGNP

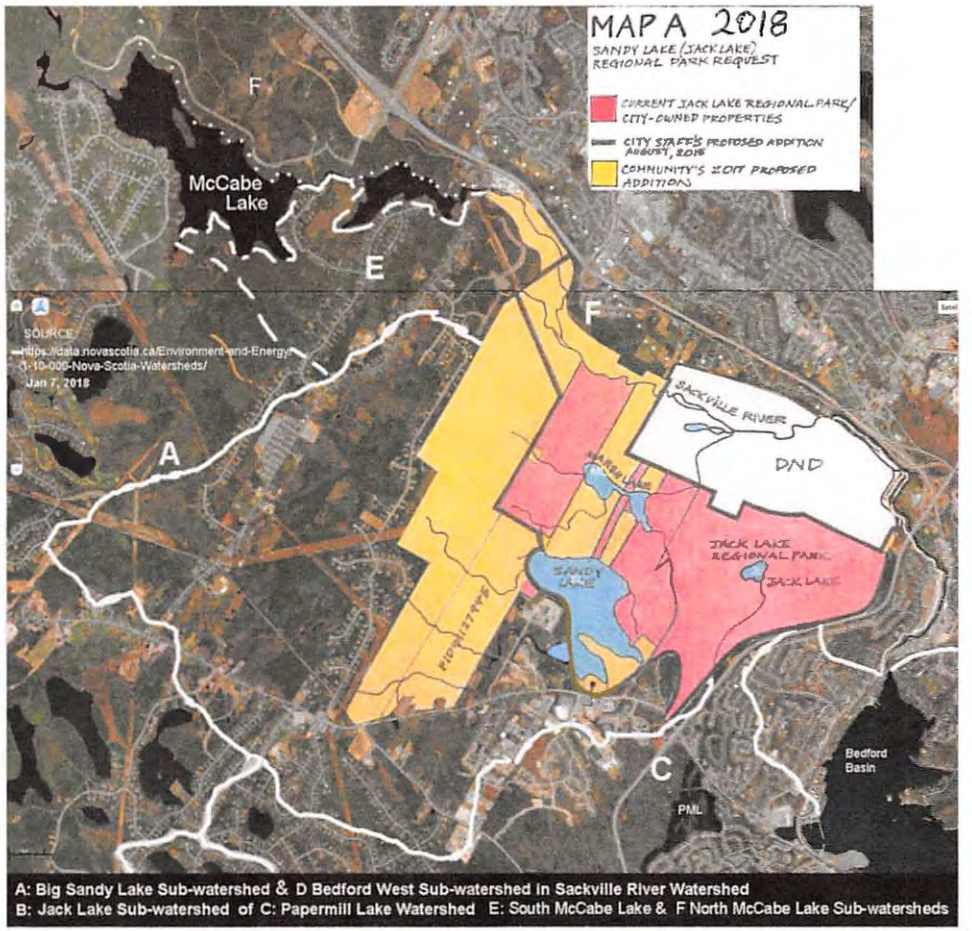
Sandy Lake & Environs: critical connectivity
Chebucto Peninsula to central/eastern mainland

View NNE: Marsh Lake to Sackville River

Looking east to Jack Lake and, in the distance, Bedford Basin

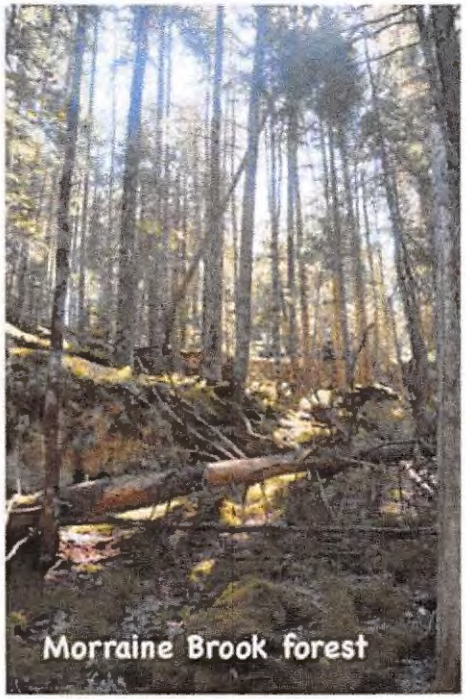
What: 2000 acres of mixed Acadian forest & surface waters (lakes, streams, wetlands)

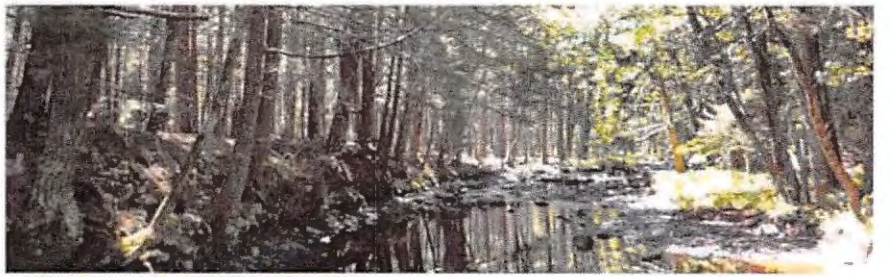
- Pieces of 4 subwatersheds, Sandy Lake the largest
- ~1000 acres now HRM, ~1000 now private
- bounded to south by Hammonds Plains Rd., north by Sackville River, east by Hwy 102, west by Gatehouse & Viscount Runs



A: Big Sandy Lake Sub-watershed & D Bedford West Sub-watershed in Sackville River Watershed
B: Jack Lake Sub-watershed of C: Papermill Lake Watershed E: South McCabe Lake & F North McCabe Lake Sub-watersheds

Existing and Proposed Parkland/Protected Area


Morraine Brook forest


Upper Peverill's Brook


Marsh Lake

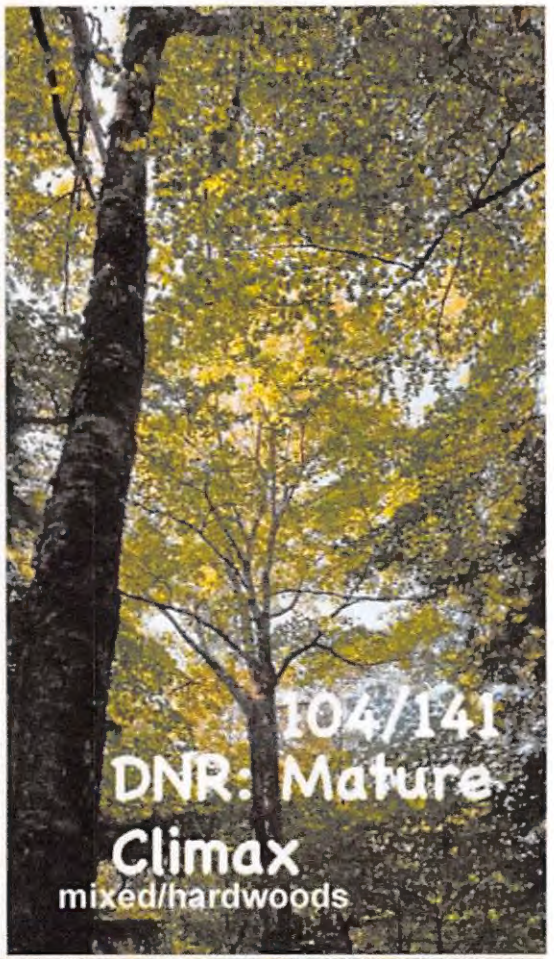

Gaspereau


Snapping turtle habitat


Sandy Lake


Jack Lake

Forest, Wetlands
Streams, Lakes



Old Growth:

- fewer but bigger trees

- younger trees also present...gaps, multilayered

-lots of deadwood: snags & CWD; cavities

- trees with lichens, moss

- "spongy duff", beetles...

**forest floor not level but with "pits & mounds"

- Andrew Whitman of the Manomet Center for Conservation Sciences (Mass,) & Shawn Fraver of the University of Maine's School of Forest Resources cited by Joe Rankin in: "Old Growth" Forests Defined by Key Ecological Characteristics, Dec 20,2016 on http://www.forestsformainesfuture.org

13 Species-at-Risk

Little Brown Bat
Mainland Moose

Barn Swallow
Canada Warbler
Common Nighthawk
Chimney Swift
Eastern Wood Pewee
Olive-sided Flycatcher
Rusty Blackbird

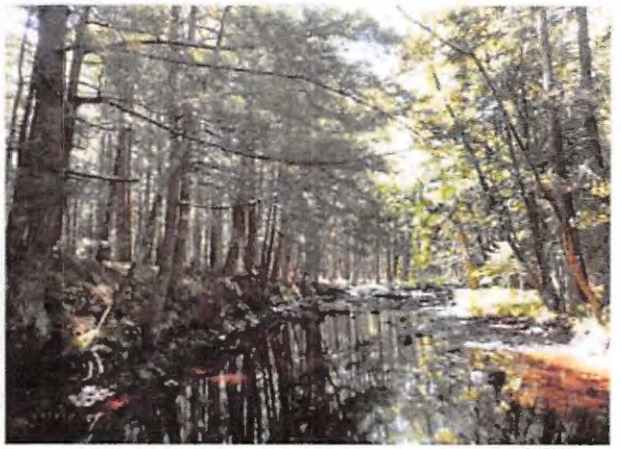
Snapping Turtle
Wood Turtle

American Eel
Atlantic Salmon

21 of 23 vertebrates species associated with old Acadian forests

Ovenbird - forest interior species

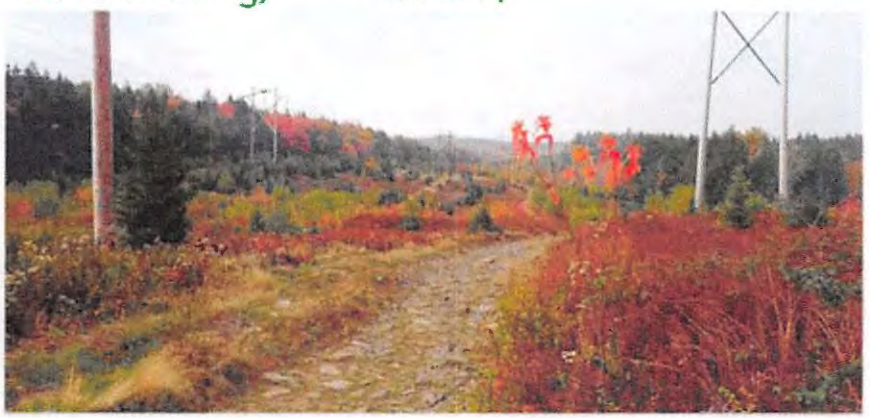
RECREATION



Swimming Fishing
Paddling ice sports

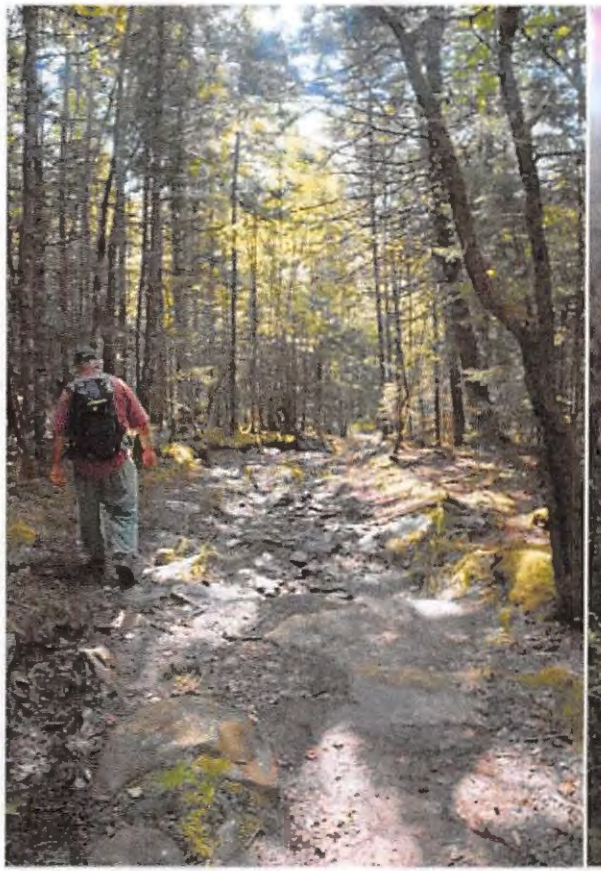
Wilderness hiking
Forest Bathing
Birdwatching,

Natural History
Wilderness Running
Hiking



Walking
Snow-shoe, Ski

Dog walking
Mt Biking



Sandy Lake Water quality: marginal oxygenation of deep waters currenty, salty water accumulating

FROM AECOM (2014)

ISSUES

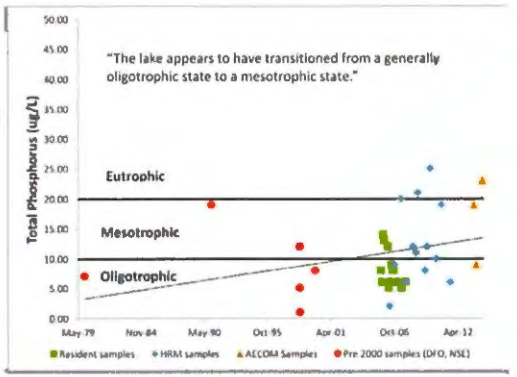
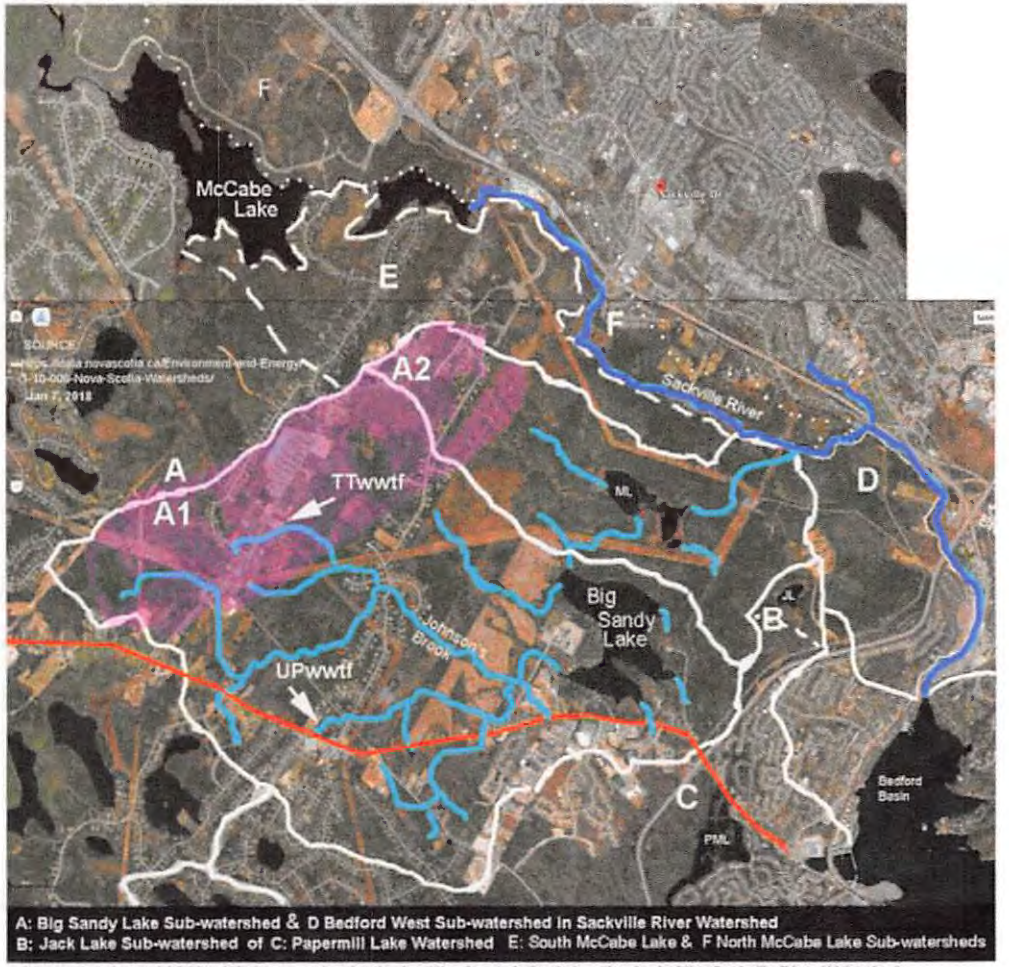


Figure 9: Sandy Lake Total Phosphorus - All Samples

Table 11. Water Quality Objectives and Early Warning Values for Total Phosphorus

Lake	Trophic State Objective	Numerical Objective	Early Warning	Evaluation
Sandy Lake	Mesotrophic	< 18 µg/L	15µg/L	Based on 3 year running average
Marsh Lake	Mesotrophic	< 15.5 µg/L	13 µg/	Based on 3 year running average

Why should the goal be mid-mesotrophic?



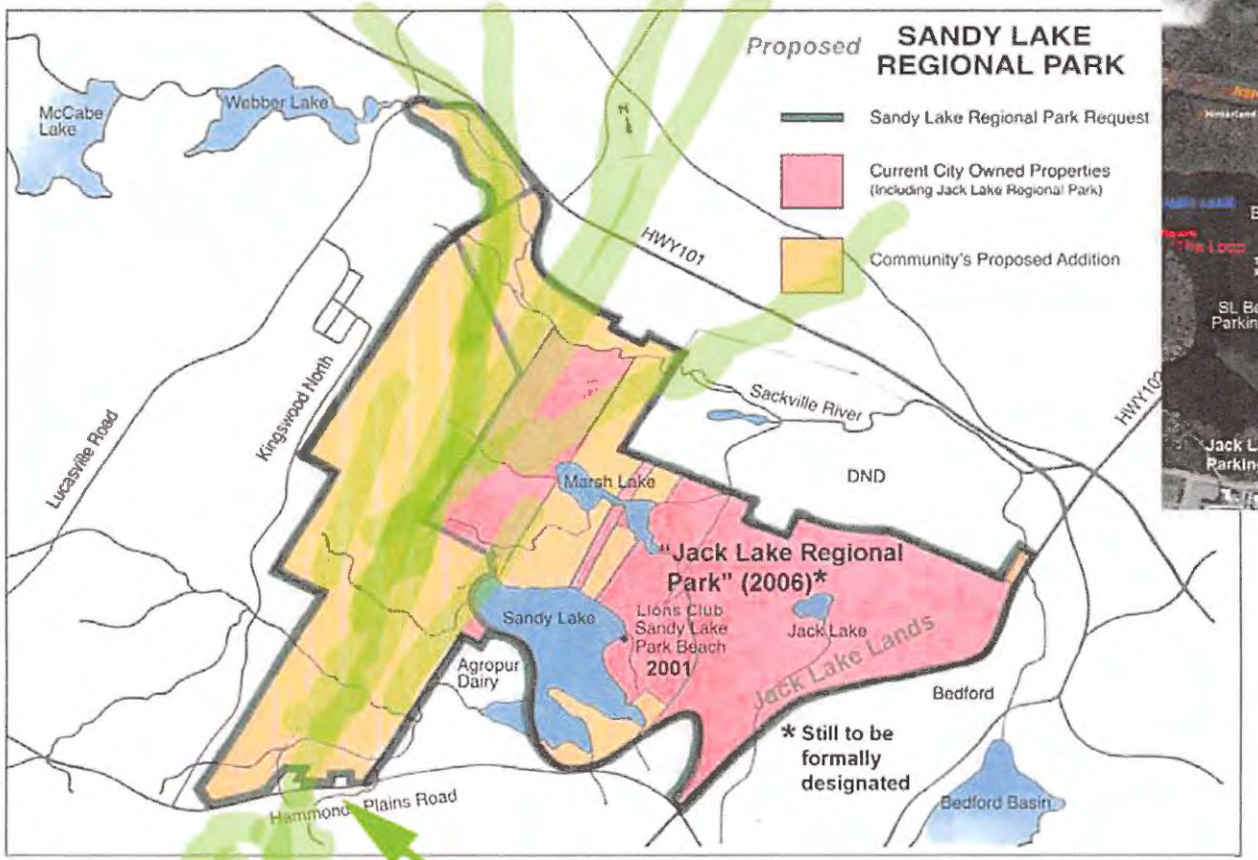
A1 Sandy Lake and A2 Marsh Lake are subwatersheds of the Sandy Lake Sub-watershed of the Sackville River Watershed
Purple highlighted area: Bedrock with acid-generating potential. UPwwtf: Uplands Park waste water treatment facility.
TTwwtf: Timber Trails waste water treatment facility. Blue highlighted streams are the major streams in the Sandy Lake Sub-watershed as identified in the Sandy Lake Watershed Study Final Report (AECOM 2014)

Major streams of Sandy Lake Sub-Watershed

Surface waters flowing into Sandy Lake are concentrated on the western side of the lake where development is proposed.

So we need to protect land to the west of Sandy Lake

Map 3 ISSUES: CONNECTIVITY



Jack Lake Lands:
- Many trails, multiple uses all seasons; mostly informally managed

Sandy Lake Beach Park:
- Formally managed; swimming, paddling, fishing

CHEBUCTO PENINSULA

The proposed SLRP embodies more of the original concept of a Regional Park at Sandy Lake, which was for parkland around the lake, not to one side of it, and that of the 1979 MAPC plan which would "include more area on all sides, from the Sackville River to the Hammonds Plains Road and from the Bedford RifleRange west toward the Lucasville Road (including buffers and flood plains)."

Major reasons to expand the Park

#1 - Historical

#2 - Protection of the Sandy Lake to Sackville River watercourse for migratory fish, reptiles, amphibians, waterfowl, otters... water quality/aquatic recreation; reduce downstream flooding

#3 - Provide a forested wildlife corridor connecting lands of the Chebucto Peninsula with central and eastern mainland


Urgent: protect this pinch point
359 m
2003
Google Earth
Imagery Date: 9/5/2015 lat 44.772821° lon -63.713291° elev 93 m eye alt 2.00 km

Map 4: Putting it all together: Conservation Priority on west side

Mixed Recreation and Conservation on east side
(where recreational activities are currently focussed)

A species to watch: freshwater mussel

Posted on January 2, 2020 by admin. www.sandylakebedford.ca

Empty mussels are common on shore and
in shallows amongst aquatic plants

The freshwater mussel *Pyganodon cataracta* occurs in abundance at Sandy Lake.
I have viewed many living specimens while snorkelling in the shallows (down to 2-3 m) and discarded shells are common amongst emergent wetland plants around the fringes of the lake. The latter could be the remains of river otter luncheons.

Living mussel

It was thus with some interest that I caught this title: A freshwater mussel apocalypse is underway—and no one knows why by Carrie Arnold on www.nationalgeographic.com, Dec 16, 2019. From that article:
Throughout the U.S. and Europe, staggering numbers of freshwater mussels are dying. To make the matter worse, no one knows why, prompting investigations into everything from infectious diseases to climate change to water pollution...
...mussels are crucial to their ecosystems, both by cleaning water of impurities and creating shelter for other species via their shells (after their decades-long lifespans are over)...Tony Goldberg, a wildlife disease expert at the University of Wisconsin-Madison, puts mussels' importance more bluntly. Without them, he says, "the freshwater ecosystem will change forever."
So together with the turtles and frogs and salmon and trout and other valued species we still find in Sandy Lake, the mussels are one to keep an eye on.

NATURAL WONDERS CONSULTING FIRM

AVIAN AND SPECIES AT RISK SURVEYS

of the proposed Sandy Lake-Sackville River Regional Park

March 2020 | gonaturalwonders@gmail.com | 902-864-0802

Image taken by David Patriquin

EXECUTIVE SUMMARY

In 2017 avian surveys were commissioned by the Sandy Lake Conservation Association for the purpose of augmenting their baseline data and to acquire additional information on the current status of bird species within the proposed Sandy Lake Park.

Initial surveys were conducted during the 2017 breeding season with additional breeding surveys and year-round data gathered in 2018 and 2019. The followup surveys also placed special emphasis on gathering data on any avian or non-avian Species At Risk that might be living within the proposed park boundaries.

The proposed park boundaries, also referred to in this report as simply the proposed park, can be found on the map labeled **Map 1: Boundary Map.**

Survey preparation work began by traveling all roads bordering the proposed park for the purpose of identifying pubic access points into the project area. Access Points used included those trail heads associated with Jack Lake and Sandy Lake off of Smiths Road, as well as trails entering the proposed park area from Gatehouse Run, Viscount Run and Savoy in Kingswood North. Surveys were not just limited to well established trails but involved travelling the shorelines of each of the water bodies present, which included all but some of the small privately owned shore line properties of Sandy Lake, all of Jack Lake and all of Marsh Lake and its surrounding wetlands.

For the purpose of the surveys we also gained permission to use private access points available through the Agropur Cooperative Dairy property. Game trails were also traveled whenever they were encountered. Details on the Avian Species found within the proposed park are located in Table 1.

Surveys conducted on the proposed park lands during the 2017 to 2019 breeding seasons detected 21 species of interest to Federal and Provincial conservation bodies.

Species at Risk living within the proposed park boundaries include: Barn Swallow, Canada Warbler, Common Nighthawk, Common Snapping Turtle, Eastern Painted Turtle, Eastern Wood-Pewee, Evening Grosbeak, Little Brown Myotis, Monarch, Moose (Mainland Population), Olive-sided Flycatcher, Rusty Blackbird and Wood Turtle. The information on these species is found in this report under Species of Concern and in Table 2. Several important wildlife corridors were identified during the surveys, including two major wildlife corridors. The locations of these two major corridors along with a dozen smaller but important wildlife corridors are marked on **Map 2: Wildlife Corridors**.

INTRODUCTION AND BRIEF PHYSICAL DESCRIPTION OF THE STUDY AREA

The eastern portion of the proposed park is covered primarily by mature forest, made up of coniferous, hardwoods and mixed woodlands. This area is populated with a network of trails known locally as the Jack Lake Trails and form a web of walkways that allow people and wildlife to easily travel between the Jack Lake area and the eastern half of Sandy Lake. It includes small areas of evergreen dominated and hard wood dominated mixed woodlands and wooded wetlands. Natural springs are common and trails are often flooded and contain many wet sections. This forest canopy is dominated by Red Spruce, with large Hemlocks and White Pines scattered throughout. In the wetter areas the forest floor is covered by various species of mosses. In the dryer more open sites Sheep Laurel, Mayflower, and Teaberry are common.

The topography includes quartzite ridges where animal dens are common. The woodlands that include the western half of Sandy Lake have been more heavily impacted by man and contain a number of human features, including homes, businesses, and clearcuts.

Surprisingly this area continues to have a fairly good diversity of wildlife due in part to the shoreline remaining largely wooded, private lots maintaining most of their tree cover and the fact that the remainder of the lake is bordered by undeveloped wildlife rich woodlands.

The northern and northwestern portions of the proposed park are centred on Marsh Lake which is surrounded by an extensive wetlands network. This northern portion is delineated to the south and east by power line corridors and to the west by Kingswood•North subdivision. To the north the proposed park boundaries fall just short of the developed areas of Lower Sackville. This area contains undeveloped riparian habitat along both banks of the Sackville River which skirts just south of its northern border.

The southwestern portion of the proposed park has been heavily impacted by a series of clearcuts and the Kingswood North residential development. However, these clearcuts are regenerating nicely and are further enhanced by a riparian habitat containing many large trees. These trees are representative of the forest that existed there before the cutting and are aiding in the recovery and recolonization of the area by wildlife.

Squeezed between Sandy Lake and the regen sites there is a green belt that is part of an area that plays a very important role as part of the Sandy Lake Wildlife Corridor. (See Map 2: Wildlife Corridors.) This major wildlife corridor has an average width of 1000 meters and is well travelled by a wide variety of wildlife including the Endangered Mainland Moose. This corridor is also used regularly by Black Bears and other large mammals and has a large healthy population of midsized and small mammals such as Bobcats, Red Fox, Woodchucks, and Snowshoe Hares. This wildlife corridor is a major influence on what species survive within the park and how the

park enhances and influence areas well outside the proposed park's boundaries. This corridor is one of two highly important Major Wildlife Corridors that were identified are being crucial to wildlife health and diversity within the proposed park. The second major wildlife corridor is the Sackville River Valley Corridor. A number of minor wildlife corridors were also encountered.

For more information on the important of natural corridors in the area, see the Halifax Green Network Plan.

WETLANDS AND WOODLANDS

For the purposes of our surveys, the definitions of the wetland and woodland habitats were kept simple and were defined on the basis of what they provided for bird species in the form of food, shelter, and nesting sites.

Much more detailed descriptions of the various wetland and woodland habitats that exist within the proposed park boundaries can be found on David Patriquin's excellent website www.sandylakebedford.ca.

Image taken by David Patriquin

All Woodland Habitats

Some species in the park are common due to the simple fact that they are able to make use of most of the park's habitats. Species like the American Crow, can be encountered in all of the habitats within the park's boundaries. Other species such as the Magnolia Warbler can be sighted in any of the park's woodland habitats.

The following species are readily encountered in any of the proposed park's forests: American Crow, American Robin, Black-capped Chickadee, Blue Jay, Common Raven, Downy Woodpecker, European Starling, Hairy Woodpecker, Magnolia Warbler, Mourning Dove, Northern Flicker, and Purple Finch.

Hardwoods

For the hardwood loving species in the proposed park, the exact species of hardwoods growing in the area are often less important than the age of the trees present.

Within the park, the main distinguishing feature is whether the hardwood habitat is made up of younger or older trees. A small exception is that a couple of species found in the park such as Veery are also attracted to wet hardwood dominated areas.

Young Deciduous Forests

Young deciduous forests in the park are composed of Red Maple, Red Oak, White Birch, Choke Cherry and other colonizing species of trees and bushes. They are rich in berry producing bushes and wildflower species and are attractive to various sun loving species such as butterflies.

The following bird species were commonly encountered in this habitat within the proposed park: American Goldfinch, American Redstart, American Robin, American Tree Sparrow, Black-and-White Warbler, Brown-headed Cowbird, Cedar Waxwing, Chestnut-sided Warbler, Common Yellowthroat, Gray Catbird, Nashville Warbler, Purple Finch, Ring-necked Pheasant, Song Sparrow, Veery, White-throated Sparrow, and Yellow Warbler.

Mature Hardwood Stands

The mature hardwood stands in the park are small in size and frequently intergrade with hardwood dominated mixed woodlands. Larger tree species present included Red Maple, Red Oak, Sugar Maple, American Beech and Yellow Birch. This habitat attracts a mixture of common and uncommon woodland bird species.

The follow bird species are typical of the Sandy Lake proposed park mature hardwood stands: Black-and-White Warbler, Black-throated Blue Warbler, Broad-winged Hawk, Evening Grosbeak, Least Flycatcher, Northern Goshawk, Northern Saw-whet Owl, Ovenbird, Pileated Woodpecker, Tennessee Warbler, White-breasted Nuthatch, and Yellow-bellied Sapsucker

Coniferous

For the coniferous loving species of the park, three main distinctions were noted. Some species such as the Merlin and Blue-headed Vireo were readily encountered in any of the coniferous habitats. Others like the Hermit Thrush and Gray Jay showed a strong preference for wet coniferous woodlands. For species such as Pine Siskin and Brown Creeper, the larger size coniferous trees were the strongest draw.

Wet Coniferous Forests

These wet coniferous forests are most often associated with the proposed park's wetlands. Tree species include Tamarack, Black Spruce, Red Spruce and Balsam Fir.

This forest type within the park contains both common and uncommon bird species including: Boreal Chickadee, Canada Warbler, Common Yellowthroat, Gray Jay, Hermit Thrush, Olive-sided Flycatcher, Ruby-crowned Kinglet, Spruce Grouse, Swainson's Thrush, Winter Wren, and Yellow-bellied Flycatcher.

Ruby-crowned Kinglet by Andy Reago & Chrissy McClarren

Mature Coniferous Stands

The mature coniferous stands in the park make up some of the best birding spots in the park as they contain a rich variety of woodland bird species including: Black-throated Green Warbler, Bay-breasted Warbler, Black-backed Woodpecker, Blackburnian Warbler, Blue-headed Vireo, Boreal Chickadee, Brown Creeper, Dark-eyed Junco, Evening Grosbeak, Golden-crowned Kinglet, Pileated Woodpecker, Pine Grosbeak, Pine Siskin, Red-breasted Nuthatch, Red Crossbill, White-winged Crossbill, and Yellow-rumped Warbler

Middle Age Coniferous Forests

The following species are birds that can be found in all coniferous dominated areas of the park: Blue-headed Vireo, Black-throated Green Warbler, Blue-headed Vireo, Cape May Warbler, Dark-eyed Junco, Merlin, Northern Parula, Pine Siskin, and Yellow-rumped Warbler

Mixed Woodlands

For the purpose of this study, Mixed Woodlands were classified in three ways: Hardwood Dominated Mixed Woodlands, Coniferous Dominated Mixed Woodlands and Mature Mixed Woodlands.

As their names imply, all three habitats contained a mixture of trees and bird species found in the more coniferous and hardwood portions of the park.

Hardwood Dominated Mixed Woodlands

The following is a list of species encountered in the proposed park's Hardwood Dominated Mixed Woodlands: Black-and-White Warbler, Black-throated Blue Warbler, Ovenbird, Red-eyed Vireo, Ruby-crowned Kinglet, Ruby-throated Hummingbird, Tennessee Warbler, White-breasted Nuthatch, White-throated Sparrow, Yellow-bellied Sapsucker, and Yellow-rumped Warbler

Coniferous Dominated Mixed Woodlands

Inside the proposed park the Coniferous Dominated Mixed Woodlands contained less species than expected, perhaps because there were always better coniferous based habitats containing larger coniferous trees nearby.

Commonly encountered species in this habitat included but was not limited to the following species: Blue-headed Vireo, Black-capped Chickadee, Golden-crowned Kinglet, Magnolia Warbler, Red-breasted Nuthatch, Ruby-crowned Kinglet, and Yellow-rumped Warbler.

Mature Mixed Woodlands

The Mature Mixed Woodlands of the proposed park are home to a wide variety of woodland birds.

Some of the bird species most strongly associated with this habitat include: Bay-breasted Warbler, Barred Owl, Bay-breasted Warbler, Black-throated Green Warbler, Blue-headed Vireo, Eastern Wood Pewee, Evening Grosbeak, Great-horned Owl, Northern Saw-whet Owl, Pileated Woodpecker, Ruby-crowned Kinglet, Ruffed Grouse, and Yellow-rumped Warbler

Urban Edges

Urban Edges are the areas lying along the proposed borders of the park where man has either altered the natural habitats or has changed the species that are using the natural habitats. Some human influences such as bird feeders caused additional species to be found in the park. Amongst the feeder related species some would be classified as rare or uncommon visitors and/ or migrants. Examples for the park include White-crowned Sparrow and Fox Sparrow. One of the proposed park's most important Urban Edge species is the provincially endangered Barn Swallow.

Barn Swallow by VJ Anderson

Commonly encountered species along the Urban edges include: American Goldfinch, American Tree Sparrow, Barn Swallow, Brown-headed Cowbird, Chipping Sparrow, Downy Woodpecker, European Starling, Evening Grosbeak, Hairy Woodpecker, Mourning Dove, Purple Finch, Ring-necked Pheasant, Rock Pigeon, Ruby-throated Hummingbird, Song Sparrow, and Yellow Warbler.

Regenerating Forest Areas

In 2013 a 2.4 km stretch of forest was clearcut just west of Sandy Lake. The cutting process left behind five strips of forests containing many large trees. These strips were left uncut as they bordered brooks and streams.

These remaining strips contain important riparian habitat and species. Each are also acting as minor wildlife corridors, feeding into the major wildlife corridor running between the Kingswood North subdivision and Sandy Lake. (See Map 2: Wildlife Corridors.)

These clearcuts are regenerating nicely and are further enhanced by the riparian habitat which is representative of the forest that existed there before the cutting, and are aiding in the recovery and recolonization of the area by wildlife. These regeneration forest areas are also simply referred to in this report as regens.

Within just the regens themselves, commonly encountered nesting species included: American Goldfinch, Brown-headed Cowbird, Cedar Waxwing, Common Yellowthroat, Gray Catbird, Nashville Warbler, Northern Parula, Olive-sided Flycatcher, Palm Warbler, Ring-necked Pheasant, Song Sparrow, White-throated Sparrow, Wilson's Warbler, Yellow-bellied Flycatcher, and Yellow Warbler.

The riparian habitats running through the regens contain many species that often use the regens for feeding purposes. The conjunction of these two habitats currently represent the highest bird densities found in the proposed park area and is the best location in the park for viewing the often-elusive Winter Wren.

Wetlands and Water Bodies

At first look the wetlands of the proposed park seem deceptively quiet due to the lack of larger groups of waterfowl that are often associated with rich aquatic habitats such as freshwater marshes. A closer inspection reveals that the park's wetlands are quite varied and each time we revisited them during our surveys, additional species were turned up.

Within the proposed park, the Sackville River Wildlife Corridor (See Map 2: Wildlife Corridors) provides the richest diversity of wetland bird species. It also provides important breeding habitat for Species at Risk, such as the Common Snapping Turtle and the Wood Turtle. The Sackville River is one of the two major wildlife corridors that is responsible for the health and diversity of the wildlife species living in the park.

Three lakes are found within the park boundaries: Sandy Lake, Marsh Lake and Jack Lake. Each support a unique association of wildlife, as well as important habitat for additional waterfowl and water-related species. Sandy Lake in particular, is important to the breeding success of the Common Loon, and other species requiring deeper bodies of water. Marsh Lake and associated wetlands attract a variety of birds, reptiles and amphibians. Jack

Lake, with its ring of boreal based wetland vegetation attracts bog loving species. The stream that connects Jack Lake to Paper Mill Lake also provides a route for wildlife species to travel in and out of the park.

Other important streams in the park include Johnston's Brook, Karen's Brook and Peverill's Brook. Johnston's Brook can be found at the southwest corner of Sandy Lake and provides an important access point for species travelling into and out of the proposed park. It is fed by two wetlands which lie well outside the borders of the proposed park and in turn these areas are enriched by wildlife species living within the proposed park's boundaries. Johnston's Brook is discussed in greater detail under the Common Snapping Turtle entry in this report. Karen's Brook is one of the streams that cross the regenerating clear cuts and enhances that area by providing important riparian habitat. Peverill's Brook is out flowing to Marsh Lake, and then to the Sackville River. Peverill's Brook is the most important connection between the larger wetlands in the study area. In addition to birds it is associated with a rich diversity of amphibians, reptiles and mammals.

For more details on the various amphibian, reptiles and mammals found in this area please visit the Sandy Lake Conservation Association webpage at http://sandylake.org/

Wetland bird species encountered during our surveys included the following: Alder Flycatcher, American Black Duck, American Woodcock, Bald Eagle, Belted Kingfisher, Canada Goose, Canada Warbler, Common Loon, Common Merganser, Common Yellowthroat, Double-crested Cormorant, Great Black-backed Gull, Great Blue Heron, Green Heron, Green-winged Teal, Herring Gull, Hooded Merganser, Little Blue Heron, Mallard, Northern Harrier, Northern Waterthrush, Olive-sided Flycatcher, Osprey, Palm Warbler, Pied-billed Grebe, Red-winged Blackbird, Ring-billed Gull, Ring-necked Duck, Rusty Blackbird, Solitary Sandpiper, Sora, Spotted Sandpiper, Swamp Sparrow, Tree Swallow, Wilson's Warbler, and Wood Duck.

More details of all bird species listed above can be found in Table 1.

SPECIES OF CONCERN

Surveys conducted within the proposed Sandy Lake-Sackville River Regional Park lands during the 2017 breeding season, and the followup surveys in 2018 and 2019, detected the following 21 species as species of interest to Federal and Provincial conservation bodies.

A summary of each species official status can be found in Table 2.

American Woodcock

The proposed Sandy Lake Park contains important breeding habitat for this species in the form of wetlands, alder swales, open areas and regenerating clear-cuts. In both Canada and the United States, the American Woodcock

is classified as a migratory game bird. It is legally hunted in both countries but harvest levels have been dropping over the past forty years. Like many migratory species the Woodcock's decline is believed to be due to loss of both wintering and breeding habitat.

Over the past few decades, the American Woodcock has experienced moderate declines in its population here in Nova Scotia and across Canada. As a result, the American Woodcock has been identified by the Federal Bird Conservation Strategy program as a Nova Scotia Priority Species for conservation work. That organization's goal is to see a fifty percent increase in the Woodcock's population.

Barn Swallow

In Nova Scotia and throughout Canada Barn Swallow populations have suffered a very serious decline that has resulted in an eighty percent decrease in its numbers. Barn Swallows are a native breeding species that feed exclusively on flying insects captured in flight during aerial foraging.

A small population of Barn Swallows consisting of several pairs nest along the urban edges of the proposed park's boundaries and rely on its various open areas to provide important foraging habitat. Some feeding habitat also exists outside the proposed park but is not protected in any form and is vulnerable to development. Provincially the Barn Swallow was placed on the Nova Scotia Endangered Species Act in 2013. Nationally it is classified as a Threatened Species and was added to COSEWIC in 2011 and to SARA Schedule 1 in 2017.

See Table 2 for additional details.

Bay-breasted Warbler

The Bay-breasted Warbler is an uncommon breeder in areas of the proposed park where mature coniferous trees are present. Environment Canada provides the following statement on this species: "Poor survey coverage over most of its breeding range, and little information on the breeding biology of this species, suggests that this is a species that warrants extra attention."

It is known that it needs mature coniferous forests to survive and that nearly the entire world breeding population relies on Canadian forests for its survival. The number of Bay-breasted Warblers nesting in Nova Scotia varies from year to year but overall, this species has to be declining as the amount of mature coniferous forests in Nova Scotia decreases. The Federal Bird Conservation Strategy has it listed as a Nova Scotia Priority Species and has a goal of increasing this species in the province by fifty percent.

Belted Kingfisher

The Belted Kingfisher has experienced long term decline since its designation as the official bird of Halifax. This decline is not only due to habitat loss but to sensitivity to human disturbance around its nesting and feeding sites.

Most of the proposed park's wetlands provide much lower human disturbance levels than are typically found in and around the urban core. In addition, the proposed park provides several wetland habitats of value to this species including banks which are needed for the construction of their nesting cavities.

The Belted Kingfisher is listed as a Nova Scotia Priority Species by the Federal Bird Conservation Strategy which would like to see an increase of fifty percent within the province for this species.

Boreal Chickadee

This cavity nesting species is an uncommon year-round resident and breeder in the park's wet coniferous woodlands and mature softwood forests. The Boreal Songbird Initiative identifies mature coniferous forests as the most important winter habitat necessary for the survival of this species.

In 2008 bird researchers Hadley and Desrochers indicated that conservation goals should center around preserving this species' wintering habitat. Studies also show that the Boreal Chickadee is an important indicator species of the health of coniferous forests. This chickadee is a Federal Bird Conservation Strategy Nova Scotia Priority Species

Canada Warbler

The Canada Warbler is an uncommon breeder in the park's forested wetlands. This long distant migrant has been in decline since the seventies and internationally its decrease has been linked to the loss of its wintering habitat in South America.

Canada Warbler by Matt MacGillivray

In 2010 bird researcher, Reitsma showed that the loss of understory on its breeding sites was also a significant factor in its decline. In 2016 Environment Canada announced that the Canada Warbler is "highly vulnerable to collisions with buildings and vehicles". Since 2008 it has been listed as threatened by COSEWIC and gained legal protection in 2010 when it was added to SARA Schedule 1. In Nova Scotia it is listed as Endangered by the Nova Scotia Endangered Species Act.

The proposed park in Sandy Lake provides important breeding habitat for the Canada Warbler as well as a location where migrating birds can escape the brighter lights of the urban core reducing the number of collisions caused by buildings. In addition, protection of the proposed park's lands from development would provide a site of very low vehicle traffic.

Cape May Warbler

The Cape May Warbler is an uncommon breeder in the wet coniferous woodlands of the park. The Cape May Warbler's numbers vary annually and in recent years their population has shown an upswing in numbers. This has resulted in little major conservation concerns for this species based upon current assessments. This may change if this species sees another downswing in its population trend. Currently is it still listed by the Federal Bird Conservation Strategy as a Nova Scotia Priority Species but this may change in the near future.

There are concerns that forestry practices in Canada could have a negative effect on this species, so park lands where this species' habitat is protected continue to be important.

Common Nighthawk

The Common Nighthawk breeds in small numbers in the regeneration clearcuts and other open areas of the park. This species has also been reported a number of times passing through the proposed park area during its fall migration.

In the eighties the Common Nighthawk population began to plummet, resulting in a reduction in numbers of an estimated sixty-eight percent. A ten year study ending in 2015 showed that the decline was continuing but had slowed to an average of twelve percent per year. The most recent data collected in the past couple of years indicates that the population may be reaching a point of stabilization. For this reason, in 2017 COSEWIC degraded its rating from Threatened but it remains on the list as a Species of Special Concern. It continues to be listed as Threatened on SARA Schedule 1, and in the Nova Scotia Environmental Species Act.

Because the reasons for the Common Nighthawk's decline are still unclear, one of the federal mandates is to gain more knowledge about this species.

Common Snapping Turtle

The Common Snapping Turtle is listed both by COSEWIC and SARA as a species of Special Concern. And it is found in the Nova Scotia Endangered Species Act under Vulnerable.

Our surveys in the proposed park identified several important Common Snapping Turtle locations, including those that are currently being used as: 1. successful nesting sites, 2. attempted breeding sites, 3. feeding locations, 4. important travel corridors and 5. winter hibernation spots. However due to time restrictions it is highly unlikely that these surveys located all sites within the study area that are of importance to the survival of this species.

Snapping Turtle activity was detected at the following four locations within the proposed park boundaries:

1. SANDY LAKE

While most of the nearby lakes in Hammonds Plains and Bedford have lost their nesting habitat for Snapping Turtles, Sandy Lake still has at least one successful breeding site.

Habitat improvement projects are currently underway by the Nova Scotia Turtle Patrol to improve areas along the Sandy Lake shoreline where Snapping Turtles are still making attempts to breed but are no longer able to do so successfully. Sandy Lake also serves as a summer feeding site and the only confirmed winter hibernation site within the Sandy Lake Proposed Park.

2. JOHNSTON'S BROOK

Johnston's Brook flows into the southwest corner of Sandy Lake. It crosses underneath the lane into the Agropur Cooperative Dairy Bedford Plant then splits into two forks. The Northern Fork crosses Gatehouse Run and is being fed by two wetlands, one wetland lying between Lucasville Road and Hammonds Plains Road, and a second wetland lying between Gatehouse Run and Lucasville Road. In addition is it also connected to a series of small ponds along Voyager Way on the south side of Hammonds Plains Road. The Southern Fork winds its way through low lying areas located along the Farmers Dairy Road and skirts a drumlin before crossing over the Hammonds Plains Road. Snapping Turtles were found travelling along the entire length of these forks with unsuccessful breeding attempts at several locals.

3. JACK LAKE

Snapping Turtles were discovered using the connector stream between Jack Lake and Paper Mill Lake. This stream is currently being used as a corridor for Snapping Turtles travelling between the two bodies of water. (See Map 2: Wildlife Corridors)

Currently only unsuccessful breeding attempts have been recorded at Paper Mill Lake and there is insufficient data to determine if Snapping Turtles are attempting to breed in Jack Lake. However adjacent breeding habitat indicates that they likely are.

4. SACKVILLE RIVER

The Sackville River offers the largest and most easily used corridor for Snapping Turtles traveling in and out of the proposed park boundaries. The river also provides unique feeding opportunities not available anywhere else in the proposed park. It also provides the best chance for maintaining genetic diversity for Snapping Turtles living in the area. Two large breeding sites occur along the Sackville River within the proposed boundaries of the Sandy Lake Park. Both breeding sites currently suffer from high degrees of predation due to human encroachment and influences. The good news is that both sites also have a high potential for improvement through human intervention in the form of habitat protection, habitat restoration and enhancement.

For the past three years Hefler Forest Products have been working with the Nova Scotia Turtle Patrol to improve turtle nesting habitats at the larger of the two sites which is located on their property. Although work is still needed to establish a sustainable population, their efforts have led to at least one successful nest in each of the last three years.

Snapping Turtles living in the Sackville River are also benefiting from the habitat improvements being implemented by the Sackville Rivers Association. Although no evidence was collected during our surveys it is probable that Snapping Turtles are also using Marsh Lake and its surrounding wetlands. This supposition is based in part on the fact that Marsh Lake provides the most direct connection between the confirmed Snapping Turtle sites on the Sackville River and those in and around Sandy Lake.

Potential nesting sites also lie adjacent to the stream connecting Marsh Lake to the Sackville River Corridor. Additional turtle surveys of Marsh Lake and its connecting wetlands are scheduled for the 2020 breeding season. It is hoped that these surveys will help us gain a better understanding of the role that area plays in the lives of the park's turtle species.

Eastern Painted Turtle

Eastern Painted Turtles are present in each of the park's proposed wetlands. However, during our surveys they were detected in lower than expected numbers. This may be in part due to the fact that the turtle surveys undertaken focused on methodologies best suited to finding the rare Wood Turtles and Snapping Turtles.

It is recommended that further surveys are undertaken to determine this species' true population number within the proposed park. In 2018 the Eastern Painted Turtle was added to COSEWIC as a species of Special Concern. It is currently under consideration for addition to SARA Schedule 1 and may soon be added to the Nova Scotia Endangered Species Act.

Eastern Wood-Pewee

The Eastern Wood-Pewee is a common breeder in the park's mixed woodland stands, especially in those stands that contain large hardwood trees and a mid-level canopy. This member of the flycatcher family specializes in capturing air borne insects that live in the forest under its canopy.

Its decline over the past few decades has led to it being added in 2012 as a species of Special Concern by COSEWIC. The following year it was listed as Vulnerable in the Nova Scotia Endangered Species Act. In 2017 it received additional protection with its inclusion on SARA Schedule 1. It is also recognized as a Nova Scotia Priority Species by Federal Bird Conservation Strategy.

Evening Grosbeak

It is an uncommon annual visitor to the park, and likely breeds. It has been reported as breeding inside the park boundaries in recent years but no breeding evidence was gathered during 2017-2019 surveys. However, those surveys coincided with a low breeding period for this species in the Halifax region of Nova Scotia. Currently it is most commonly encountered along the urban edges of the park at feeders and in the mature forest areas of the park.

This once well-known and popular species has suffered a severe population decline in Nova Scotia and across Canada at an estimated drop of 77 to 90 percent. The primary reason for its decline is the loss of mature and old-growth mixed woodlands and coniferous forests.

The establishment of proposed park boundaries will help protect these mature forests that the Evening Grosbeak and other species depend on for their breeding success.

In 2016 the Evening Grosbeak was added to both COSEWIC and SARA Schedule 1 as a species of Special Concern. In 2017 it was listed as Vulnerable in the Nova Scotia Endangered Species Act.

Little Brown Myotis

In 2010 the invasive fungus Pseudogymnoascus destructans arrived in Atlantic Canada and began devastating the region's local bat populations via a disease named White-nose Syndrome. In a few short years, ninety four percent of Nova Scotia's Little Brown Bats had been wiped out of existence. Their rapid decline landed them on the Nova Scotia Endangered Species Act in 2013 at its highest risk category of Endangered. Federally, in 2014 emergency measures led to the Little Brown Bat being added to COSEWIC and SARA Schedule 1 also under the category of Endangered. On June 10, 2018 a single Little Brown Bat was observed feeding over Sandy Lake in the early evening just after sunset. The bat was observed at close range through binoculars and showed no signs or legions

often associated with White Nose Syndrome. However those signs may not have been detectable. More importantly however, the bat was demonstrating normal feeding behavior in proper habitat and during the correct time of day. This single bat appeared to be healthy and likely represents one of the few individuals that survived the initial White-nose Syndrome outbreak. This bat may be an individual that developed resistance to the disease-causing fungus and could act as a nucleus for this species becoming reestablished in the Sandy Lake area.

Historically Little Brown Bats have bred in the area covered by the proposed park. Ample breeding and feeding habitat exist in the proposed park for this species. No known winter hibernacula have been identified within the proposed park's boundaries.

Monarch

The Monarch is a species of butterfly uncommonly encountered in the proposed park's open areas and urban edges during the species' breeding season.

Small numbers may also migrate through the proposed park in the spring but the area would not be considered as a fall migration route for the species. Milkweed is the food plant for the caterpillars of the species but the adult feed on a wide range of flowers. The Monarch's population has declined by ninety percent and is globally endangered.

In Canada it is listed as Endangered by COSEWIC, as well as the Nova Scotia Endangered Species Act. It is recommended that botany surveys are carried out to determine if either Swamp Milkweed or Common milkweed exist within the proposed park boundaries.

Moose - Mainland Population

In 2017 moose signs were sighted within the proposed park area near Sandy Lake. Individuals that are part of a small herd of Moose that range from Mount Uniacke to Peggy's Cove wander through the proposed park area at least a couple times a year. As a result of this behavior the department of Lands and Forestry consider the proposed park lands as important habitat for the Mainland Moose.

These Mainland Moose often travel along a major wildlife corridor that is currently unprotected and is in danger of being lost to development but would be protected within the proposed park boundaries if established. The mainland population of Moose is recognized under the scientific name Alces alces·americana and has been included in the Nova Scotia Endangered Species Act since 2003.

Olive-sided Flycatcher

The Olive-sided Flycatcher is an uncommon summer visitor and breeder in the park's wetlands and regenerating woodland sites. This bird can be seen sitting near the edges of these habitats in tall trees, then swooping out over the open areas to capture flying insects. Their loud calls mean they are often heard in the proposed park before they are seen.

Breeding Bird Surveys show that the Olive-sided Flycatcher populations in the province and across Canada have been declining since 1970. This flycatcher is listed as threatened by SARA and the Nova Scotia Endangered Species Act and as a species of Special Concern by COSEWIC.

A 2007 study suggested that the nesting success of the Olive-sided Flycatcher on clearcut sites is lower than locations that are regenerating as the result of fire.

Pine Grosbeak

The Pine Grosbeak is an uncommon visitor to the mature coniferous stands in the park. It is most often sighted in the posed park during the winter months.

Pine Grosbeaks are primarily members of the boreal forest in northern Canada but their breeding range includes Nova Scotia. They are classified as an irruptive species moving south in some winters in large numbers. When these southward irruptions occur this species often shows up in the proposed park area and some may stick around to breed once the summer season begins. Since no irruptions occurred during our study period this speculation could not be confirmed.

The Federal Bird Conservation Strategy has designated the Pine Grosbeak as a Nova Scotia Priority Species and would like to see its population in the province increase by fifty percent.

Ruffed Grouse

The Ruffed Grouse can be encountered throughout the proposed park area in a wide variety of habitats. Locally numbers go up and down in response to the number of predators present, but its overall population in the province stays pretty consistent. It is also a common game bird species that is popular with Nova Scotia hunters. Like most game species, numbers are monitored and efforts are made from time to time to increase a certain species' numbers.

At the moment the Federal Bird Conservation Strategy has listed the Ruffed Grouse as a NS Priority Species and has targeted it for a population increase of fifty percent.

Rusty Blackbird

The Rusty Blackbird is an uncommon visitor to the park's wetlands, but it has bred in the past. The Rusty Blackbird has been described as one of our most dramatically declined species. Estimates have the decline numbers ranging from eighty-five to ninety nine percent. It was present during our 2017-2019 breeding surveys, however nesting status was undetermined.

In 2006 it was listed by COSEWIC as a species of Special Concern. In 2009 it was added to SARA Schedule 1 under the same category. In 2013 the Nova Scotia Endangered Species Act listed it as Endangered.

Spruce Grouse

Not encountered during our 2017-2019 surveys. However, appropriate habitat for this species is still present in the form of wet coniferous woodlands with a forest floor heavily carpeted with mosses so it is likely that this species is still present. It is currently listed by the Federal Bird Conservation Strategy as a NS Priority Species. Their goal is to see the species increased by fifty percent.

Wood Turtle

The Wood Turtle was listed as Threatened by COSEWIC in 2007, by SARA Schedule 1 in 2010 and by the Nova Scotia Endangered Species Act in 2013.

Wood Turtle populations in the Sandy Lake Proposed Park are on the brink and may soon be extirpated from the area. Our surveys turned up only one unsuccessful breeding attempt by Wood Turtles in the study area and no additional sightings at their traditional locations. In recent years Wood Turtles have been sighted annually in the areas bordering Kingswood North. The Nova Scotia Turtle Patrol has recorded eleven sightings of Wood Turtles prior to 2018 in that neighborhood. In addition, the department of Lands and Forestry has a number of reports dating back to that time frame.

In 2018 and 2019 our surveys turned up no Wood Turtles in the Kingswood North area and none were reported to either the Nova Scotia Turtle Patrol or Lands and Forestry. One pair of Wood Turtles continue to attempt to nest along the Sackville River Wildlife Corridor. In recent years, those attempts have been unsuccessful due to nest predation.

More Wood Turtle surveys are planned for the spring, summer and fall of 2020, and efforts to help them to survive in the park are ongoing.

CONCLUSIONS AND RECOMMENDATIONS

The area within the proposed Sandy Lake-Sackville River Regional Park warrants protection as it provides important habitat for 21 Species of Interest to Federal and Provincial conservation bodies including 13 wildlife species officially designated as Species at Risk.

Establishment of the proposed park would protect two major wildlife corridors, including one identified in the Halifax Green Network Plan as vital to wildlife movement on and off the Chebucto Peninsula, which is a major conservation area.

Establishment of the proposed park boundaries would protect the Sandy Lake Wildlife Corridor which is a major connector for wildlife to the Blue Mountain-Birch Cove Lake Wilderness Area. Protection of this corridor would enhance the survival of species found in both parks as well as protect the biodiversity of these two areas. Establishment of the proposed park would protect an important portion of the Sackville River which is one of the two major wildlife corridors that act as crucial travel routes for wildlife and has the additional advantage of helping to direct moving wildlife away from man-made structures such as roads.

In addition to the two major wildlife corridors, establishment of this proposed park would protect at least a dozen smaller corridors containing important riparian and/or wetland habitats. Locations of these smaller corridors have been ground truthed and mapped out in this report thus providing important information for the more detailed decision-making process, necessary when plans are made beyond the higher, regional level planning.

Surveys indicate that the proposed park area provides an important oasis and support for wildlife living in green spaces located in the more urban areas surrounding the proposed park, and that failure to establish the proposed park's boundaries would lead to a collapse in wildlife species in terms of both volume and variety.

In order to protect the health and diversity of the current Sandy Lake Park, its borders need to be expanded to reacquire lands that were once set aside for inclusion in the park

Acquisition of additional lands found inside the proposed park boundaries is needed in order to protect the water quality and watersheds in the current Sandy Lake Park. These additional lands would include important watershed lands. Continued maintenance of this area as natural habitat is also essential for maintenance of water quality, aquatic habitat and flood amelioration in Sandy Lake to Sackville River watercourse and for the Sackville River system itself.

The proposed Sandy Lake-Sackville River Regional Park represents the last opportunity to acquire and protect wetlands and woodlands that directly connect the Sackville River watershed to Blue Mountain-Birch Cove Lake Wilderness Area.

Table 1: Status and Relative Abundance of Species Recorded During Avian Surveys	
Species	**Current Status and Relative Abundance**
Waterfowl	
American Black Duck	Common breeder throughout the various wetlands of the study area. The park also provides feeding grounds during spring and fall migrations.
Canada Goose	Uncommon breeder. This species is a relative newcomer to the park, but it is increasing in numbers in all wetlands in the general vicinity of the park, and is likely to do so within the proposed park boundaries.
Common Loon	Common breeder present in Sandy Lake during ice-free months.
Common Merganser	Confirmed breeder, most commonly encountered in the Sackville River portion of the proposed park.
Double-crested Cormorant	Present during the breeding season in Sandy Lake and along the Sackville River.
Green-winged Teal	Present in small numbers during the breeding season in Sandy Lake, Marsh Lake and Sackville River.
Hooded Merganser	Present during the breeding season and common fall migrant.
Mallard	Present year round within park boundaries.
Pied-billed Grebe	Present during the breeding season; breeding status undetermined.
Ring-necked Duck	Present during spring and fall migrations.
Wood Duck	Small numbers encountered during fall migration.
Birds of Prey	
Bald Eagle	Encountered in the park environs year-round.
Barred Owl	Most commonly encountered owl species in the park. Year-round resident; breeds in mature tree stands.
Broad-winged Hawk	Uncommon breeder within the hardwood stands of the park.
Great-horned Owl	Annual breeder and year-round resident.
Long-eared Owl	Has bred within the park in recent years, but was not encountered during our surveys. However, is likely still present; as appropriate nesting and feeding habitat remains.
Merlin	Common breeder in the mixed and coniferous woodlands of the park.

Northern Goshawk	Year-round resident and common breeder within hardwood stands.
Northern Harrier	Present during the summer and fall months in various wetlands. Breeding status undetermined.
Northern Saw-whet Owl	Confirmed breeder within the mature woodlands of the park.
Osprey	Common summer resident and breeder in wetlands.
Sharp-shinned Hawk	Common breeder and year-round resident in all woodland areas and urban edges.
Game Birds	
Ring-necked Pheasant	Common breeder and year-round resident of urban edges, young deciduous forests and regenerating sites.
Ruffed Grouse	Year-round resident and confirmed breeder in the mixed woodlands of the park.
Spruce Grouse	Not encountered during our 2017-2019 surveys. However, appropriate habitat for this species is still present in the form of wet coniferous woodlands with a forest floor heavily carpeted with mosses so it is likely that this species is still present.
Other Non-Passerines	
American Woodcock	Commonly encountered within the regenerating forests, open areas and wetland regions of the park. Confirmed breeder.
Belted Kingfisher	Commonly encountered in the park in the summer months, making use of wetlands for feeding purposes. Breeds in the park, along the banks of the Sackville River.
Black-backed Woodpecker	Rare visitor to the park. When present, found in the areas dominated by stands of large coniferous trees with plenty of large snags.
Chimney Swift	Reported in the past in this location, however none encountered during our surveys.
Common Tern	Reported in the past in this location, however none encountered during our surveys.
Downy Woodpecker	Common year-round resident and breeder. Found in all woodland habitats and urban edges.
Great Black-backed Gull	Year round, uncommon visitor to the park in wetland areas.
Great Blue Heron	Non-breeder, however uses wetland areas of the park for feeding purposes during spring, summer and fall.
Green Heron	Rare visitor to the park in wetland areas; one record of a summer wondering individual.
Hairy Woodpecker	Common year-round resident and breeder. Found in all woodland habitats and urban edges.

Herring Gull	Year-round common visitor to the park.
Killdeer	Although none were encountered during our surveys, they have been reported in the wetlands of the park.
Little Blue Heron	Not encountered during our surveys. Local residents report one spending the summer at Marsh Lake in recent years.
Mourning Dove	Common, year-round resident and breeder. Found in all woodland habitats and urban edges.
Northern Flicker	Common breeder in all woodland regions of the park.
Pileated Woodpecker	Breeder and year-round mature forest resident. A keystone species that provides nesting sites for other species in the park.
Ring-billed Gull	Common year-round visitor to the park.
Rock Pigeon	Common year-round resident and breeder along the urban edges of the park.
Ruby-throated Hummingbird	Common breeder throughout the park. Present in most of the park's woodland habitats but most common in hardwood dominated areas and urban edges.
Solitary Sandpiper	Uncommon fall migrant in wetlands. Encounter most often at Marsh Lake.
Sora	Spring migrant and occasionally present in summer. Breeding status undetermined.
Spotted Sandpiper	Spring and fall migrant. Also present during the summer months, likely breeder.
Yellow-bellied Sapsucker	Uncommon breeder in hardwood stands and hardwood dominated drumlins within the park.
Passerines	
Alder Flycatcher	Common breeder in wetland regions of the park. Especially in alder dominated locations.
American Goldfinch	Common breeder and year-round resident. Most common in the young deciduous forests, regenerating sites and the urban edges.
American Crow	Common breeder and year-round resident. Present in all habitat types found within the park.
American Redstart	Common woodland breeder, especially in portions of the park with younger deciduous forests.
American Robin	Common breeder and often present during other months of the year. Present in all habitat types found within the park.
American Tree Sparrow	Uncommon winter visitor. Most often encountered in the alder dominated areas, young deciduous hardwoods and urban edges.
Bank Swallow	Listed as a species found in the Sandy Lake Park, but none were observed during our surveys. However, it is highly likely that Bank Swallows pass through the park during their fall migration.
Barn Swallow	Common summer breeder in the urban edges. Often seen over or near Sandy Lake.

Bay-breasted Warbler	Uncommon breeder. Found in mature coniferous and mature mixed woodlands. Often encountered on or near the various drumlins in the park.
Black-and-White Warbler	Common breeder in the park's hardwood and mixed forests.
Black-capped Chickadee	Common year-round resident and breeder. Present in all habitat types found within the park.
Black-throated Blue Warbler	Uncommon breeder, often found near park drumlins, and hardwood dominated areas.
Black-throated Green Warbler	Common breeder in the park's mixed and coniferous forests.
Blackburnian Warbler	Uncommon breeder in regions of the park that contain larger softwood trees.
Blue Jay	Common year-round resident and breeder. Present in all habitat types found within the park.
Blue-headed Vireo	Common breeder in the park's mixed woodlands and evergreen dominated area.
Boreal Chickadee	Uncommon year-round resident and breeder in the park's wet coniferous woodlands and mature softwood forests.
Brown-headed Cowbird	Uncommon summer resident that lays its eggs in the nest of other passerine breeders found in the park. Most common in urban edges, young deciduous forests, and regen areas.
Brown Creeper	Year-round resident and common breeder in and around larger coniferous stands of the park.
Canada Warbler	Uncommon breeder in the park's forested wetlands.
Cape May Warbler	Uncommon breeder in the wet coniferous woodlands of the park. This species will be present in the park in some years and absent in others.
Cedar Waxwing	Uncommon breeder in the more open areas of the park, young deciduous woodlands, regen sites.
Chestnut-sided Warbler	Common breeder in the young deciduous areas of the park.
Chipping Sparrow	Present during the summer months; likely breeds but no breeding evidence gathered during surveys. Most common in the urban edges.
Common Nighthawk	The Common Nighthawk breeds in small numbers in the regens and other more open areas of the park. This species has also been reported a number of times passing through the proposed park area during its fall migration.
Common Raven	Common year-round resident and breeder. May be encountered in any of the park's habitats.
Common Yellowthroat	Common breeder in the park's wetland habitats, as well as lightly vegetated disturbed sites, regens, young deciduous forests.
Dark-eyed Junco	Common year-round resident and breeder. Most common in evergreen dominated areas of the park especially those parts where hemlocks are common.

Eastern Wood-Pewee	Common breeder in the park's mixed woodland stands. Especially in those stands that contain large hardwoods.
European Starling	Common year-round resident and breeder. Most common in the urban edges but may be encountered anywhere within the park.
Evening Grosbeak	Uncommon annual visitor to the park; may breed. Has bred inside the park boundaries in recent years. Currently most commonly encountered along the urban edges of the park at feeders and in the mature forest areas of the park.
Fox Sparrow	Regular spring and fall migrant. Most common along the urban edges.
Golden-crowned Kinglet	Common year-round resident, especially common in the park's coniferous dominated regions.
Gray Jay	Uncommon year-round resident in the park's wet coniferous regions. Over the last decade, this species has been declining in the Bedford- Hammonds Plains area. So it was a pleasant surprise to discover during the surveys that the study area continues to support the survival of the species in an area that continues to experience disappearing wildlife habitat.
Gray Catbird	Uncommon summer breeder in more open areas of the park, regens, and young deciduous forests.
Hermit Thrush	Common breeder, especially in wet coniferous forests of the park.
Least Flycatcher	Uncommon breeder in the park's hardwood stands.
Magnolia Warbler	Widespread common breeder. May be encountered in all habitats found in the park. Especially common in coniferous dominated areas and regenerating sites.
Nashville Warbler	Common breeder, especially in the park's more open and disturbed sites, including regens and young deciduous forests.
Northern Parula	Uncommon to common breeder in the park's coniferous dominated areas.
Northern Waterthrush	Uncommon breeder in the park's wetlands, especially along the habitats bordering the Sackville River.
Olive-sided Flycatcher	Uncommon summer breeder in the park's wetlands and regen sites.
Ovenbird	Common breeder in hardwood dominated areas found within the park.
Palm Warbler	Uncommon to common breeder in the park's wetlands and regenerating forest areas.
Pine Grosbeak	Uncommon visitor to the mature coniferous stands in the park.
Pine Siskin	Uncommon breeder in the park's coniferous habitats.
Purple Finch	Common widespread breeder throughout the park. Present in all woodland habitats in the park and its urban edges.
Red Crossbill	Uncommon breeder, present most years in the park, but numbers vary according to available cone crops. Common breeder in 2018 and 2019 in the parks coniferous forests.

Red-breasted Nuthatch	Common year-round resident and breeder, especially in areas of the park with larger evergreens.
Red-eyed Vireo	Widespread common breeder in the park's hardwood dominated mixed woodlands.
Red-winged Blackbird	Common breeder in the park's wetlands.
Ruby-crowned Kinglet	Common breeder throughout the park, especially common in the park's mixed woodlands.
Rusty Blackbird	Uncommon visitor to the park's wetlands; has bred in the past. Present during surveys, breeding status undetermined.
Scarlet Tanager	None detected during our breeding bird surveys, but have been listed as breeding in the past near Marsh Lake. They are rare breeders in the province that nest in mature hardwood stands which are present in the park.
Song Sparrow	Common breeder, especially in the park's urban edges, young deciduous forests and regenerating sites. Small numbers present in winter.
Swainson's Thrush	Uncommon breeder in the wet forests of the park.
Swamp Sparrow	Uncommon breeder in the park's wetlands.
Tennessee Warbler	Uncommon breeder in the park's hardwood dominated areas.
Tree Swallow	Annual breeder commonly seen feeding over the park's lakes and wetlands.
Veery	Uncommon summer breeder in the park's wet hardwood dominated forests.
White-breasted Nuthatch	Common breeder in the hardwood dominated areas. Present year round in the park in most years.
White-crowned Sparrow	Uncommon fall migrant. Most commonly encountered along the urban edges.
White-throated Sparrow	Common breeder, especially in the park's regenerating sites, but also in young deciduous forests and hardwood dominated mixed woodlands.
White-winged Crossbill	Common breeder in the park's spruce dominated areas.
Wilson's Warbler	Uncommon breeder in the park's wetlands and regens.
Winter Wren	Uncommon breeder in the park's wet coniferous woodlands, especially in the park's riparian habitats.
Yellow-bellied Flycatcher	Uncommon breeder in the park's coniferous dominated wet woodlands.
Yellow-rumped Warbler	Common breeder in the park's coniferous and mixed woodlands.
Yellow Warbler	Common breeder in the park's younger deciduous forests, urban edges and regen areas.

Table 2 :·Species of Concern - Summary of Each Species Official Status					
Species	COSEWIC Status	SARA Status	SARA Schedule 1 Status	Federal Bird Conservation Strategy NS Priority Species	Provincial Status and Nova Scotia Endangered Species Act
American Woodcock	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Population Decreasing
Barn Swallow	Threatened (2011)	Threatened	Threatened (2017)	Strategy = Increase by 100 percent.	Endangered (2013)
Bay-breasted Warbler	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Population Variable
Belted Kingfisher	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Population Decreasing
Boreal Chickadee	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 100 percent.	Population Decreasing
Canada Warbler	Threatened (2008)	Threatened	Threatened (2010)	Strategy = Increase by 50 percent.	Endangered (2013)
Cape May Warbler	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Population Decreasing
Common Nighthawk	Special Concern (2018)	Threatened	Threatened (2010)	Strategy = Increase by 100 percent.	Threatened (2007)
Common Snapping Turtle	Special Concern (2008)	Special Concern	Special Concern (2011)	Not Applicable - Non Bird Species	Vulnerable (2013)
Eastern Painted Turtle	Special Concern (2018)	Special Conce rn	Under consideration for addition.	Not Applicable - Non Bird Species	Population Decreasing
Eastern Wood-Pewee	Special Concern (2012)	Special Concern	Special Concern (2017)	Strategy = Increase by 50 percent.	Vulnerable (2013)
Evening Gro sbeak	Special Concern (2016)	Special Concern	Special Concern (2016)	Strategy = Maintain Population	Vulnerable (2017)
Little Brown Myotis	Endangered (2014)	Endangered	Endangered (2014)	Not Applicable - Non Bird Species	Endangered (2013)
Monarch	Endangered (2016)	Endangered	Special Concern (2003)	Not Applicable - Non Bird Species	Endangered (2017)
Moose (Mainland Population)	Data Deficient	Data Deficient	Data Deficient	Not Applicable - Non Bird Species	Endangered (2003)

Olive-sided Flycatcher	Special Concern (2018)	Threatened	Threatened (2010)	Strategy = Maintain Population	Threatened (2013)
Pine Grosbeak	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Population Decreasing
Ruffed Grouse	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Not Accessed
Rusty Blackbird	Special Concern (2006)	Special Concern	Special Concern (2009)	Strategy = Increase by 100 percent.	Endangered (2013)
Spruce Grouse	Data Deficient	Data Deficient	Data Deficient	Strategy = Increase by 50 percent.	Population Decreasing
Wood Turtle	Threatened (2007)	Threatened	Threatened (2010)	Not Applicable - Non Bird Species	Threatened (2013)

APPENDIX

Map 1: Boundary Map (Recommended Boundary for Proposed Park Highlighted in Red)

Sandy Lake - Sackville River Regional Park Planning Vision, January, 2020

Map 2: Wildlife Corridors

Legend

- Points 1A and 1B mark the northern and southern extents of a major wildlife corridor identified in this report as the Sandy Lake Wildlife Corridor.
- Points 2A and 2B mark the western and eastern extents of a major wildlife corridor identified in this report as the Sackville River Valley Corridor.
- Points 3-8 represent smaller but important riparian wildlife corridors that feed the Sandy Lake Wildlife Corridor.
- Point 9 marks the key wildlife connector between Marsh Lake and the Sackville River Valley Corridor.
- Point 10 marks the key wildlife connector between Jack Lake and Paper Mill Lake.
- Points 11 & 12 mark a wildlife corridors where animals cross over the Hammonds Plains Road. Corridor 12 also feeds into Sandy Lake Wildlife Corridor.

APPENDIX H

SPECIES LISTS FOR SANDY LAKE AND ENVIRONS

As compiled in **Sandy Lake Conservation Association and Sackville Rivers Association submission to the Halifax Green Network Plan implementation public process** 2017; Posted 29 Dec 2017, revised 23 Apr 2019 and 10 May 2019

Mammals

Common Name	Scientific Name	Source
American Beaver	*Castor canadensis*	1
American Mink	*Neovison vison*	1,2
American Porcupine	*Erethizon dorsatum*	1,2
American Red Squjrrel	*Tamiasciurus hudsonicus*	1,2
Black Bear -American Black Bear	*Ursus americanus*	1,2
Bobcat	*Lynx rufus*	1
Coyote,	*Canis latrans*	1,2
Deer Mouse	*Peromyscus manjculatus*	1
Eastern Chipmunk	*Tamias striatus*	1
Ermine (Weasel)	*Mustela erminea*	2
House Mouse	*Mus domesticlls*	1
Little Brown Bat	*Myotis lucifugus*	1, 6
Mainland Moose	*Alces alces americana*	2, 6
Meadow Vole	*Microtus pennsylvanicus*	1,2
Moles		2
Muskrat	*Ondatra zibethicus*	1
Northern Flying Squirrel	*Glaucomys sabri nus*	1
Raccoon	*Procyon lotor*	1,2
Red Fox,	*Vulpes vulpes*	1
River Otter	*Lontra canadensis*	1,2
Sholt-tailed Shrew	*Blarina brevicauda*	1
Short-tailed Weasel	*Mustela erminea*	1
Smoky Shrew	*Sorex fwneus*	1
Snowshoe Hare	*Lepus americanus*	1,2
Striped Skink	*Mephitis mephitis*	2
White-tailed Deer	*Odocoileus virginianus*	1,2
Woodchuck (Groundhog)	*Marmota monax*	1,2
Woodland Jumping Mouse	*Napaeozapus insignis*	1

Fish

Common Name	Source
American Eel	2,4
Atlantic Salmon	2
Banded Killifish	4
Brown Bullhead	4
Catfish	2
Common White Sucker	4
Gaspereax	2,4
Small Mouthed Bass	2
Speckled Trout	2,4
Yellow Perch	4

Amphibians and Reptiles

Common Name	Source
Bull Frog	2
Green Frog	2
Leopard Frog	2
Peepers	2
Wood Frog	2
American Toad	2
Paited Turtle, Eastern	6
Snapping Turtles	2,36
Wood turtle	3
Garter Snake	2
Spotted Salamanders	2

Insects

Common Name	Source
Juvenal's Dusky-wing	3
Monarch	6

Birds

Common Name	Source
Alder Flycatcher	1
American Black Duck	1
American Crow	1,2

American Goldfinch	1,2
American Redstart	1
American Robin	1.2
American Tree Sparrow	1
American Woodcock	1,6
Bald Eagle	1,2
Bank Swallow	3
Barn Swallow	1,3,6
Barred Owl	1,2
Bay-breasted Warbler	3, 6
Belted Kingfisher	1, 6
Black Duck	2
Black-and-White Warbler	1
Black-backed Woodpecker	1
Black-capped Chickadee	1,2
Black-throated Blue Warbler	1
Black-throated Green Warbler	1
Blackburnian Warbler	1
Blue Jay	1,2
Blue-headed Vireo	1
Boreal Chickadee	1,3, 6
Broad-winged Hawk	1
Brown Creeper	1
Brown-headed Cowbird	1
Canada Geese	2
Canada Warbler	1,3, 6
Cape May Warbler	6
Cedar Waxwing	1
Chestnut-sided Warbler	1
Chimney Swift	1,3
Chipping Sparrow	1
Common Loon ---Common	1,2
Common Nighthawk	6
Common Raven	1
Common Yellowthroat	1
Dark-eyed Junco	1,2
Double-crested Cormorant	1,2
Downy Woodpecker	1
Eastern Wood Pewee	1,3,6
European Star!ing	1
Evening Grosbeak	1,2, 6
Fox Sparrow	1

Golden-crowned Kinglet	1
Gray Catbird	1,3
Gray Jay	1,3
Great Black-backed Gull	1
Great Blue Heron	1
Green Heron	1
Green-winged Teal	1
Hairy Woodpecker	1
Hermit Thrush	1
Herring Gull	1
Hooded Merganser	1
Killdeer	3
Least Flycatcher	1
Little Blue Heron	1
Long-eared Owl	1
Magnolia Warbler	1
Mallard	1
Merganser	1
Merlin	1
Mourning Dove	1
Nashville Warbler	1
Northern Flicker	1
Northern Goshawk	1
Northern Harrier	1
Northern Mockingbird	3
Northern Parula	1
Northern Saw-whet Owl	1
Northern Waterthrush	1
Olive-sided Flycatcher	1,3, 6
Osprey	1,2
Ovenbird	1
Palm Warbler	1
Pied-billed Grebe	1
Pileated Woodpecker	1
Pine Grosbeak	1, 6
Pine Siskin	1,3
Purple Finch	1,2
Red Crossbi ll	1
Red-breasted Nuthatch	1
Red-eyed Vireo	1
Red-winged Blackbird	1
Ring-billed Gull	1

Ring-necked Duck	1
Ring-necked Pheasant	1,2
Rock Dove	1
Ruby-crowned Kinglet	1
Ruby-throated Hummingbird	1,2
Ruffed Grouse	1, 6
Rusty Blackbird	1,3, 6
Scarlet Tanager	3
Sharp-shinned Hawk	1
Solitary Sandpiper	1
Song Sparrow	1
Sora	1
Spotted Sandpiper	1,3
Spruce Grouse	1, 6
Swainson's Thrush	1
Swamp Sparrow	1
Tennessee Warbler	1,3
Tree Swallow	1
Veery	1
White-breasted Nuthatch	1,2
White-crowned Sparrow	1
White-throated Sparrow	1
White-winged Crossbill	1
Wilson's Warbler	3
Wood Duck	1
Yellow Warbler	1
Yellow-bellied Flycatcher	1
Yellow-bellied Sapsucker	1
Yellow-rurnped Warbler	1

Plants

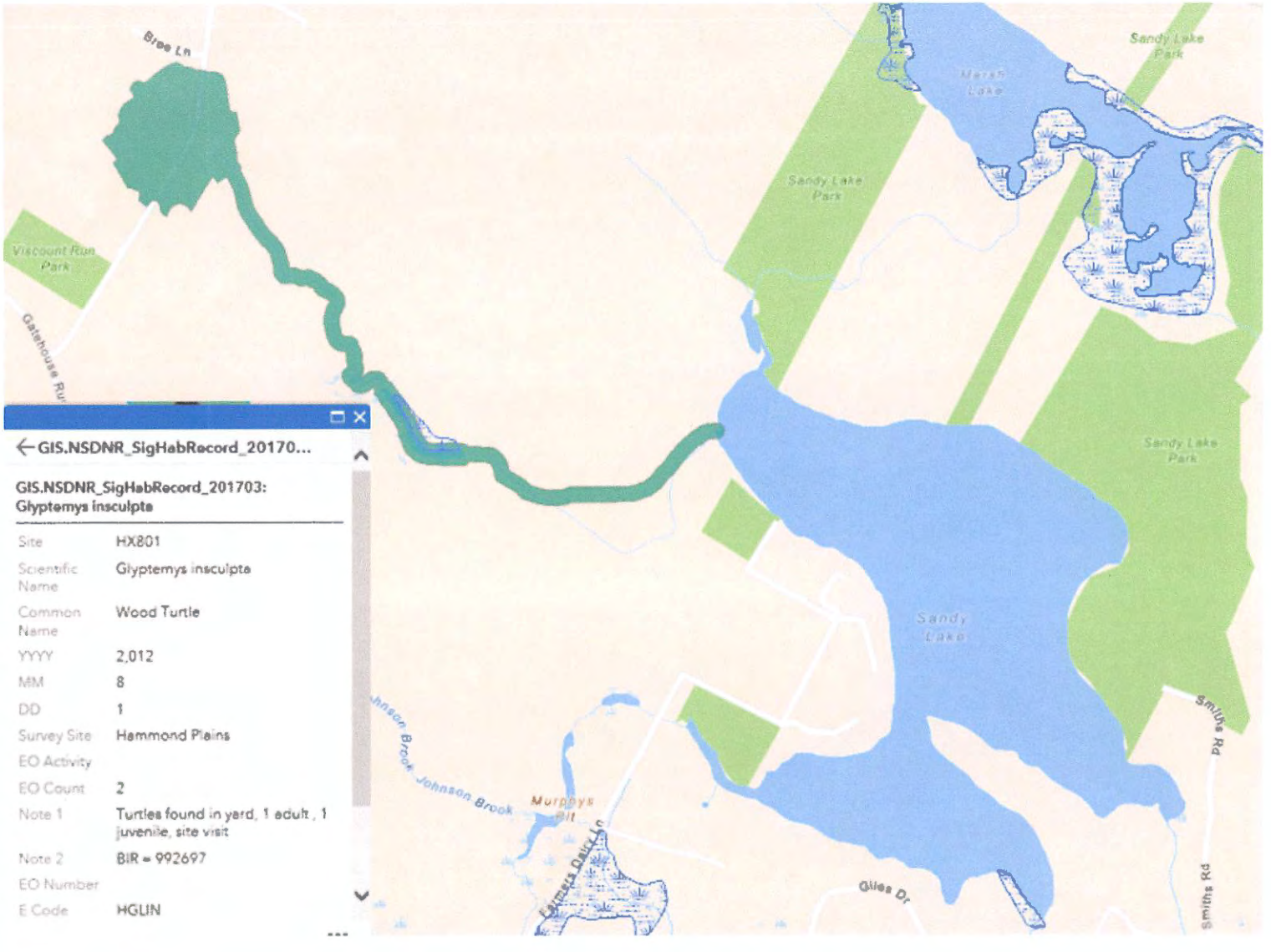
Habit	Common Name	Source
Bryophy		
Forb	Dwarf Bilbury	4
Forb	Mountain Sandwort	4
Forb	Wood sorrel	5
Gram	Poverty Grass	4
Pteridiop	Wood fern	5
Shrub		
Tree	American Beech	4,5
Tree	Balsam Fir	5

Tree	Black Spruce	5
Tree	Eastern Hemlock	4,5
Tree	larch	5
Tree	Red Maple	5
Tree	Red Oak	4,5
Tree	Red Pine	4
Tree	Red Spruce	5
Tree	Sugar Maple	4,5
Tree	Trembling Aspen	4
Tree	White Ash	5
Tree	White Birch	4
Tree	White Pine	4,5
Tree	Yellow Birch	4,5

SOURCE Occurrences as cited **in Sandy Lake Conservation Association and Sackville Rivers Association submission to the Halifax Green Network Plan implementation public process** (2017)

1. **Observed in Sandy Lake Regional Park lands by Clarence Stevens between 2005 and 2015**
2. **Wildlife recorded by Sandy Lake residents since 2010**
3. **Atlantic Canada Conservation Data Centre**, cited in AECOM 2014 "The Atlantic Canada Conservation Data Centre records 25 species of conservation concern within the Sandy Lake watershed. Although precise locations of species sightings are not recorded, most of these species appear to have been identified in the Marsh Lake area"
4. **1986 Jack Lake Environmental Evaluation Report 1986 Wildlife Study**
5. **2001 Sandy Lake Park Environmental Review (Lion's Beach Park)**
6. **Species of interest to Federal and Provincial conservation bodies** observed on surveys conducted on the lake areas of the proposed Sandy Lake-Sackville River Regional Park lands during the **2017 & 2018 breeding seasons** by Clarence Stevens.

Wood Turtles 2012



APPENDIX I

Forests and surface waters of Sandy Lake & Environs (Bedford, Nova Scotia)

http://versicolor.ca/sandylakebedford/lakes/

THE THREE LAKES

There are three lakes in the area encompassed by Sandy Lake and Environs:

Sandy Lake, a headwater lake for the Sackville River.

Marsh Lake, downstream from Sandy Lake via Peverill's Brook; it drains into the Sackville River. (Sandy Lake Watershed is a sub-watershed of the Sackville River Watershed.)

Jack Lake, on a separate watershed; it drains into Papermill Lake (outside of the proposed Sandy Lake Regional Park) and thence to the Bedford Basin.

Some morphometric water and chemistry data for the three lakes from the *Jack Lake CHMC/NSDH Report* (1986) are given below:

Summary of morphometric data for Sandy, Marsh and Jack Lakes. Ranges for temperature and dissolved oxygen are also given. From Jack Lake Environmental Evaluation Final Report. Canada Mortgage and Housing Corporation Nova Scotia Department of Housing, 1986

Lake	Elevation (m)	Surface area (ha)	Max depth (m)	Watershed Area (ha
Sandy Lake	30.5	74.0	20.0	1670
Marsh Lake	23.5	22.0	2.2	493
Jack Lake	75.0	2.75	7.0	32.8

Lake	Retention time (yrs)	Volume M3	Temperature Deg C	Dissolved O2 (mg/L)
Sandy Lake	0.34	5.1×10^6	2.5 - 11.5	9.9 – 11.7
Marsh Lake	0.01	7.4×10^5	5.0 – 9.2	10.1 – 11.2
Jack Lake	0.18	7.4×10^4	2.5 – 11.5	9.9 – 11.7

Selected water chemistry values for Sandy, Marsh and Jack Lakes in Nov/Dec 1984 (top values) and May 1985 (bottom).
From Jack Lake Environmental Evaluation Final Report. Canada Mortgage and Housing Corporation Nova Scotia Department of Housing, 1986.

Variable	Sandy Lake	Marsh Lake	Jack Lake
pH	6.14 5.44	6.10 5.30	4.63 4.50
Conductivity uS/cm	99.5 141	102 122	41.5 42.7
Calcium Mg/L	4.10 4.64	4.00 3.95	1.00 1.18

TEMPORAL TRENDS OF TOTAL P, pH and CONDUCTIVITY IN SANDY LAKE

Based on Total Phosphorus measurements, Sandy Lake has moved from an oligotrophic state in 1979 towards a mesotrophic state today.

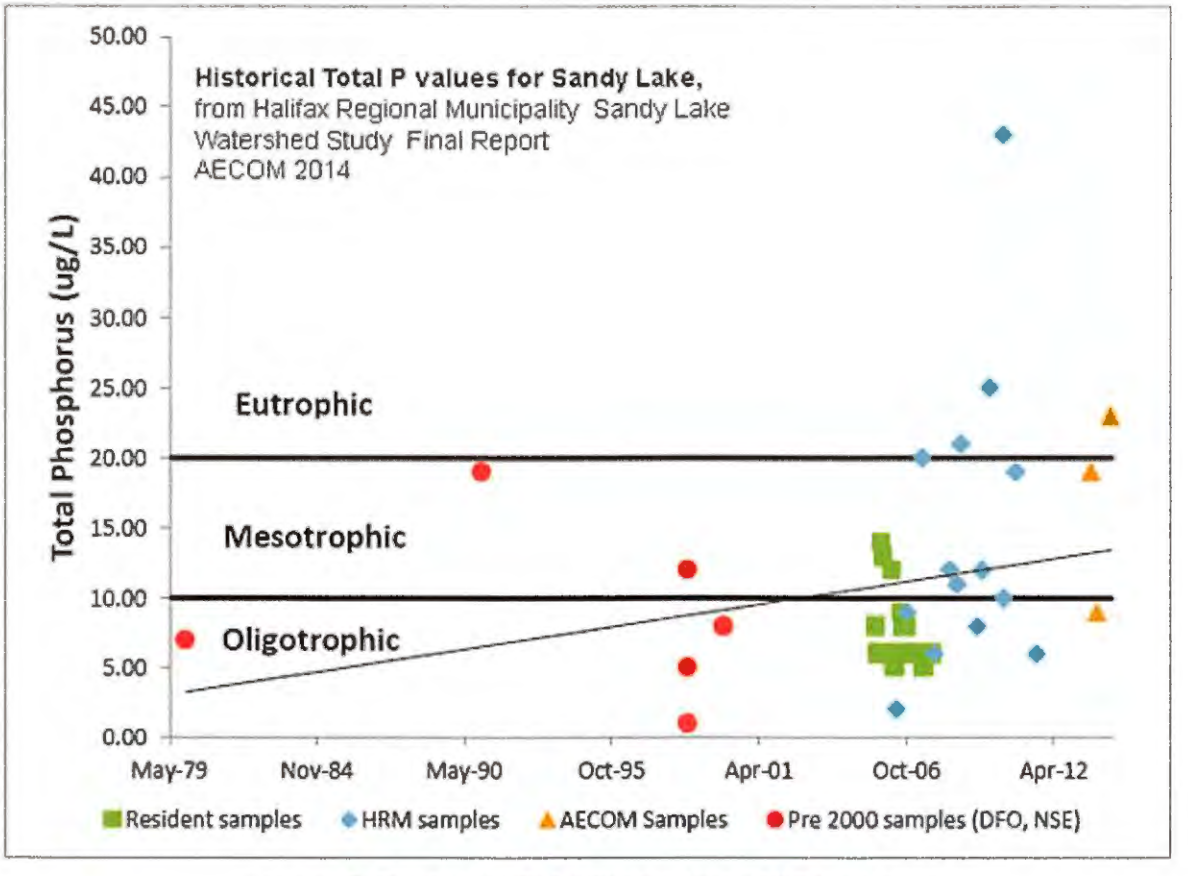


Figure 9: Sandy Lake Total Phosphorus - All Samples

pH and conductivity values have also increased since 1977-1980:

Some historical pH and conductivity values for Sandy Lake

Variable	1955	1971	1977	1980	1985	1991	2000	2010	2017
pH	5.10	-	4.57	4.90	5.44	5.29	5.65	7.56	6.70
EC (uS/cm)	40	37	100	58.9	141	113.7	133.0	167	168

2018: Oct 3, 2017. View this website> **Lakes>Limnological Profiles**

2010: from **HRM Water Quality Monitoring Program Results - Spring 2010** http://www.region.halifax.ca/energy-environment/environment/documents/HRMLakesDeepstationSurveydata-Spring2010.pdf

1980-2000 from: **Synoptic Water Quality Survey Of Selected Halifax Regional Municipality Lakes On 28-29 March 2000** by P. Clement et al., 2007. Canadian Technical Report of Fisheries and Aquatic Sciences NNNN https://novascotia.ca/nse/surface.water/docs/SynopticWaterQualitySurvey-MetroHalifaxLakes-2000.pdf

1985 (May 14-15), from: **JACK LAKE Environmental Evaluation Final Report,** Canada Mortgage and Housing Corporation Nova Scotia Department of Housing, 1986.

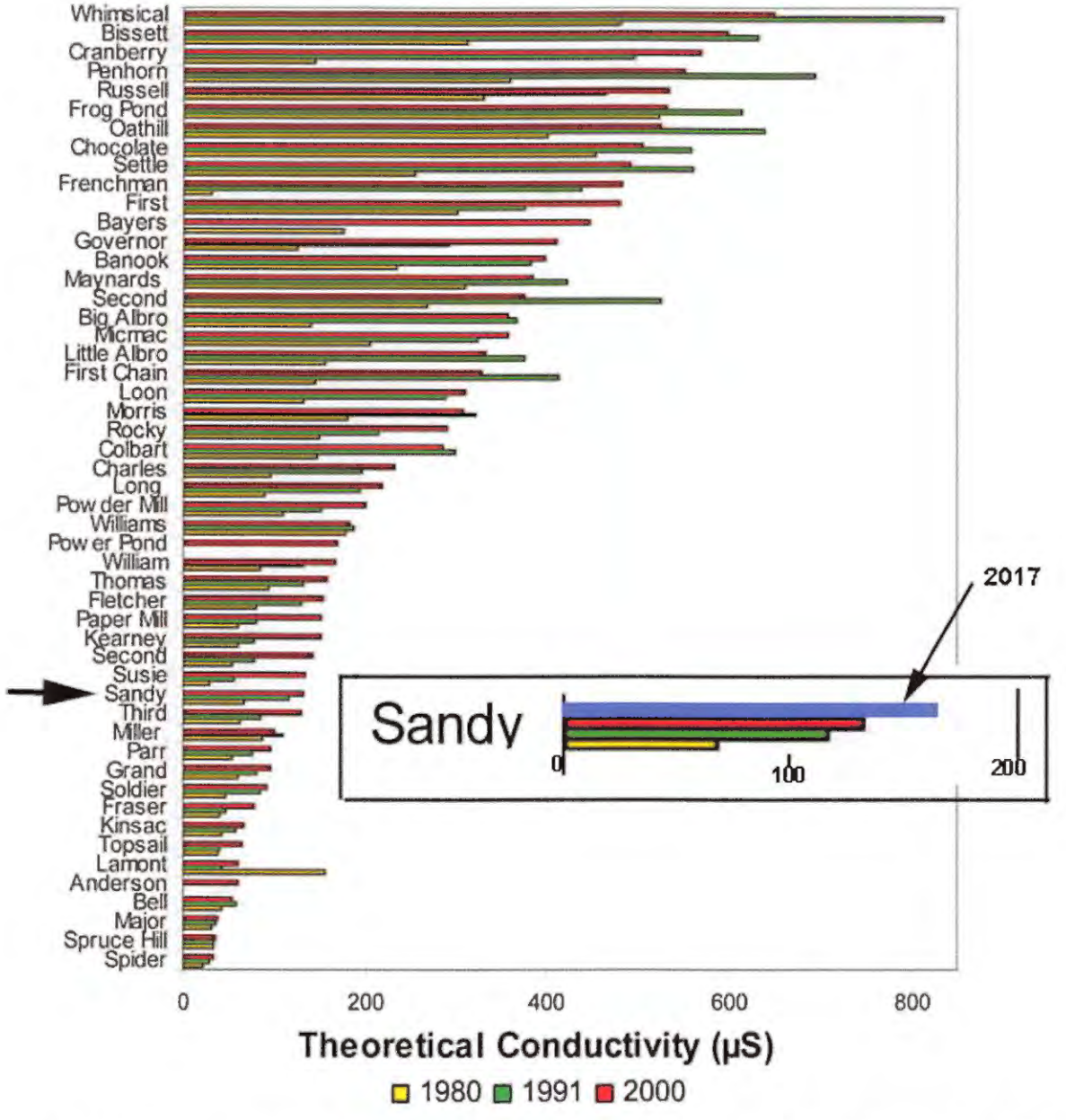
1977 from Watt, W.D. et al. 1979. **Acidification and other chemical changes in Halifax County lakes after 21 years.** Limnol. Oceanogr. 24: B 154- % 16 1. Sampled in Jan 1977

1971: **Metropolitan Area Planning Committee 1971-1972: Water Quality Survey for Selected Metropolitan Area Lakes,** Feb 1972. Data for Lake 31 (Sandy Lake). All cc data: N. Inlet 57.0 S Inlet 57.0 Surface 37.0 59 feet 39.0 Outlet 39.0 Sampled Aug 30, 1971

1955 from: Gorham, E. 1957. **The chemical composition of lake waters in Halifax County, Nova Scotia.** *Limnol. Oceanogr.* 2: 12-21. Sampled in Dec 1977. pH avg of before and after aeration

The interpretation of pH changes is complicated by the influence of acid rain and the lack of values earlier than 1955. pH dropped about 1/2 unit between 1955 and 1977 which is attributable to acid rain; the values for 1977 and 1980 are below requirements for salmon (~5.0 and greater for adults, >5,4 for fry [1]), while the 1955 value is close to the lower limits for salmon. As salmon were in Sandy Lake historically, it seems that pH values favourable for Atlantic salmon must have existed in Sandy Lake prior to the era of increasing acid rain. That era occurred from the mid-1950's through to 1980s when average lake pH dropped 1-1.5 units.[2] Emission controls were implemented in the 1990s and reductions in stream acidity in northeastern NA began to be observed in the 2000s, although not in much of Nova Scotia on soils developed on slates and granite.[3] Increases in pH (less acidity) have been reported recently for the Pockwock and Lake Major water reservoirs.[4] As sugar maple, a calcium-demanding species [5], occurs on on the thick drumlins by Sandy Lake, it can be inferred that the forests/drumlins by Sandy Lake (also Marsh Lake) provide some watershed buffering of lake pH. (See AECOM 2014, Fig 5 for distribution of drumlins.)

Urbanization tends to increase stream pH values, also electrical conductivity (EC), a measure of salt content. In Nova Scotia, our liberal use of road salt is blamed for much of the trends of increase in conductivity in Halifax area lakes over the interval 1980-2000 as revealed in synoptic Lake studies:



Modified Fig 4 from **Synoptic Water Quality Survey Of Selected Halifax Regional Municipality Lakes On 28-29 March 2000.** P Clement et al. 2007. Canadian Technical Report of Fisheries and Aquatic Sciences NNNN

EC values in the area of 30-60 uS/cm are typical of pristine lakes in the Halifax region. [1] EC values for Sandy Lake were in that range in 1955 and 1971, and 1980 (not in 1977 however) but samples taken from 1985 onward were well above 100 with an overall upward trend. The low values in 1955 and 1971 suggest the lake was likely well below the mesotrophic range (re: figure above), i.e. it was oligotrophic in those earlier years.

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1. Also, pH in the range 4.5 to 5 is cited by White et.al 1981 for Sandy Lake in 1980; liming had only a transitory effect (White et.al 1981. On the feasibility of rehabilitating acidified Atlantic salmon habitat in Nova Scotia by the addition of lime. Fisheries Vol 9(1):1-3). Salmon fry are highly sensitive to ph 5.4 and below, adults to pH <5.0, but it depends on the

source of acidity, tolerance being less when the acidity is derived from sulphates in acid rain than from naturally occurring humic acids. Critical pH values for brook trout are cited as pH 4.7 to 5.2. Farmer, G. **Effects of low environmental pH on Atlantic salmon in Nova Scotia**. 2000. Canadian Stock Assessment Research Document 2000/050. Baldigo and Lawrence 2001. **Effects of stream acidification and habitat on fish populations of a North American river**. Aquat.Sci.63 (2001) 196–222.

2. Ginn et al. 2007. **Assessing pH changes since pre-industrial times in 51 low-alkalinity lakes in Nova Scotia, Canada** Can. J. Fish. Aquat. Sci. 64: 1043–1054.

3. Clair, T.A., Dennis, I.F., and Vet, R. 2011. **Water chemistry and dissolved organic carbon trends in lakes from Canada's Atlantic provinces: no recovery from acidification measured after 25 years of lake monitoring**. Can. J. Fish. Aquat. Sci. 68(4): 663–674.

4. L.E. Anderson et al., 2017.**Lake Recovery Through Reduced Sulfate Deposition: A New Paradigm for Drinking Water Treatment**. Environ. Sci. Technol., 2017, 51 (3), pp 1414–1422.

5. Long, R.P. et al. 2009. **Sugar maple growth in relation to nutrition and stress in the northeastern United States**. Ecol Appl. 2009 19:1454-66.

6.**Synoptic Water Quality Survey Of Selected Halifax Regional Municipality Lakes On 28-29 March 2000** by P. Clement et al. 2007. Canadian Technical Report of Fisheries and Aquatic Sciences NNNN. UPDATE May 10, 2019: 2011 data just published: Synoptic water quality survey of selected Halifax-area lakes : 2011 results and comparison with previous surveys / Pierre M. Clement and Donald C. Gordon.

OBSERVATIONS OF LIMNOLOGICAL VARIABLES IN 2017 and 2018

Four sets of data were obtained:

(i) I routinely carried a pocket conductivity meter and frequently a pocket pH meter (the latter borrowed from CBEM at St. Mary's University), and made measurements of water on surface waters as I encountered them.

(ii) On Aug 10, 2018, I paddled the perimeter of Sandy Lake and measured electrical conductivity (EC), occasionally pH at regular intervals.

These two sets of results are plotted on Google Maps. View EC & pH

pH values for Sandy Lake were in the range 6.6 to 7.2, while EC values were mostly in the range 170 to 180. Streams on the east side of Sandy Lake had EC values in the range 30-51 uS/cm, pH 4.9 to 5.8. EC values for 2 streams on the west side were 78 and 98 uS/cm (pH 4.8, 5.4) likely reflecting some input of solutes from developments in the Gatehouse run/Lucasville Road area within the watershed. The highest stream EC and pH values were for the major inlet at the southwest corner of the lake (EC 346, 348 uS/cm pH 7.4) where Johnsonn's Brook (sometimes known as Bob's Brook) enter the lake. These waters receive effluent originating from the Uplands Park Wastewater Treatment Facility serving approximately 170 people, which AECOM (2014) identified as a point source of pollutants.

A set of water quality observations on Sandy Lake in 1991* revealed an exceptionally low pH value of 3.38 for the "Northern Inlet". The same site sampled on Aug 21, 2017 had a pH value of 5.7. The low value in 1991 may have reflected peak acidification due to acid rain and/or exposure of acid slates in

the northwestern part of the watershed (see AECOM 2014, p 8) and the higher value now observed, reductions in acid rain-causing emissions, and possibly some urban influence of now established development.

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*__Sandy Lake Development Impact Assessment Final Report__ by D. Conrad et al. 2002 Biological Engineering Department, Dalhousie University

(iii) On Nov 8, 2018 I sampled 3 streams associated with Johnson's Brook and water entering the lake via the culverts at the SW corner of the lake (just down from the road to the dairy). There was very high-water flow at this time, but a clear salt signal was evident in two of the streams converging at "Murphy's Pit". One was the streams draining the Uplands Park wastewater treatment area (EC 125 uS/cm). Another was the stream draining the construction/trucking yard and community just to the SE of the Dairy Road (EC 410). Water at the latter site was very cloudy and full of particulate material. This stream does not seem to have been identified as a significant source of pollutants in the AECOM 2014 study and should be further investigated. Samples were taken again at this site on Dec 13, and through the winter by a volunteer (B. Sarty). These continued to show a salt signal. View details under http://versicolor.ca/sandylakebedford/lakes/ec-ph/

View EC & pH

(iv) A set of vertical profiles of temperature, oxygen, EC and pH were obtained for 3 sites on Sandy Lake ON Oct 3, 2017, using a Wet-pro Field kit borrowed from the Community Based Environmental Monitoring Network at St. Mary's University. I had wanted to do these measurements in August to view summer stratification at its peak, but the equipment was not available then. Hence measurements were made on Oct 3 when the water column was likely in the process of "de-stratifying". View Limnological Profiles for the results.

The oxygen values are of particular note. The phosphorus models in effect attempt to predict oxygen profiles which affect a wide range of life in lakes, but the oxygen profiles give a more direct and description of the state of the lake than total P values. The results from Oct 3 indicate oxygen values at depth are lower than values required for cold water fish, but there is not (yet) severe depletion of oxygen. This state is consistent with AECOM's conclusions based on Total Phosphorus measurements that the lake is moving from an oligotrophic (nutrient-poor) into a mesotrophic state.

(*Mesotrophic* lakes are richer in nutrients than nutrient-poor oligotrophic lakes but are not nutrient-rich *eutrophic* lakes in which oxygen is depleted in deeper layers.)

The only comparable historical data for Sandy Lake are apparently those reported for the surface and at 59 ft (18 m) on Aug 30, 1971:

Variable	1971 surface	1971 18 m	2017 surface	2017 17.5 m
Temp (° C)	21	-	17.1	5.7
Conductivity (uS/cm)	37	39	169	248
Oxygen (mg/L)	7.25	5.0	9.42	2.25

1971: from **Metropolitan Area Planning Committee 1971-1972: Water Quality Survey for Selected Metropolitan Area Lakes.** Sandy lake was sampled on Aug 30, 1971
2017: Sampled on Oct 3

So at peak stratification in 1971, the oxygen concentration at the bottom was twice the value in 2017. In 2018 the conductivity on the surface had increased about 4.6 fold and the bottom value was 79 uS/cm greater, compared to a difference of only 2 uS/cm in 1971. As differences in conductivity/salt content between surface and deeper water increase, they increase density stratification of water column and slow down and at some point eliminate seasonal turnover of the water column associated with temperature changes, and thus re-oxygenation of the deeper layers; in turn that can lead to permanently low or no oxygen in the deeper layers.

The current state of Sandy Lake and the worsening trend should be a matter of concern. While waters entering the major inlet are likely the major source of pollutants, I note also the apparent "salt signal" in streams draining land in the area of Gatehouse and Lucasville Roads; and that a large volume of clearcut debris entered the northwest side of the lake.

As noted in the SLCA Response to AECOM study rising temperatures add to the stresses, e.g. by reducing oxygen solubility.
AECOM has identified a number of measures to be taken to protect Sandy Lake even with further development in the watershed; stronger measures and less development were suggested by SLCA (see Recommendations in SLCA Response to AECOM study).
These recent observations suggest that the lake is currently in a precarious state.

In regard to Water Quality Monitoring, AECOM 2014 advised:

The Water Quality Monitoring Functional Plan identifies Sandy Lake as a Tier I waterbody or "High Vulnerability" to be sampled with a sampling program consisting of monthly collections during the ice free season (April – December) and at least one sample during the winter season...Temperature and dissolved oxygen profiles are recommended to be collected during each sampling event at 1 m intervals with profiling intervals increased to up to 3 m below the 20 m level. Water samples should be collected from 0.5 m below the lake surface, at mid-depth, and 1 m above the lake bottom.
Both discrete and volume-weighted samples from Sandy Lake are recommended to be analyzed. Total phosphorus and chlorophyll a testing must be performed on all discrete water samples. E. coli need only be measured for the 0.5 metre (top) water sample. Volume-weighted samples made up of top,

middle and bottom water samples are to be tested for the remaining grouped analytical parameters specified in Table 14.

The water quality monitoring program for Tier 1 lakes (Stantec 2009) is recommended as a suitably robust water quality monitoring plan for Sandy Lake that will allow for the identification of seasonal and long-term patterns in water quality and to evaluate how water quality may be impacted by development in the Sandy Lake watershed.

The observations reported here illustrate the paramount importance of routine monitoring of limnological profiles. In addition, they illustrate how measurements of conductivity of incoming waters through different seasons would be appropriate for monitoring. The equipment for such measurements is cheap and robust and such measurements could be conducted by a citizens group. Also, I suggest keeping a watchful eye on the lakeside wetlands. In the more open areas of the lake, those wetlands are now dominated by an emergent aquatic plant, the bayonet rush, which is characteristic of oligotrophic (nutrient-poor) lakes, thus change in that conditions towards species characteristic of mesotrophic/eutrophic conditions could be regarded as significant. *

I think its clear that Sandy Lake could and probably would degrade rapidly with further significant development in the watershed. The morphometrics of Sandy Lake and the degree of development around the lake are similar to those of Williams Lake on the Halifax south mainland. At Williams Lake, there was apparently no seasonal turnover in a recent winter*, and a program of alternatives to road salt on some adjacent streets has been re-introduced.

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*I have to report the detailed observations on aquatic plant species in Sandy Lake. Species more characteristic of higher nutrient levels occur closer to the major inlets.

-dp Jan 2, 2017

** View Water quality measurements on Williams Lake and Colpitt Lake (Halifax, N.S.) Dec 7-13, 2015 with reference to possible impacts of road salt by David Patriquin for the Williams Lake Conservation Company (2016)

APPENDIX J

Quotes from How Our Health Depends on Biodiversity

2010

Eric Chivian M.D. and Aaron Bernstein M.D., M.P.H.
Dr. Chivian was winner of the 1985 Nobel Peace Prize.

For the full paper go to:
https://www.researchgate.net/publication/265187166_How_Our_Health_Depends_on_Biodiversity

"The eminent Harvard biology Professor Edward O. Wilson once said about ants, "We need them to survive, but they don't need us at all." The same fact could be said about countless other insects, bacteria, fungi, plankton, plants, and other organisms. This fundamental truth, however, is largely lost to many of us. Rather, we humans often act as if we are totally independent of Nature, as if our driving thousands of other species to extinction and disrupting the life-giving services they provide will have no effect on us whatsoever.

This summary, using concrete examples from our award-winning Oxford University Press book, *Sustaining Life: How Human Health Depends on Biodiversity*, co-sponsored by the U.N. and the International Union for the Conservation of Nature, has been prepared to demonstrate that human beings are an integral, inseparable part of the natural world, and that our health depends ultimately on the health of its species and on the natural functioning of its ecosystems.

We have written this summary because human health is generally not part of discussions about biodiversity loss, by policy-makers or by the general public, and because most people, as a result, do not understand the full magnitude of the biodiversity crisis and do not develop a sense of urgency about addressing it. We believe that once people really grasp what is at stake for their health and their lives, and for the health and lives of children, they will do everything in their power to protect the living world." p.3

Another aspect discussed with examples is that future pandemics can result from disruptions caused by habitat loss. "Ecosystem disruption and the loss of biodiversity have major impacts on the emergence, transmission, and spread of many human infectious diseases." ... "The pathogens for some 60% of human infectious diseases, such as those causing malaria and HIV–AIDs, have entered our bodies after having lived in other animals." P.16

"Ecosystems provide goods and services that sustain life on this planet, including human life. If damaged, we cannot fully restore them, no matter how much money we spend." P.7

Sandy Lake – Sackville River Regional Park

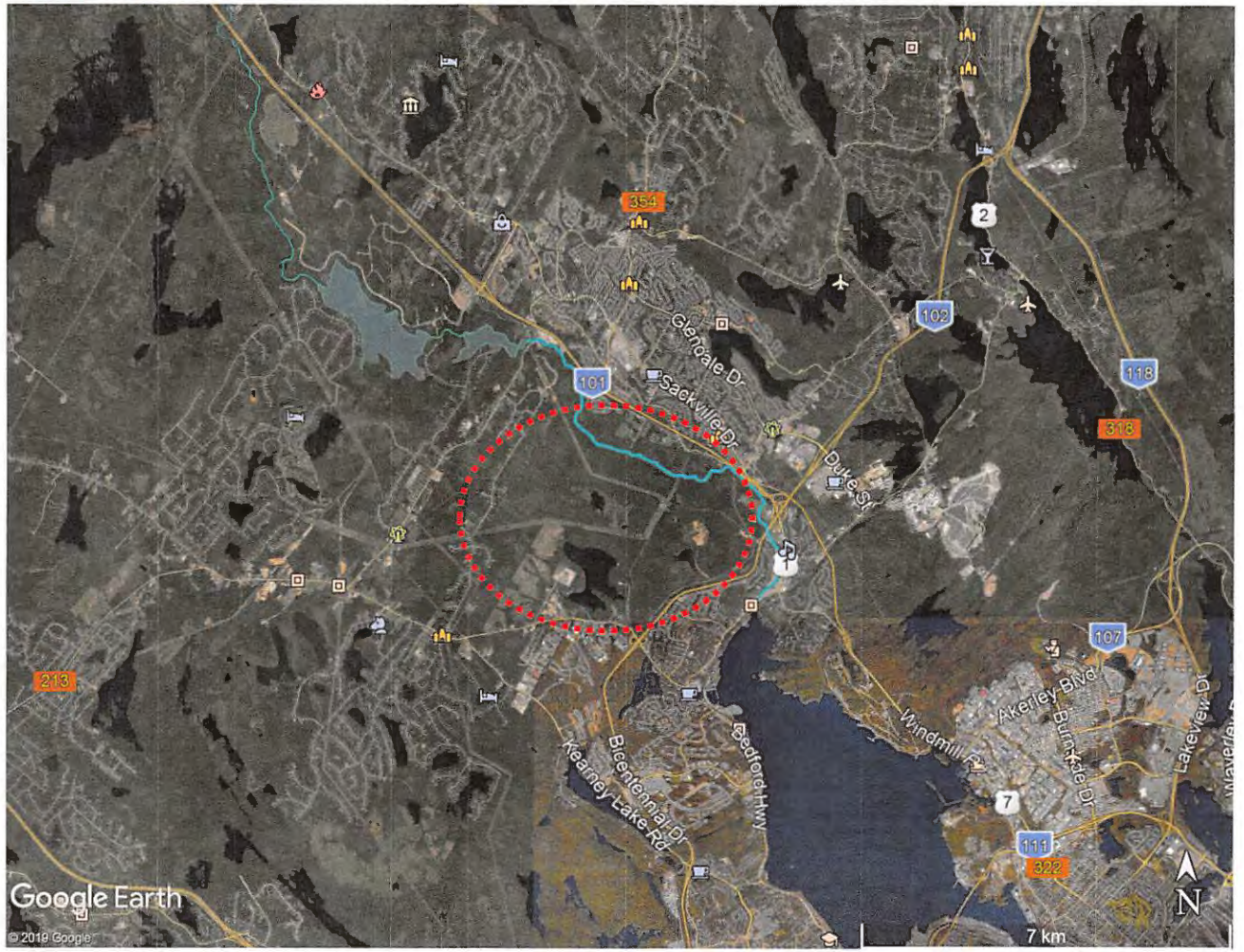
Planning vision

January, 2020

DIORA LAND DEVELOPMENT

Sandy Lake – Sackville River Regional Park

Planning context



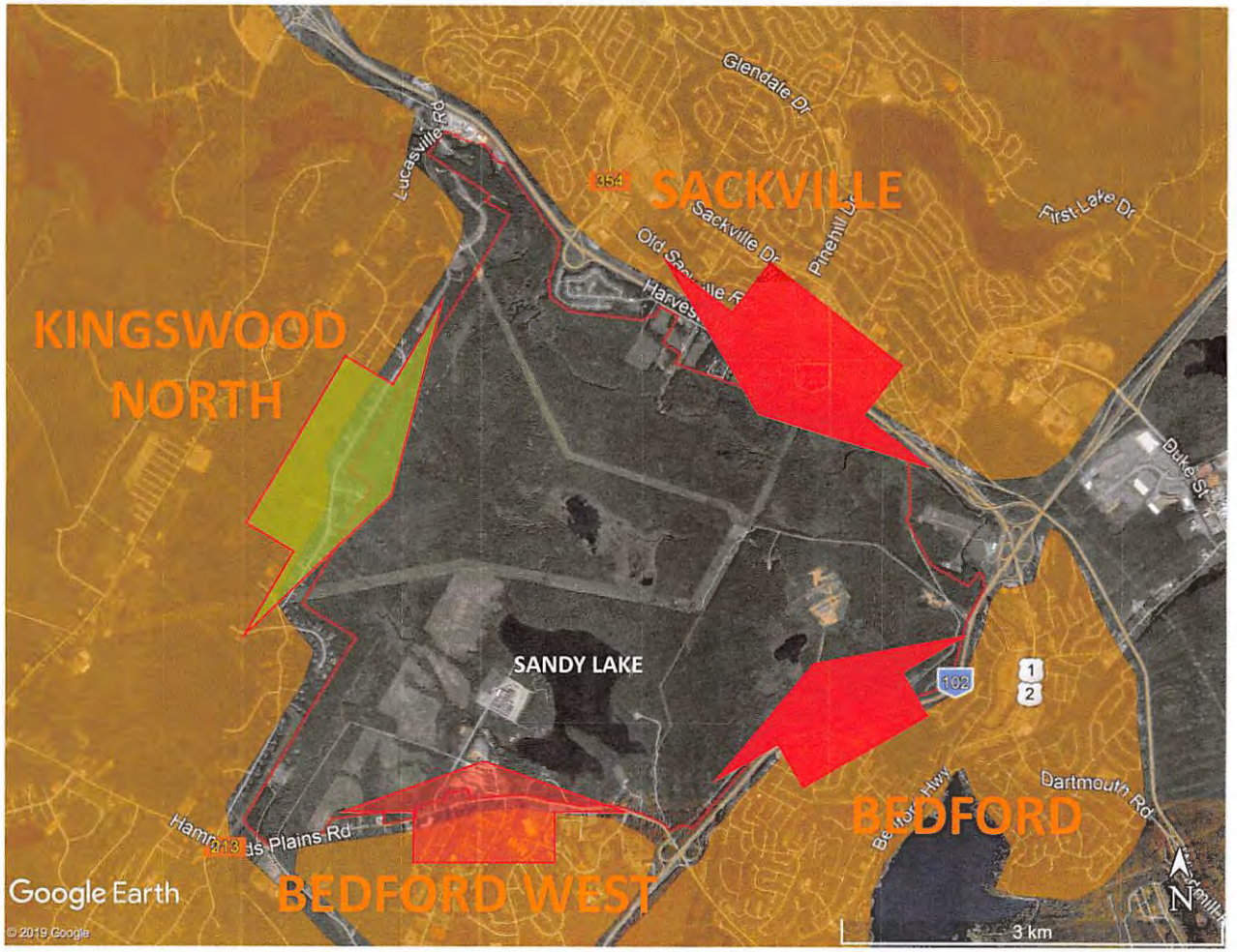
General location of the Sandy Lake – Sackville River Regional Park

General location of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park is located between Highway 101, Highway 102 and Hammonds Plains Road. This area includes undeveloped land between Sandy Lake and Sackville River. Convenient access to this area from the adjacent communities is restricted by the existing highway system.

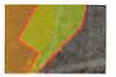
Sandy Lake – Sackville River Regional Park

Planning context



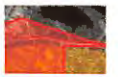
Context of Sandy Lake – Sackville River Regional Park to the surrounding communities

Surrounding residential communities



Access to the Regional Park area from Kingswood North Community

Restricted public access from Sackville and Bedford Community

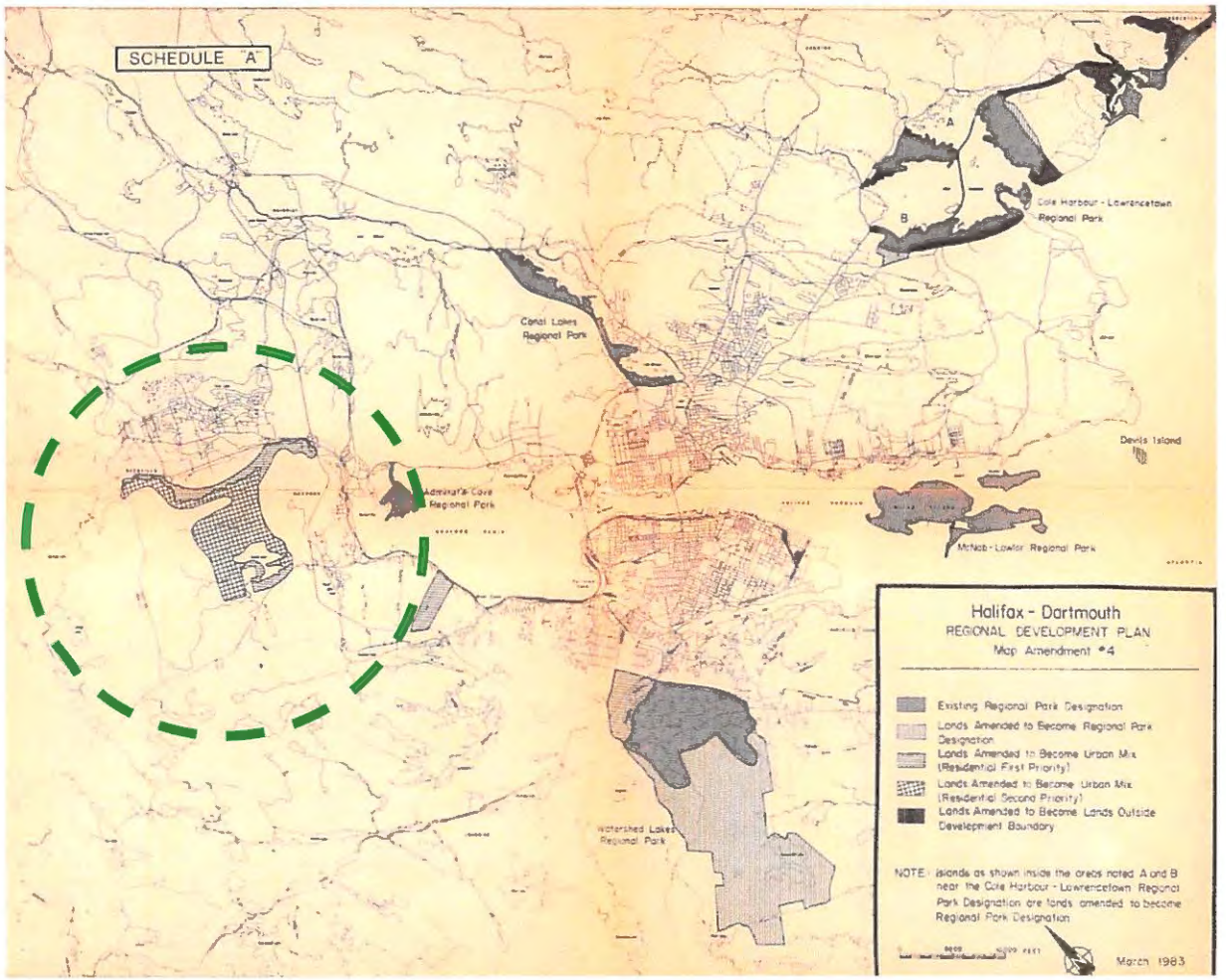


Limited access to the Regional Park area from Bedford West Community

Sandy Lake – Sackville River Regional Park area is directly adjacent to Bedford, Sackville and Bedford West Communities. Direct public access to the Park area is restricted and limited by highway system and major roads. Only Kingswood North community has relatively easy direct contact with the Park area.

Sandy Lake – Sackville River Regional Park

Planning background

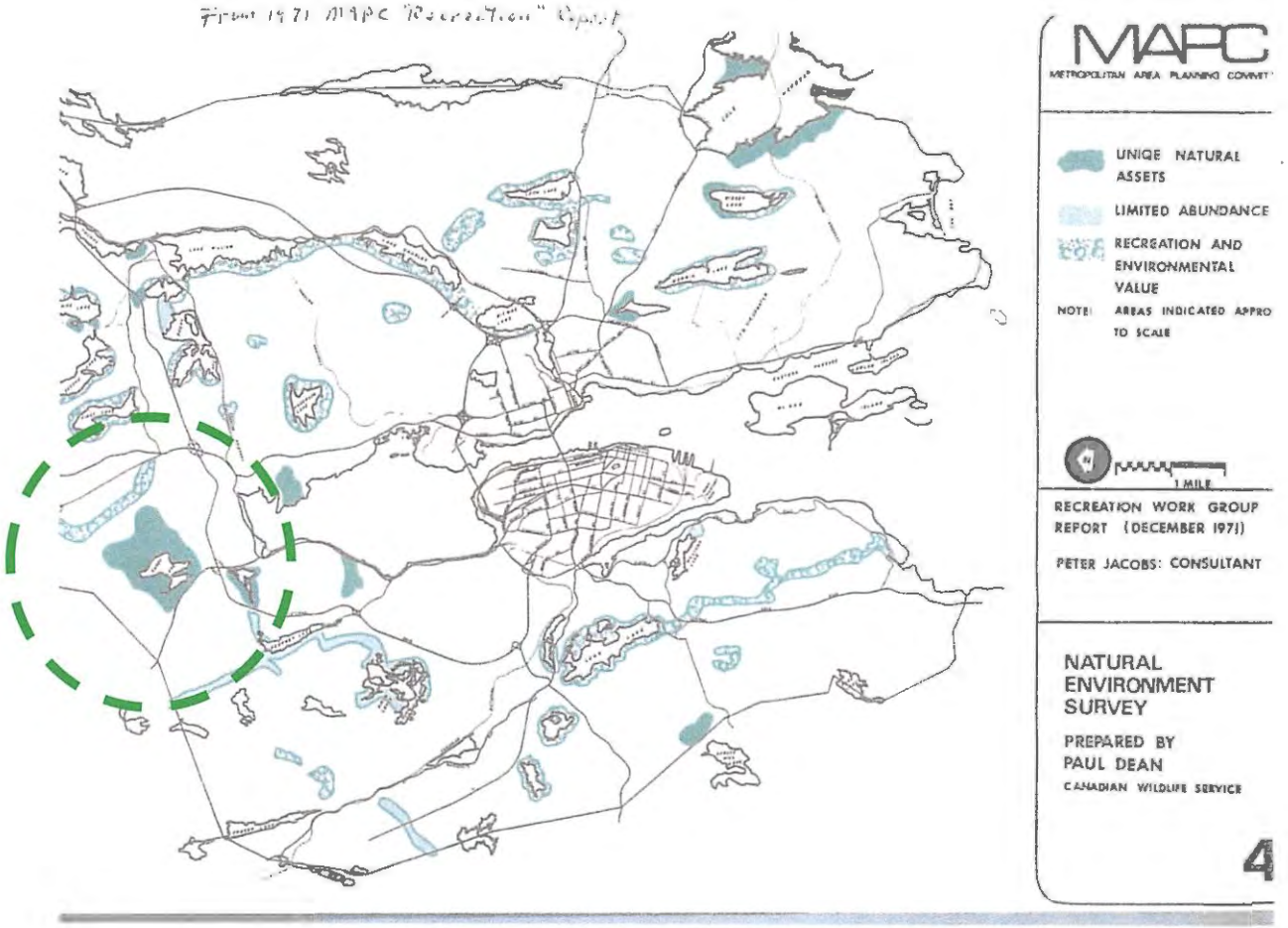


Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

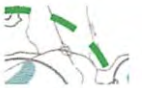
General location of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning background



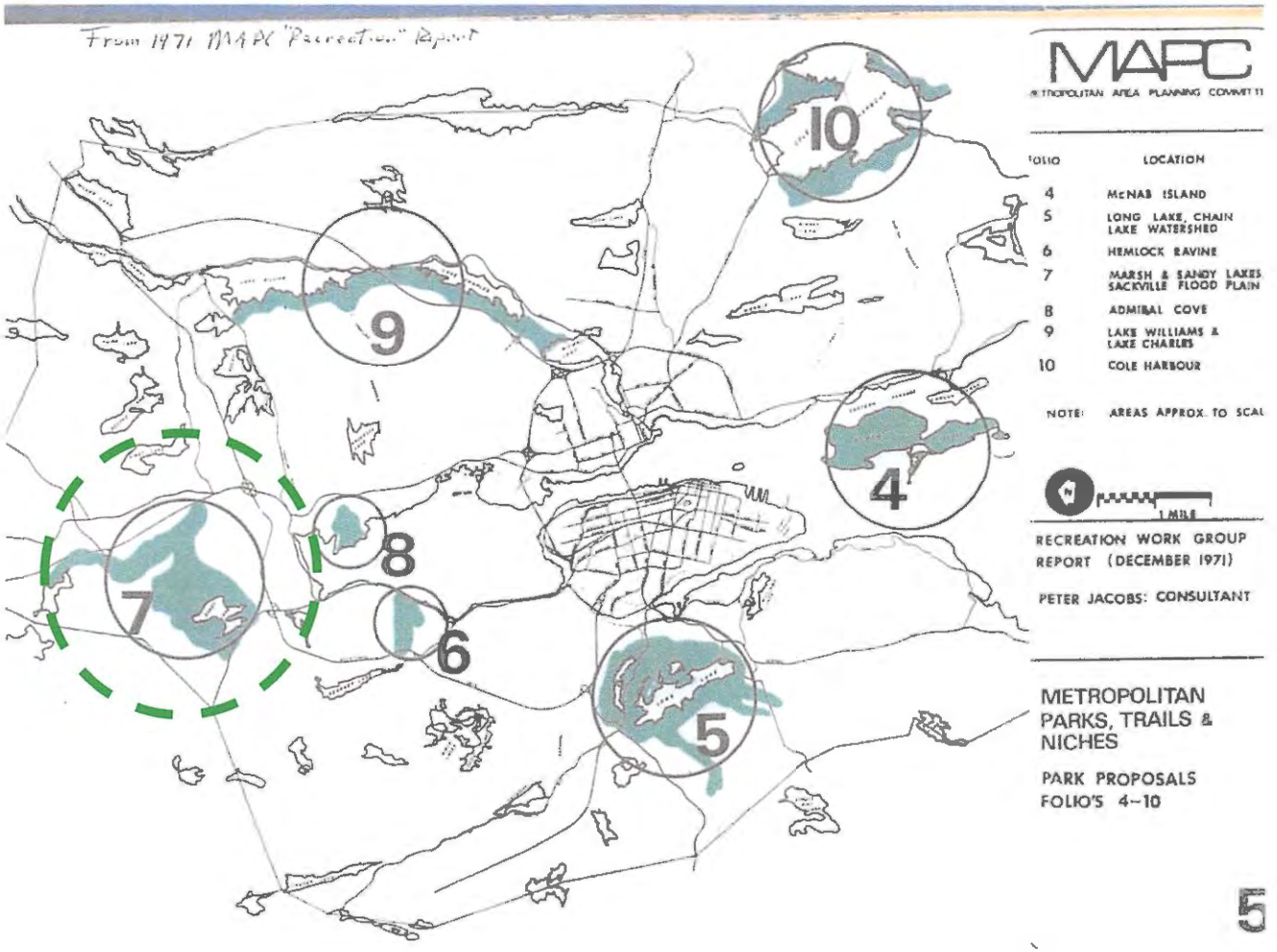
Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park



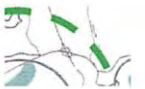
General location of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning background



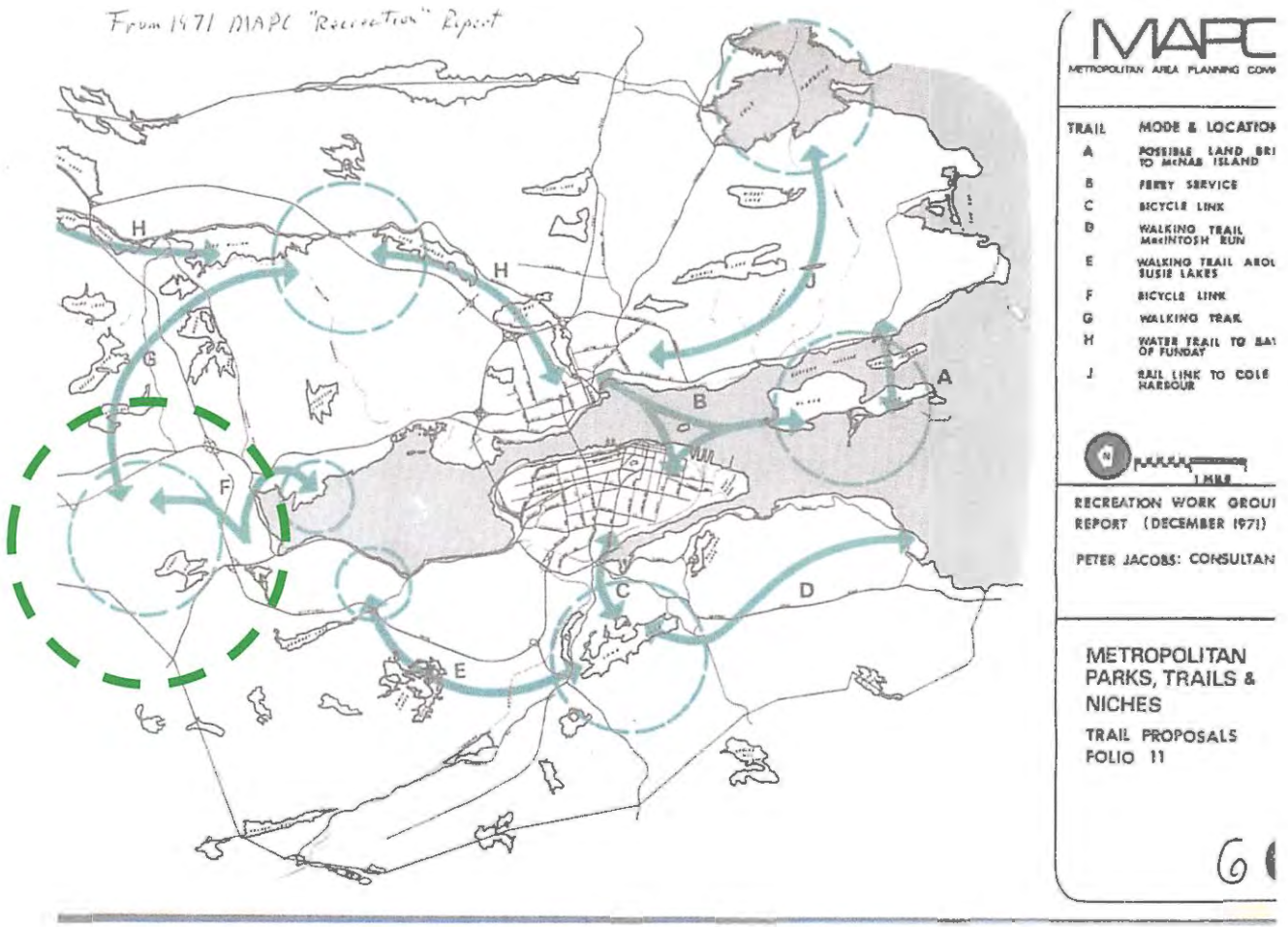
Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park



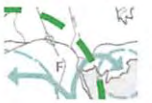
General location of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning background



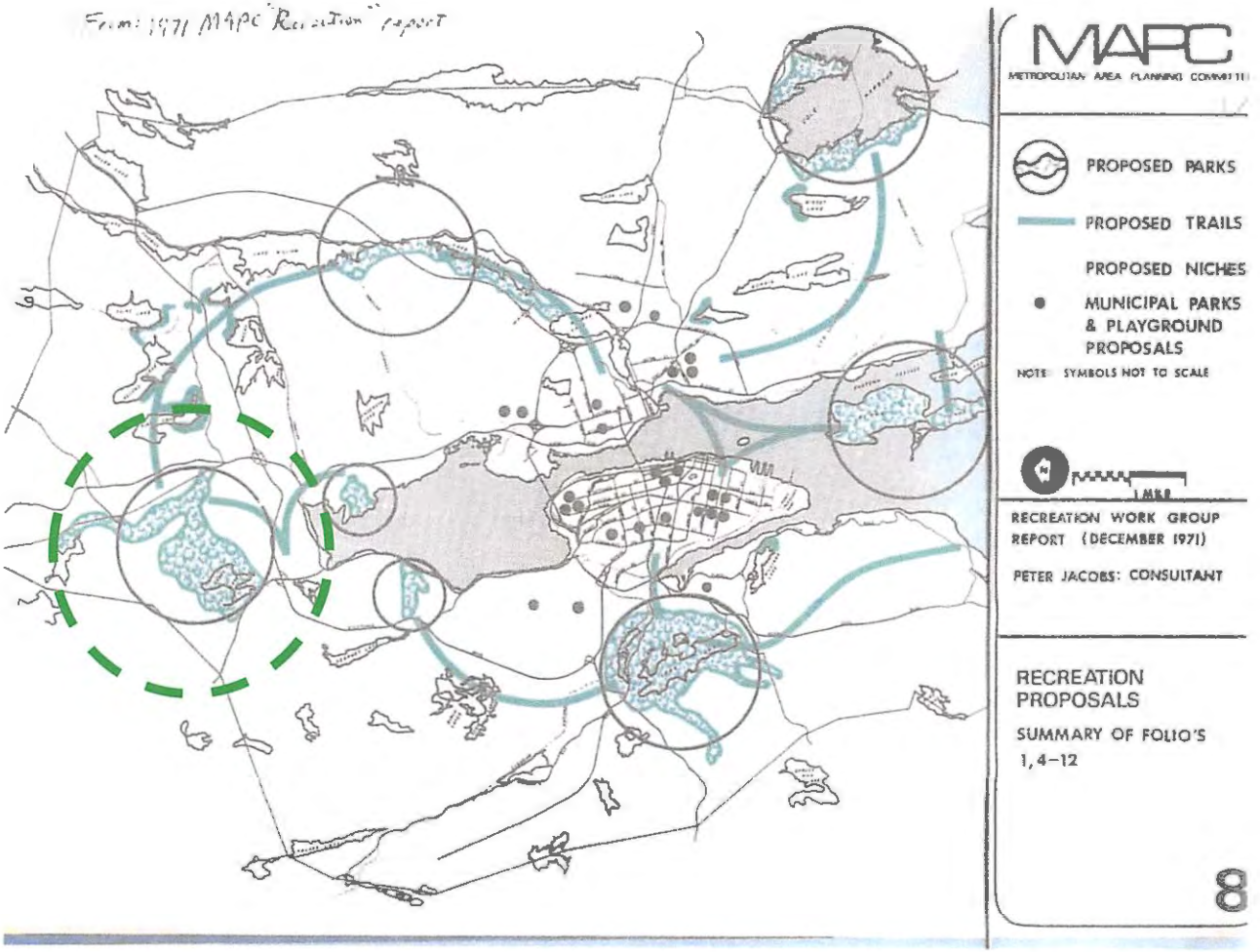
Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park



General location of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

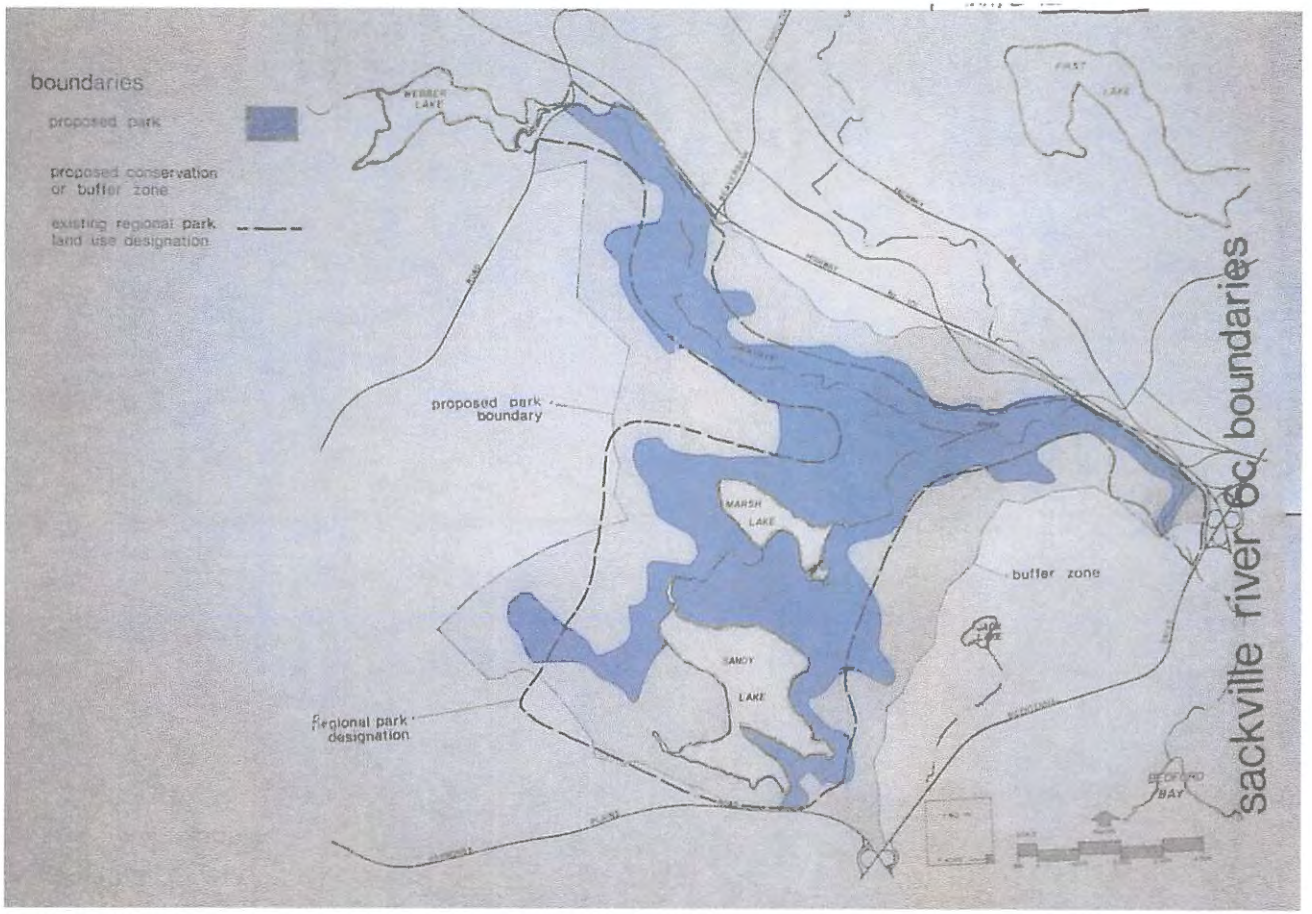
Planning background



Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

General location of Sandy Lake – Sackville River Regional Park

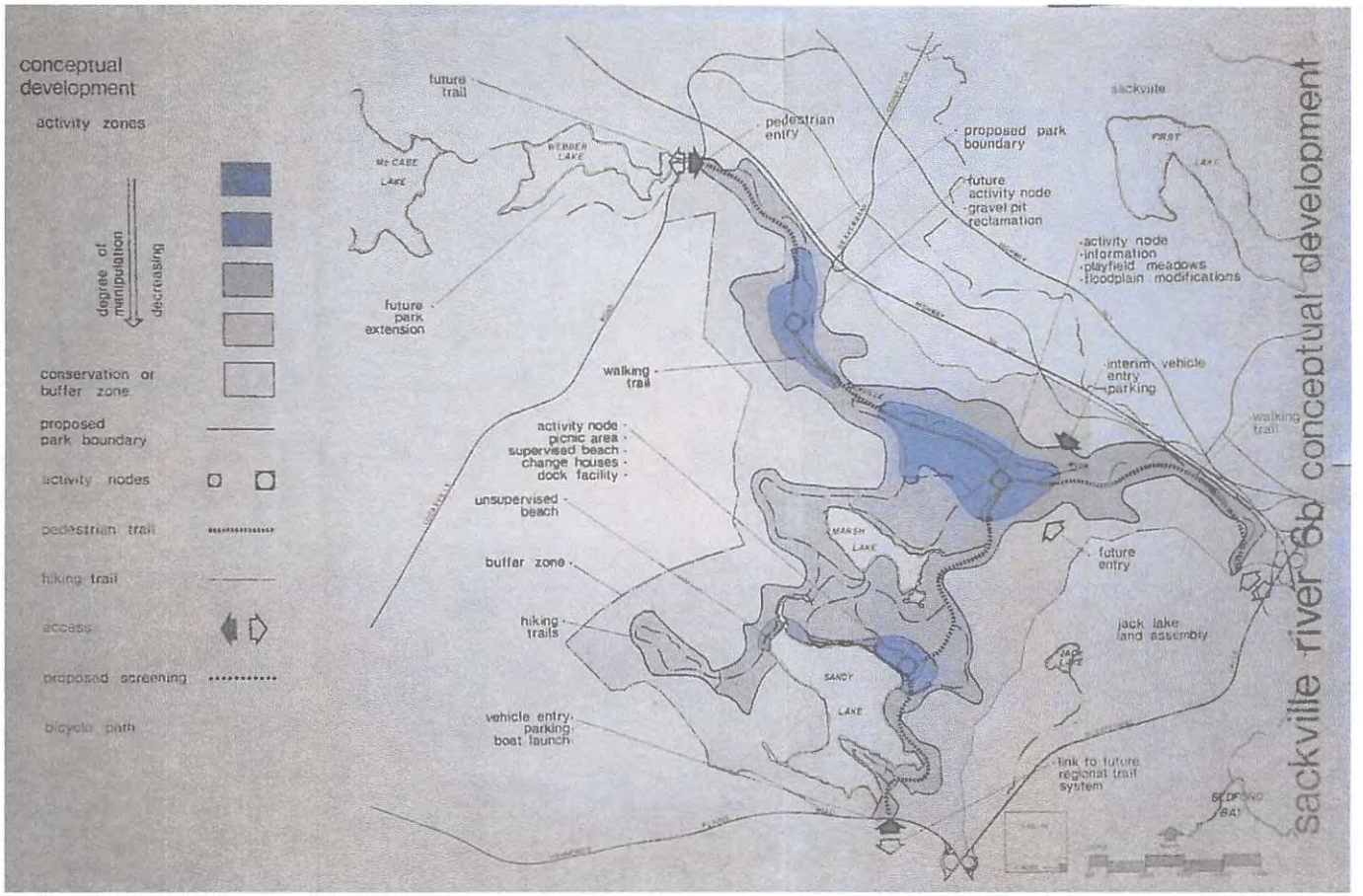
Sandy Lake – Sackville River Regional Park
Planning background



Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

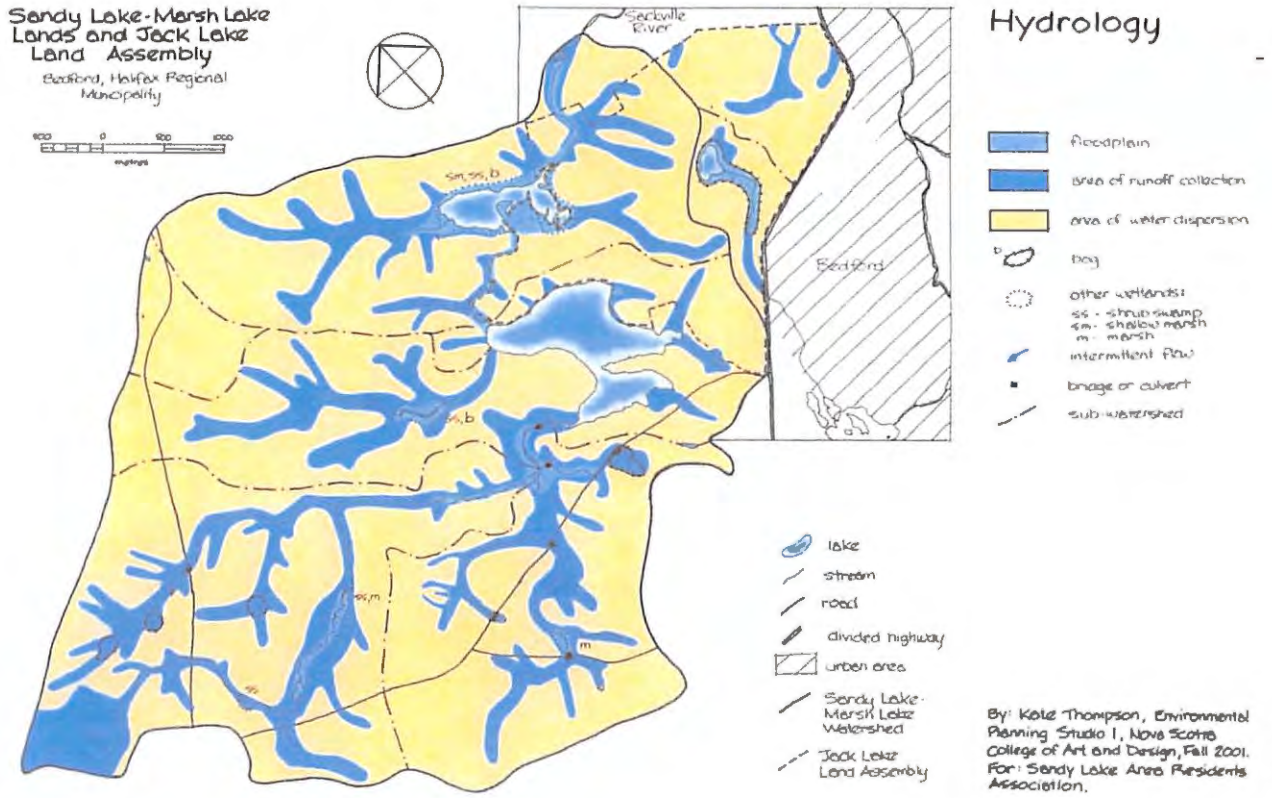
Planning background



Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning background

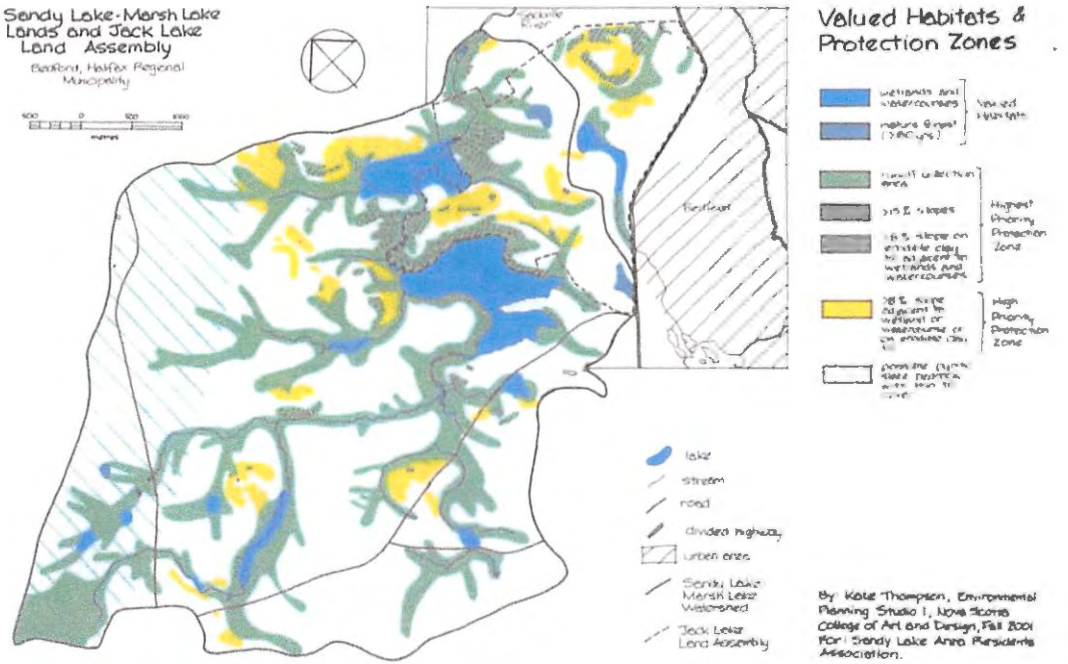


Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning background

2001 NSCAD Environmental Inventory
Sandy Lake, Marsh Lake, Jack Lake



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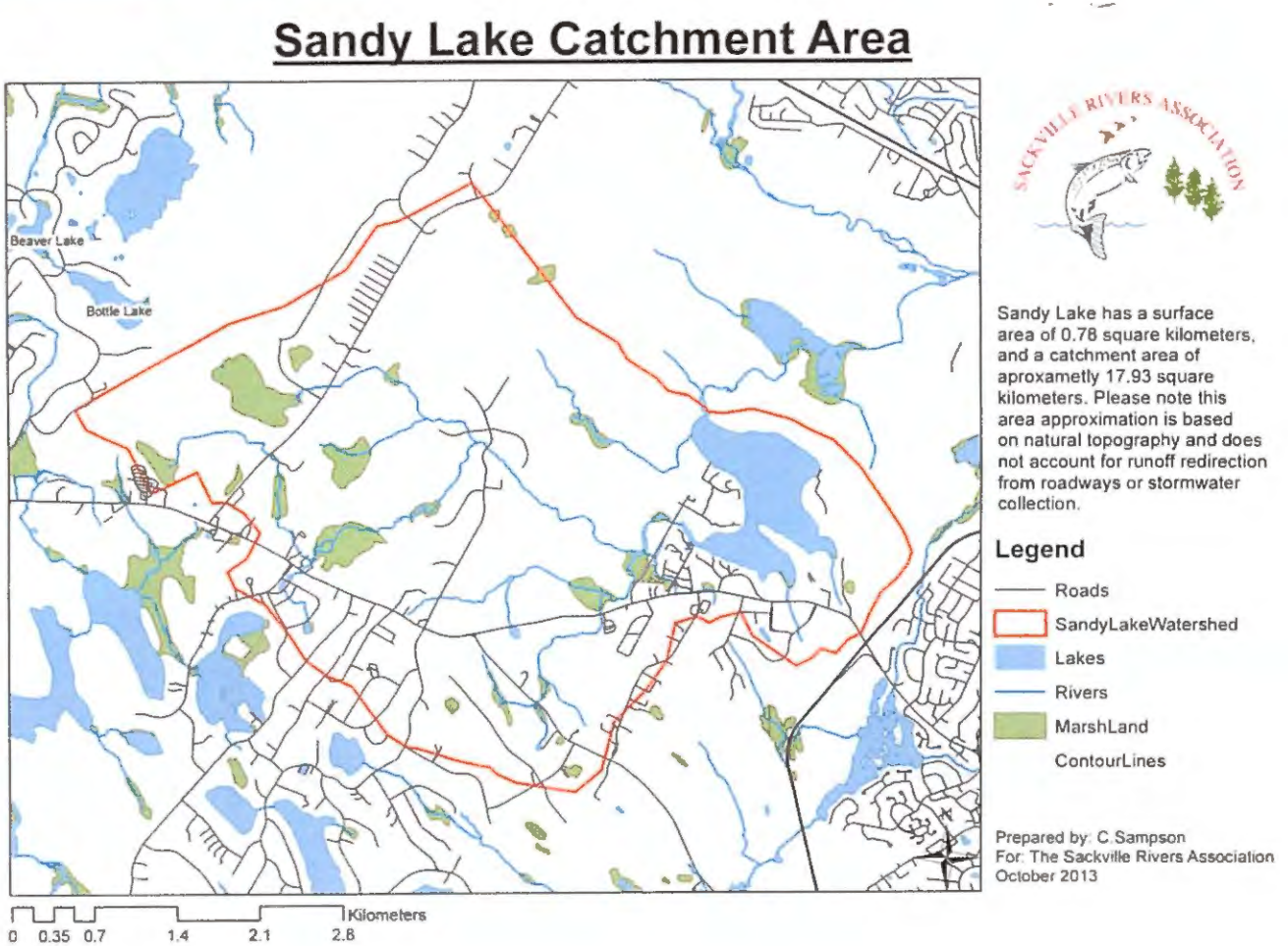
Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

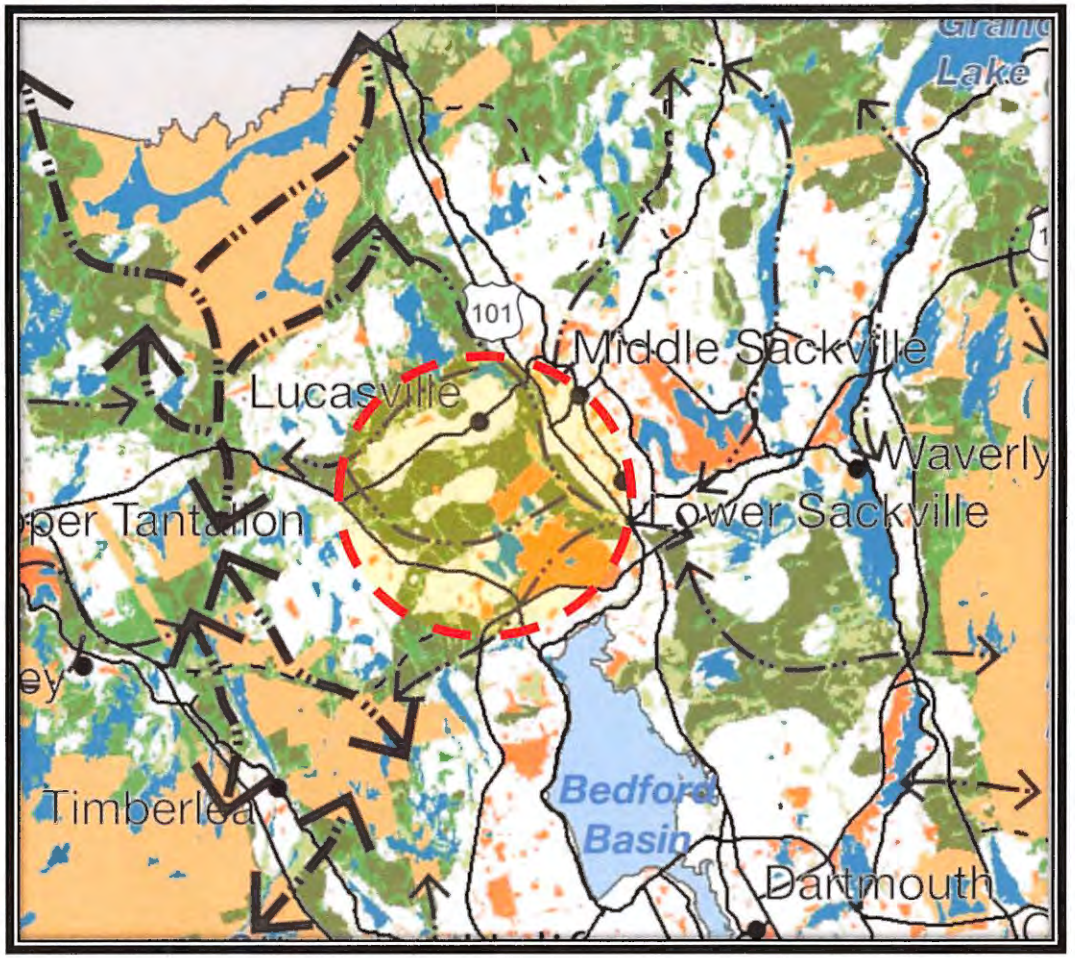
Planning background



Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning background

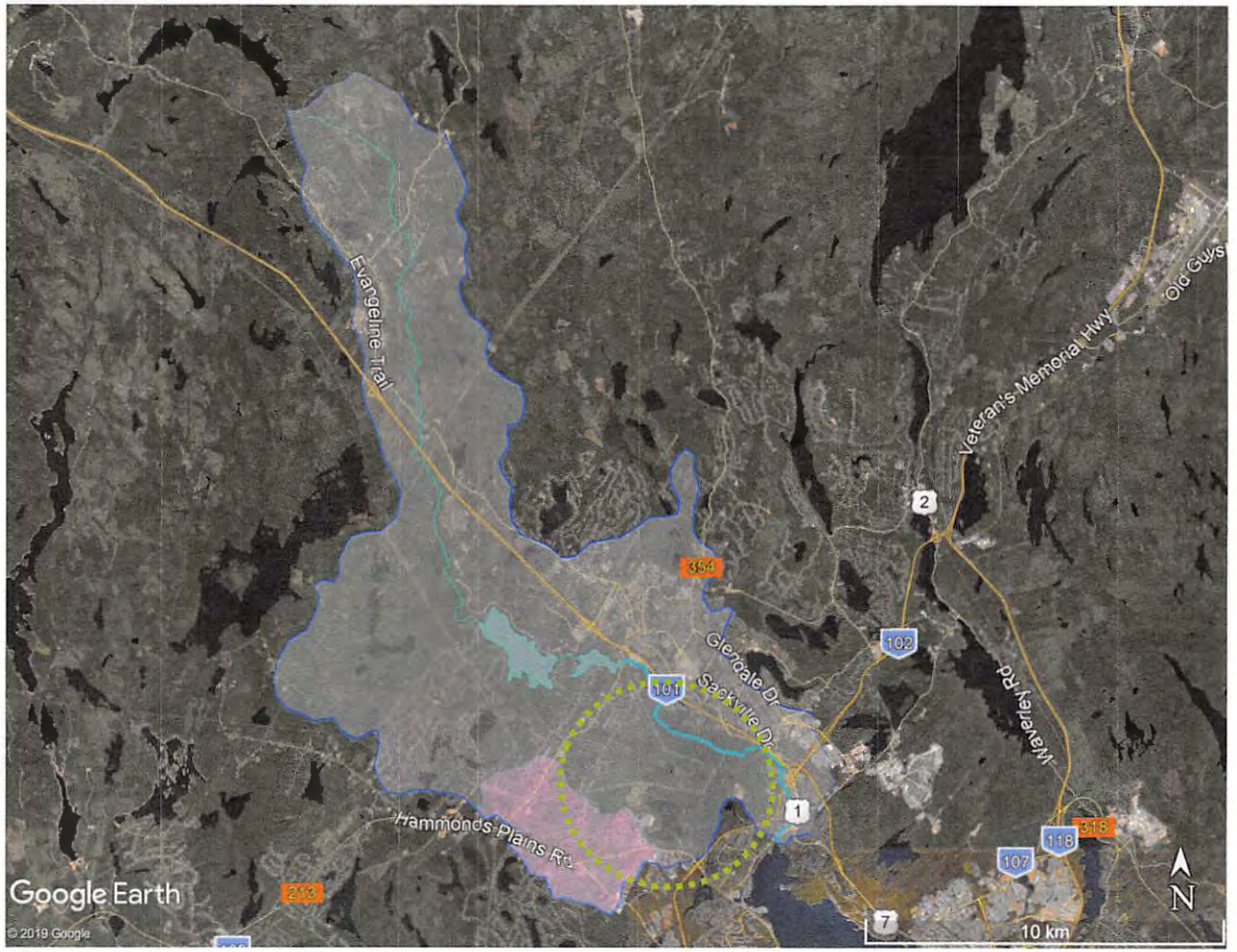


Planning documents supporting creation and location of Sandy Lake - Sackville River Regional Park

Halifax Green Network Plan recommendations for Sandy Lake – Sackville River Regional Park area

Sandy Lake – Sackville River Regional Park

Planning background analyses



Location of Sandy Lake – Sackville River Regional Park within Sackville River watershed

General area of Sandy Lake – Sackville River Regional Park

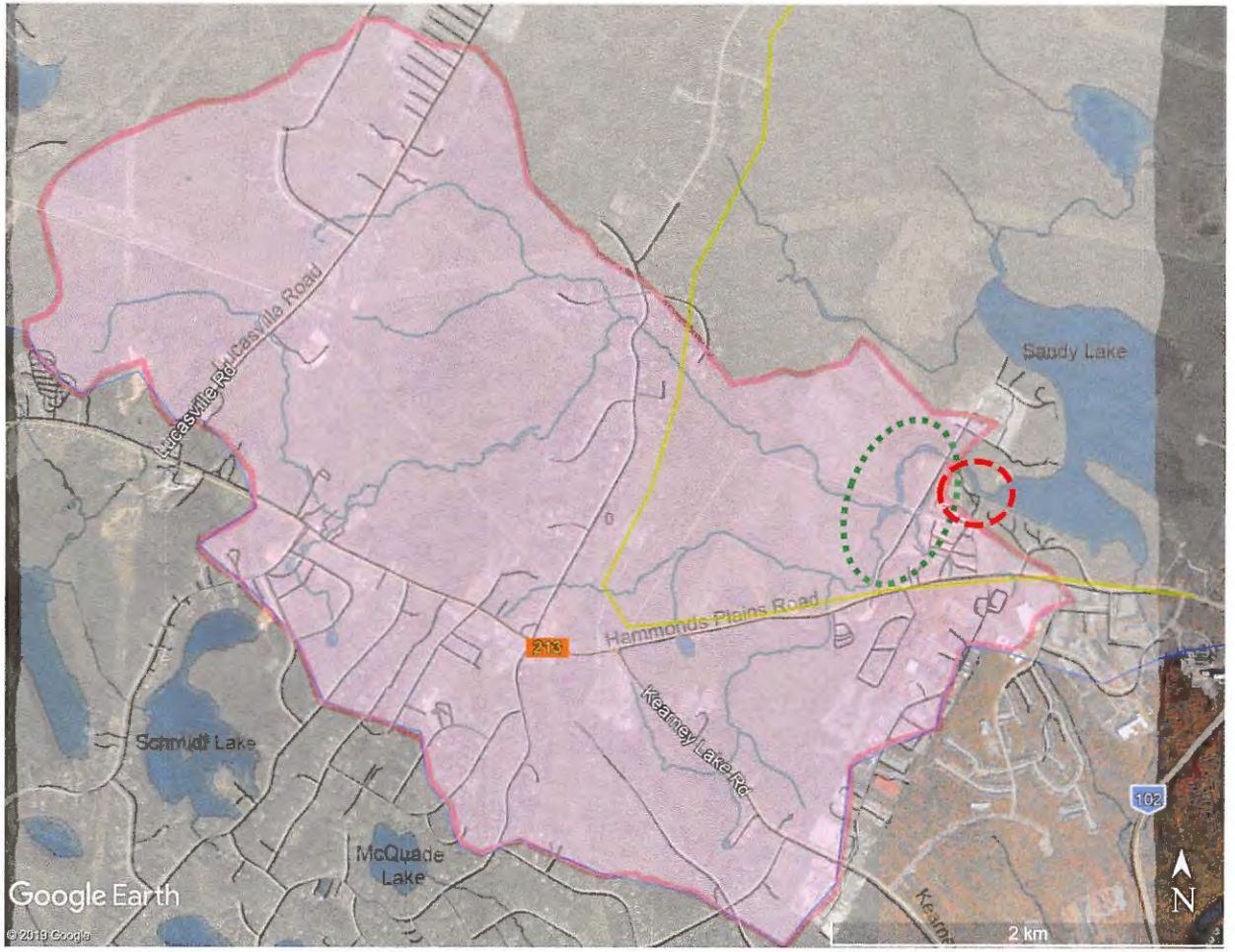
Boundary of the Sackville River watershed

Boundary of the Johnson Brook

Almost entire area of Sandy Lake – Sackville River Regional Park area is located within the Sackville River watershed. The Johnson Brook watershed which is part of this watershed discharges directly to Sandy Lake. A large portion of this sub-watershed is developed and the remaining undeveloped area can be also developed in the near future. This may create a significant impacted on water quality discharging to Sandy Lake. As a result this will have a significant impact on the Lake water quality and overall environmental and ecological sustainability of Sandy Lake- Sackville River Regional Park.

Sandy Lake – Sackville River Regional Park

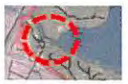
Planning background analyses



Johnson Brook sub-watershed discharging to Sandy Lake of Sandy Lake – Sackville River Regional Park


Suitable land for Sandy Lake – Sackville River Regional Park


Boundary of the Johnson Brook watershed


Discharge point of Johnson Brook to Sandy Lake


Proposed area for Johnson Brook water treatment

The most significant impact on water quality of Sandy Lake is Johnson Brook watershed. Good portion of this watershed is already developed or can be potentially developed in the near future. Proper protection of all watercourses within this sub-watershed as well as treatment of water before discharge is the only way to protect water quality of Sandy Lake.

Sandy Lake – Sackville River Regional Park

Planning background analyses

Existing undisturbed vegetation and forest cover in area of the Sandy Lake –Sackville River Regional Park

Existing undisturbed vegetation and forest cover in area of the Sandy Lake –Sackville River Regional Park

Johnson Brook watershed

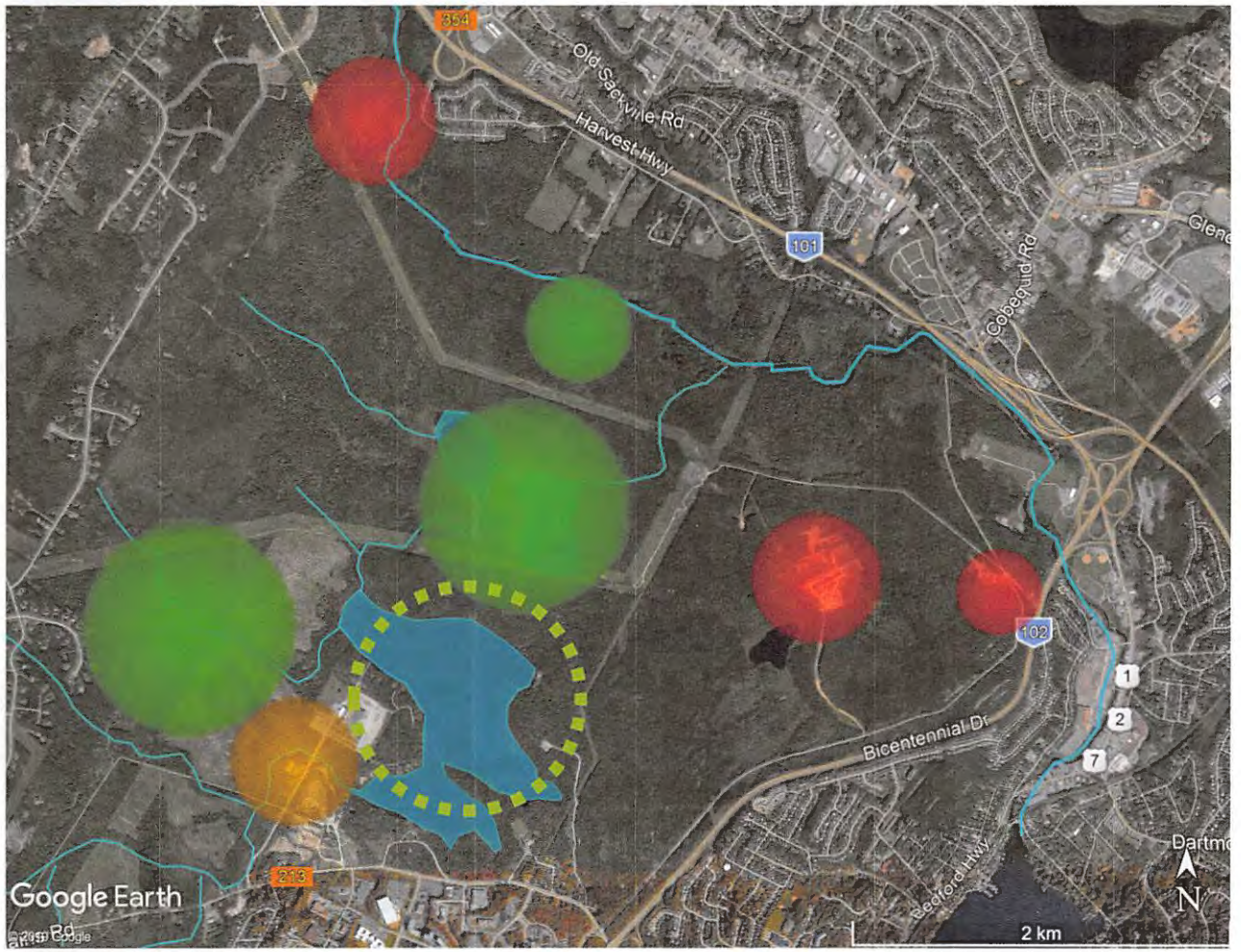
Discharge point of Johnson Brook to Sandy Lake

Major watercourses

Existing vegetation and forest cover play a key role in determining recreation and environmental values of the Park. Protection and proper management of vegetation on public land as well as private properties play a key role in protection of water quality within the Park area. Protection of vegetation within Johnson Brook watershed is particularly important and will have the most significant impact on the Park.

Sandy Lake – Sackville River Regional Park

Planning background analyses



Environmentally sensitive areas in area of Sandy Lake – Sackville River Regional Park

- Area of significant environmental value
- Major watercourses
- Area of significant environmental degradation and erosion
- Critical area for protection of Sandy Lake water quality
- Major freshwater recreation area of the Regional Park

There are several areas which require special attention in the Park. All require special assessment and need to be addressed in the future land management plan for the Park area.

Sandy Lake – Sackville River Regional Park

Planning background analyses

Present primary recreation destinations in area of Sandy Lake - Sackville River Regional Park

Current recreation areas within Sandy Lake – Sackville River Regional Park

Current recreation corridors within Sandy Lake – Sackville River Regional Park

Due to limited public access opportunities to the Park area recreation use of the Park is relatively limited. The recreation destinations are concentrated around the Sandy Lake beach, deforested area in the central part of the Park as well as viewing area located in the East part of the Park. Existing power line corridors with service roads provide nature trail opportunities. Limited management of this infrastructure may lead to erosion of recreation and ecological features of this Park.

Sandy Lake – Sackville River Regional Park

Planning vision

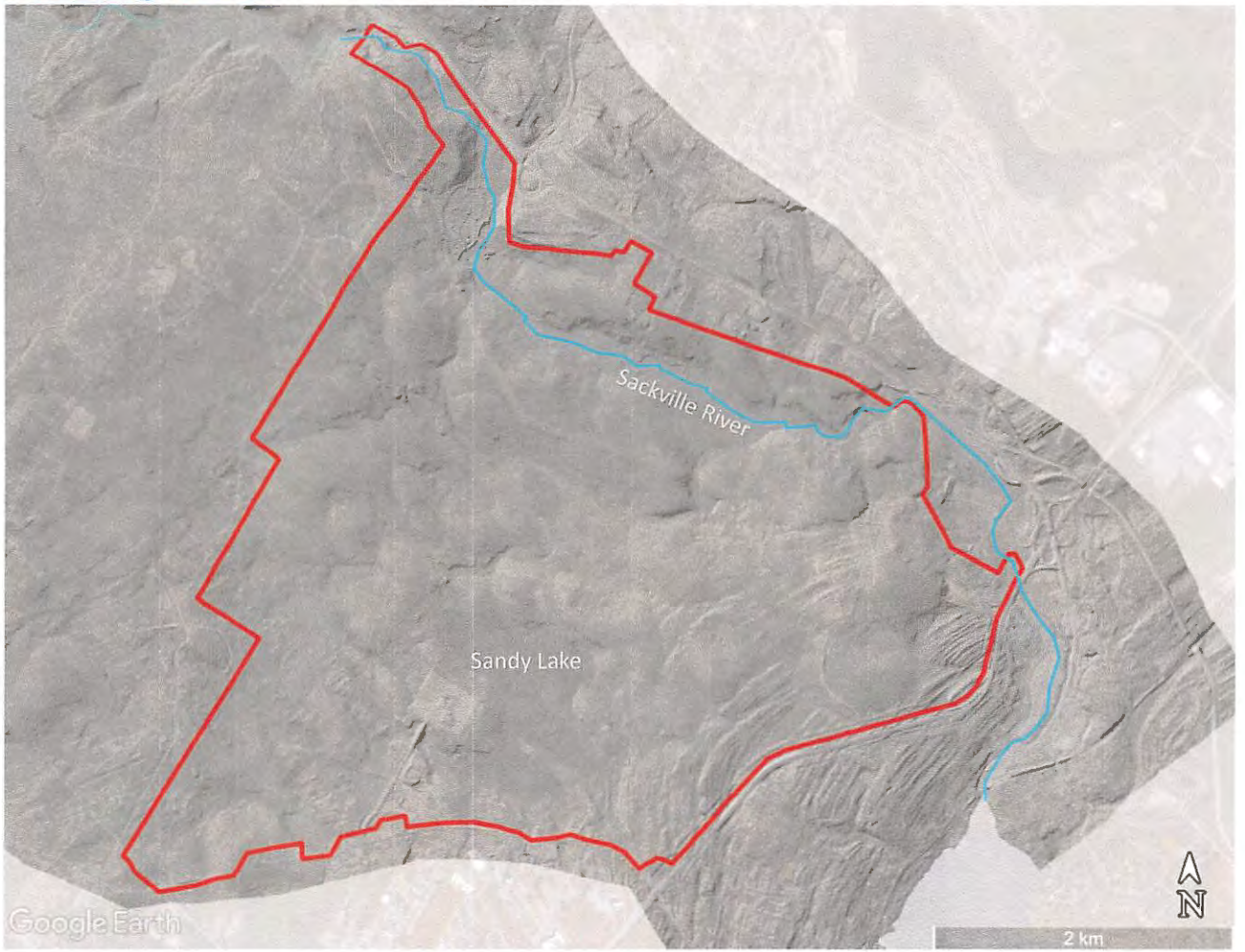
Adjustments to Sandy Lake - Sackville River Regional Park boundary

- Proposed boundary of Sandy Lake – Sackville River Regional Park 2020
- Proposed boundary of Sandy Lake – Sackville River Regional Park 2019
- Proposed boundary of Sandy Lake – Sackville River Regional Park 2015

The main reason to modify boundary of Sandy Lake – Sackville River Regional Park is to protect unique undisturbed forest and biological ecosystem located within publicly inaccessible portion of DND property as well as improve opportunities for water quality outflow from Johnson Brook watershed to Sandy Lake. From public perspective both areas may not have a direct impact on the Park functional operation however will play an essential role supporting key asset of the Park.

Sandy Lake – Sackville River Regional Park

Planning vision



Recommended boundary of Sandy Lake - Sackville River Regional Park on existing land tpography

Proposed boundary of Sandy Lake-Sackville River Regional Park

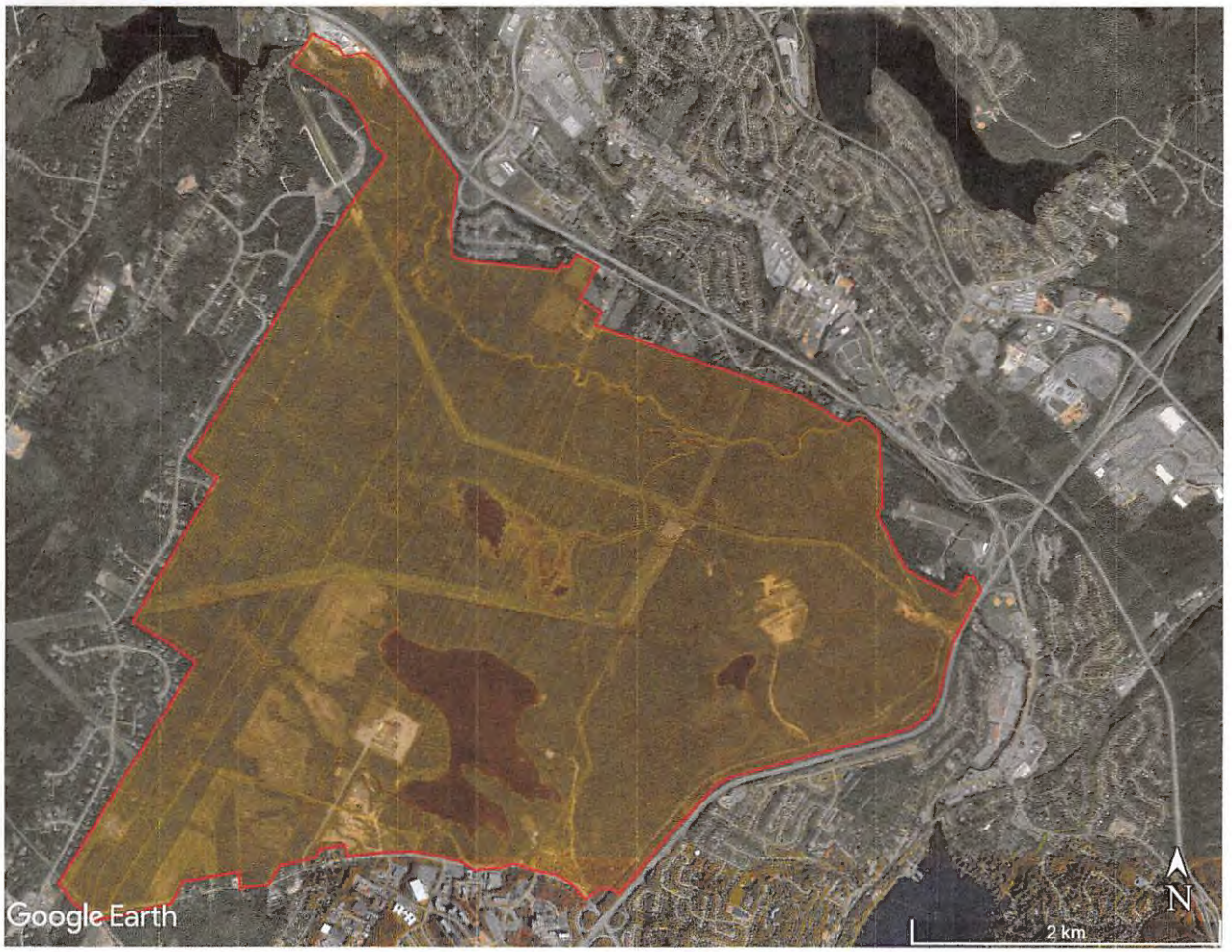
Existing topography in area of the Park

Sackville River

The proposed boundary of the Sandy Lake – Sackville River Regional Park will include all still available and important land required to protect critical environmental components of the Park. The proposed boundary will also include land required to establish proper public access opportunities to the Park.

Sandy Lake – Sackville River Regional Park

Planning vision



Recommended boundary of Sandy Lake - Sackville River Regional Park in community context

Proposed boundary of Sandy Lake – Sackville River Regional Park

Land development in area of the recommended boundary of Sandy Lake – Sackville River Regional Park.

Sandy Lake – Sackville River Regional Park

Planning vision

Interaction of Johnson Brook sub-watershed with Sandy Lake – Sackville River Regional Park

Recommended boundary of Sandy Lake – Sackville River Regional Park

Boundary of the Johnson Brook watershed

Majority of Johnson Brook watershed is located outside of the proposed boundary of Sandy Lake- Sackville River Regional Park and has potential for development. It is possible that the future development may compromise quality of runoff. This may have a negative impact on water quality of Sandy Lake and the remaining section of the waterway leading to Sackville River. Proper management of land uses in this portion of Johnson Brook watershed is critical to protect Sandy Lake water quality and recreation values in the Park.

Sandy Lake – Sackville River Regional Park

Planning vision

Municipal land ownership in area of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park boundary

Municipal Land ownership

Municipal land in area of the Sandy Lake – Sackville River. The land has limited or no access to public streets.

Sandy Lake – Sackville River Regional Park

Planning vision

Restricted public access in Sandy Lake – Sackville River Regional Park

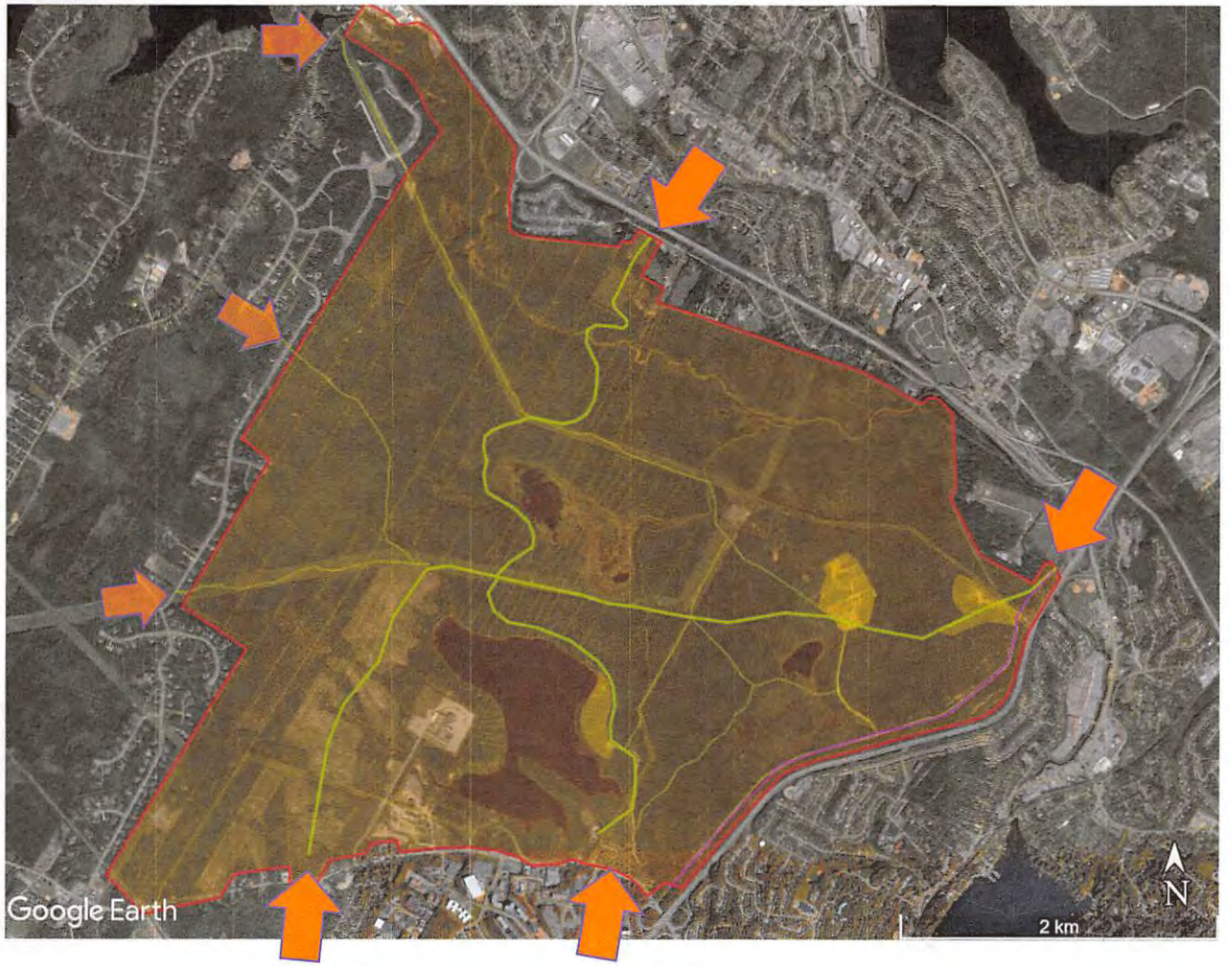
Proposed boundary of Sandy Lake – Sackville River Regional Park

Restricted public access area within the Park

The currently restricted public access areas can be made accessible for public in the future or remain inaccessible. Proper land use regulations need to be implemented to fulfill the overall goals of the Regional Park. For the benefit of the surrounding communities residents and the park performance, cooperation of the identified parcels land owners is necessary.

Sandy Lake – Sackville River Regional Park

Planning vision



Existing and future trails and access points to Sandy Lake – Sackville River Regional Park

- Proposed boundary of Sandy Lake – Sackville River Regional Park
- Primary trail system within the Park
- Secondary trail system within the Park
- Primary access point to the Park
- Secondary access point to the Park

The proposed trails alignment is based on site topography, recreational and environmental values, preferred recreation destinations. These trails also provide opportunities for connection with trail and transportation system external to the Park. The primary and secondary entrance points to the Park are located in places with a convenient connection to public road system.

Sandy Lake – Sackville River Regional Park
Planning vision

General location of functional areas in Sandy Lake – Sackville River Regional Park

Proposed boundary of Sandy Lake – Sackville River Regional Park

Functional areas of the Park

Area recommended for active recreation uses with enhanced protection of watercourses and water discharge to Sandy Lake

Area recommended for passive recreation uses With limited grade alteration and vegetation removal

Area recommended for environmental protection with limited passive recreation uses

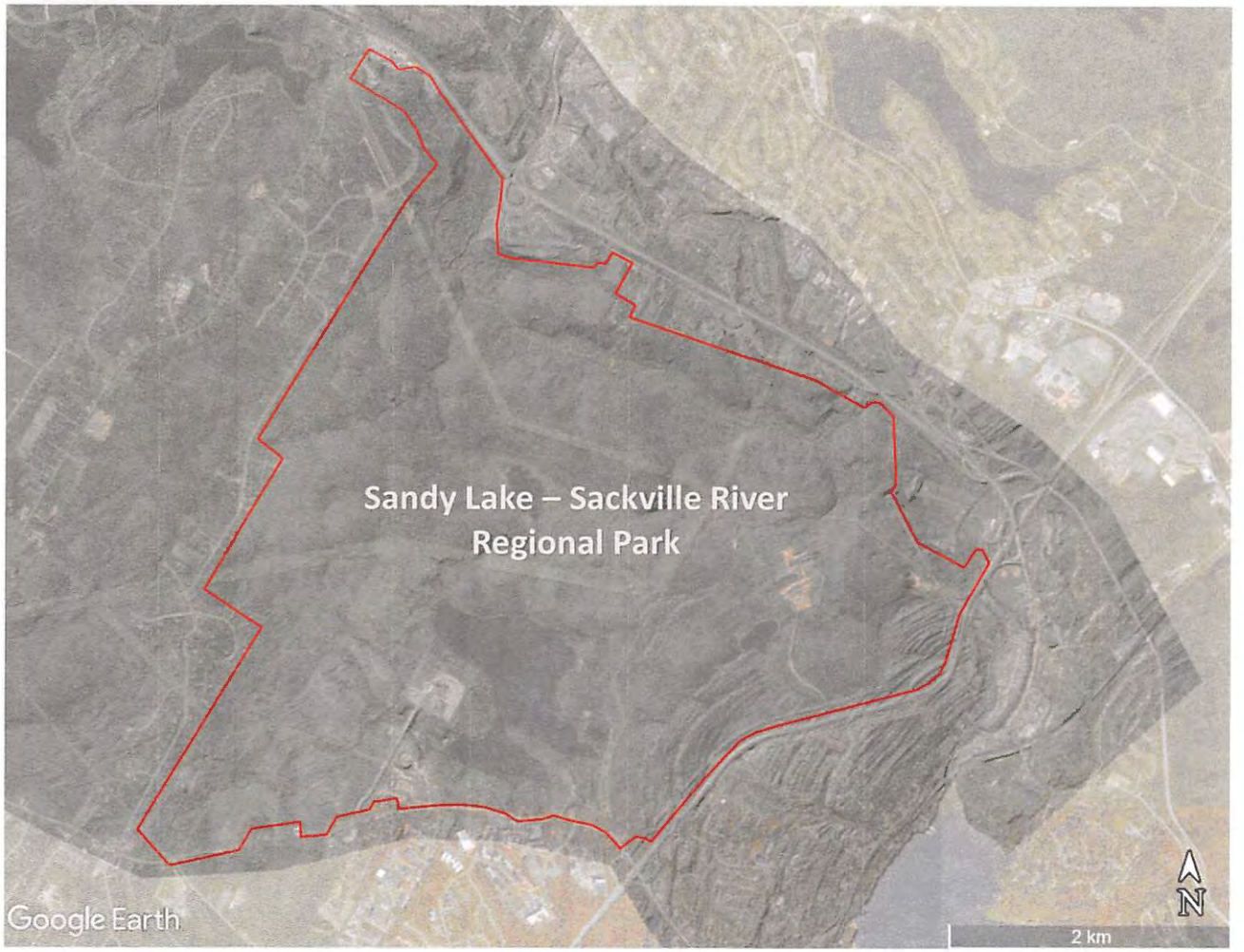
Area of full environmental protection and restricted for public access

Transition area from current uses to uses more compatible with the Park objectives

Functional Areas represent general location of land use within the Park. These areas will interact with each other and will be subject to more detail analyses. The boundaries can be modified to respond to recreation trends and needs. Existing character, recreation and ecological values need to be retained and improve with proper protection of the existing waterways and vegetation.

Sandy Lake – Sackville River Regional Park

Planning vision



Recommended boundary of Sandy Lake – Sackville River Regional Park

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Land topography

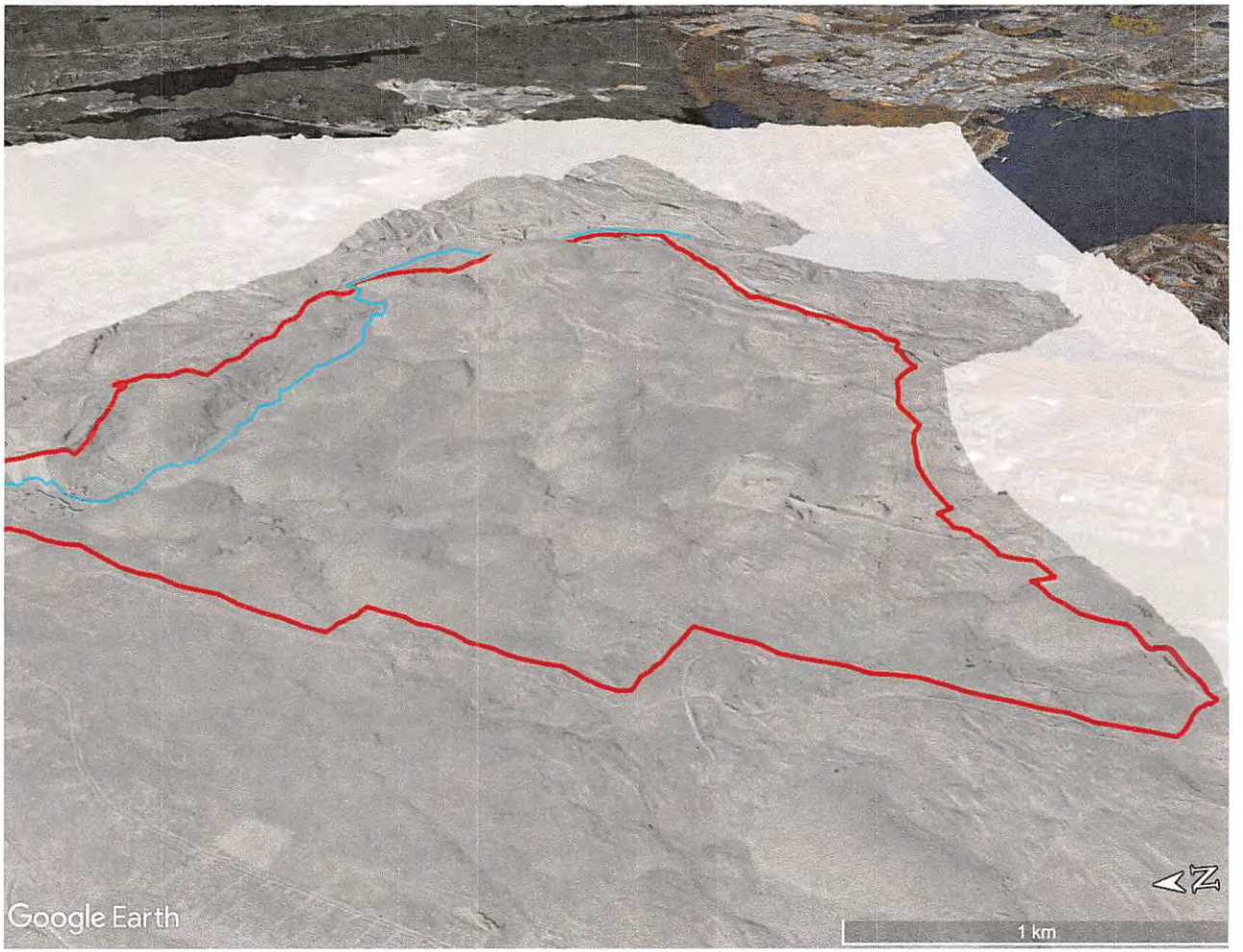
Recommended boundary of Sandy Lake – Sackville River Regional Park

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Land topography



Recommended boundary of Sandy Lake – Sackville River Regional Park

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Land topography

Recommended boundary of Sandy Lake – Sackville River Regional Park

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Planning vision

Recommended boundary of Sandy Lake – Sackville River Regional Park

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Land topography

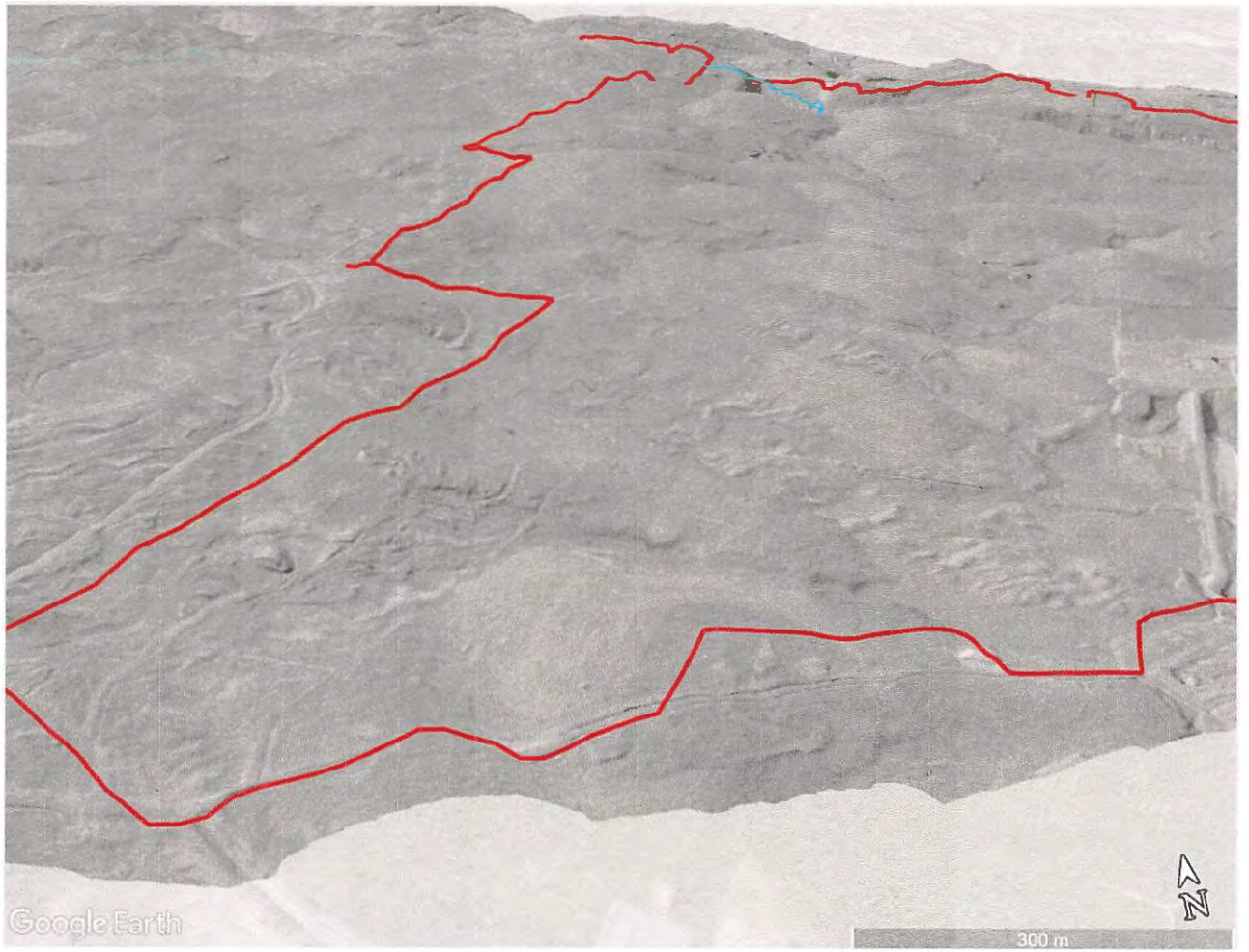
Recommended boundary of Sandy Lake – Sackville River Regional Park , area of Bedford access

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Land topography



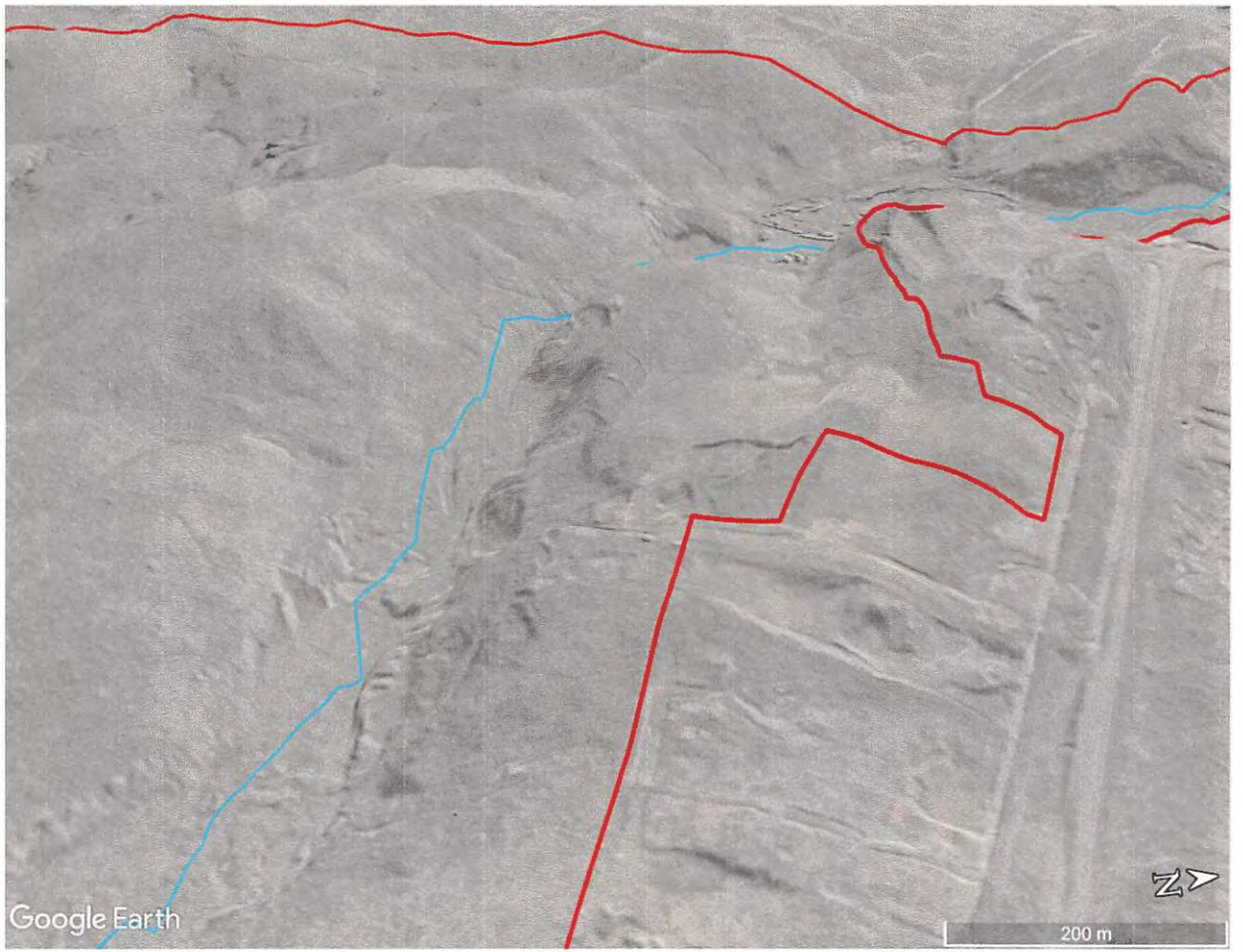
Recommended boundary of Sandy Lake – Sackville River Regional Park, area of Hammonds Plains Road access

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Land topography



Recommended boundary of Sandy Lake – Sackville River Regional Park, area of Sackville access

Recommended boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Land topography

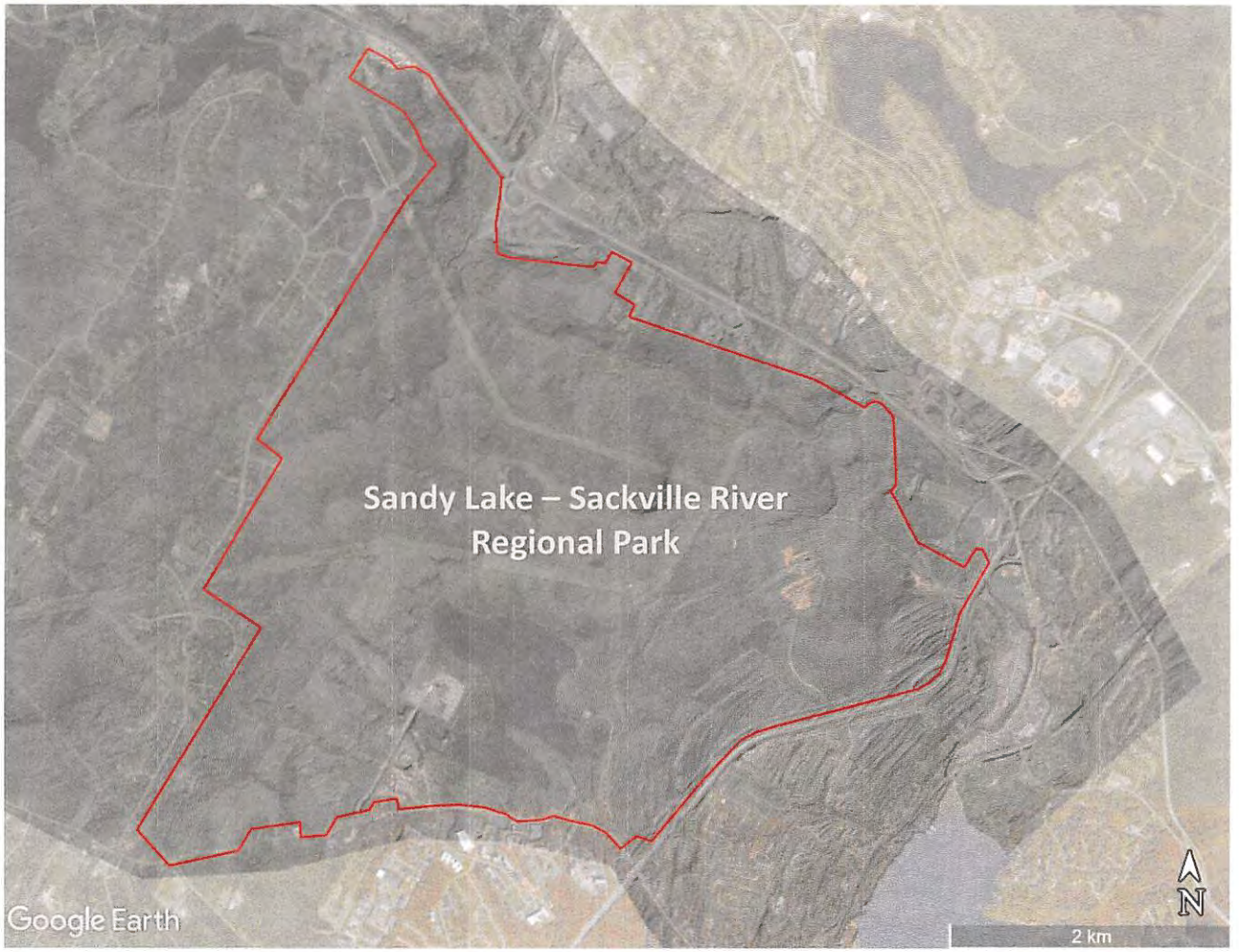
Recommended boundary of Sandy Lake – Sackville River Regional Park, area of Sackville access

Proposed boundary of Sandy Lake – Sackville River Regional Park

Sackville River

Sandy Lake – Sackville River Regional Park

Planning vision

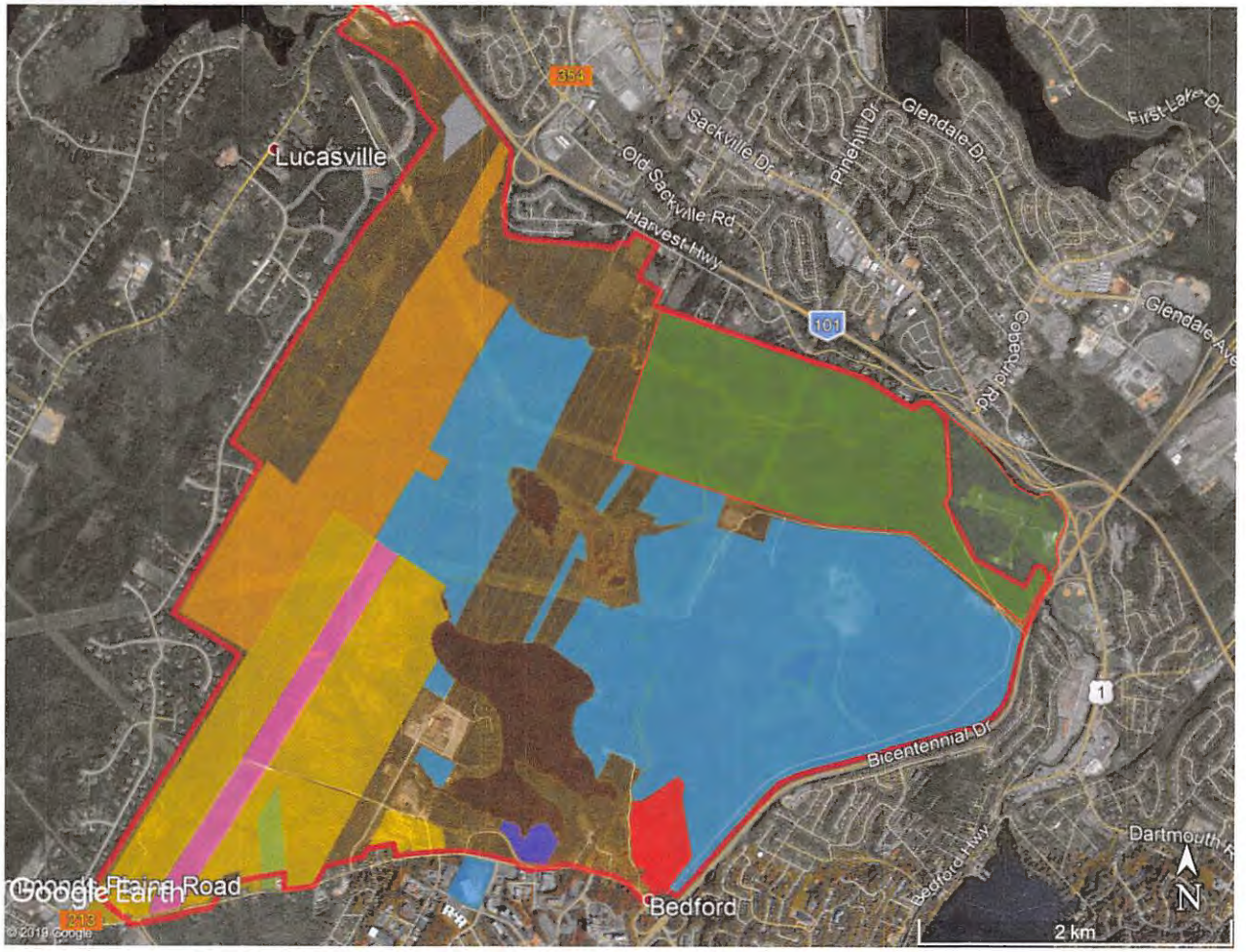


Recommended boundary of Sandy Lake – Sackville River Regional Park

Proposed boundary of Sandy Lake – Sackville River Regional Park

Sandy Lake – Sackville River Regional Park

Planning vision



Land ownership in area of Sandy Lake – Sackville River Regional Park

- Land owned by HRM
- Land owned by Clayton Developments
- Land owned by United Gulf Developments
- Land owned by Azmi Armaout
- Land owned by Sandy Lake Developments
- Land owned by Crombie
- Land owned by Khalid Shabban
- Land owned by Armco Developments
- Land owned by DND
- Proposed Sandy Lake – Sackville River Regional Park boundary

Sandy Lake – Sackville River Regional Park

Planning vision

Existing and future trails and access points to Sandy Lake – Sackville River Regional Park

- Proposed boundary of Sandy Lake – Sackville River Regional Park
- Primary trail system within the Park
- Secondary trail system within the Park
- Primary access point to the Park
- Secondary access point to the Park

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APPENDIX L

APPENDIX M

Excerpts from *TOWARDS THE IDENTIFICATION OF EINVIRONMENTALLY SENSITIVE AREAS FOR ENVIRONMENTAL MANAGEMENT: A CASE STUDY IN THE SACKVILLE RIVER WATERSHED, NOVA SCOTIA*
By Rhea D. Mahar, Department of Geography, Saint Mary's University, 1994

Pages 34 to 36:

"(ii) History of Human Settlement

This section is sourced from Simmons et al. (1984) and Coakley (1988).

Although the first Paleo-Indian campsite remains have been discovered at Debert, N.S., dated at 11,000 years ago, between 10,000-5,000 years ago there is a lack of evidence of human occupation of the province. Dramatic fluctuations in sea level and a minor local glacial period are thought to be explanations. People would have settled on shorelines which are now under the sea. Igneous rock axes of the period between 5,000-3,500 years ago provide evidence of Native populations in Halifax and Hants counties, among others (Simmons et al.,1984).

For at least 5,000 years Mi'kmaq paddled down the Sackville River in spring, to the Bedford Basin. Fish were caught and dried for winter storage. Salmon, gaspereaux, lobster and other seafood were also caught. Seasonal gathering of berries, nuts, and roots altered the landscape very little (Coakley, l988).

The "Contact Period" began around 1500 A.D. when Portuguese and Basque fishers would spend summers on the shores of Bedford Basin curing fish and trading with Mi'kmaq (Simmons et al.,1984).

1604-1755 AD, The Acadian Period: Since the Acadians dyked marshland and did little to disturb Mi'kmaq forest lands, the two groups lived quite harmoniously. French farmers settled near the mouth of the Sackville River in the area now occupied by Bedford Place Mall. The marsh had been dyked for hay and crops. The pasture nearby was for grazing livestock; cattle, hogs and poultry. The Acadians built two trails in the 1600's; one to the Minas settlements and one to present-day Truro, then on to New Brunswick. With the expulsion of the Acadians in 1755 and the subsequent colonization of the now British colony, pressure ensued on the land between settlers and Mi'kmaq, the first people. In 1783, hunting reserves were established for Mi'kmaq. These were inadequate for their needs.

Bridges, mills, Fort Sackville, churches, farms and estates were soon erected in the watershed. The stagecoach era from 1800-1858 sported several Inns along the road to Windsor.

1851 AD - Today, Industrialization and Urbanization Period: This era has been condensed together since we are essentially still proceeding in the same fashion but equipped with more progressive technology. At the turn of the century, the Sackville River was used extensively for moving logs to booms on the Bedford Basin (Figure 9). Sawmills used the River to turn waterwheels and to transport logs. The discovery of gold at Mount Uniacke in 1865 fostered the building of a town. The open pit mines there operated sporadically until the 1930's. A fish hatchery was established at the river's mouth in 1873. Not only did it stock the Sackville River, but it stocked all of Nova Scotia at one time (Figure 4). The Sackville River once was teaming with fish which were "packed like sardines" (Coakley, 1988, p.2l), but two

hundred years of increasing urban development have caused a steady decline in returning runs almost to the point of extinction. Erosion, siltation, nutrient enrichment from domestic and industrial effluents, fluctuating water levels, increased water temperature, and lower pH have adversely affected the river system's ability to sustain Atlantic Salmon (Cameron, 1990).

Urbanization in the Bedford-Sackville area began with the development of pastureland in 1929 on the east bank of the River for the building of Sunnyside place (Figure 6). This was the first in a development pattern which was to see a linear strip of malls, stores, gas stations and other services along Hwy 1.

Suburban residential housing, beginning in the 1960's (Coakely, 1988), caused an increase in sedimentation to the river, destroying fish habitat. As a result of this, the fish hatchery at the mouth of the river closed down in 1961 (Figure 10).

The watershed hosted several quarries. The river itself was readily utilized as a source of aggregate sand and gravel. Gravel washings were poured back into the river. Animal manure from the Sackville Downs race track also caused contaminated runoff to flow into the Little Sackville River.

More recently, some fairly aggressive development projects have further manipulated the river. In 1971, the river was moved aside for the construction of the 101 highway. Bedford Place Mall was built over a saltmarsh near the river's mouth in 1977. In that same year the Halifax-Dartmouth Metropolitan Authority began the Sanitary Landfill operation near the river, two-and-a-half kms north of McCabe Lake. The pattern of urban residential development sprawl continues.

APPENDIX N

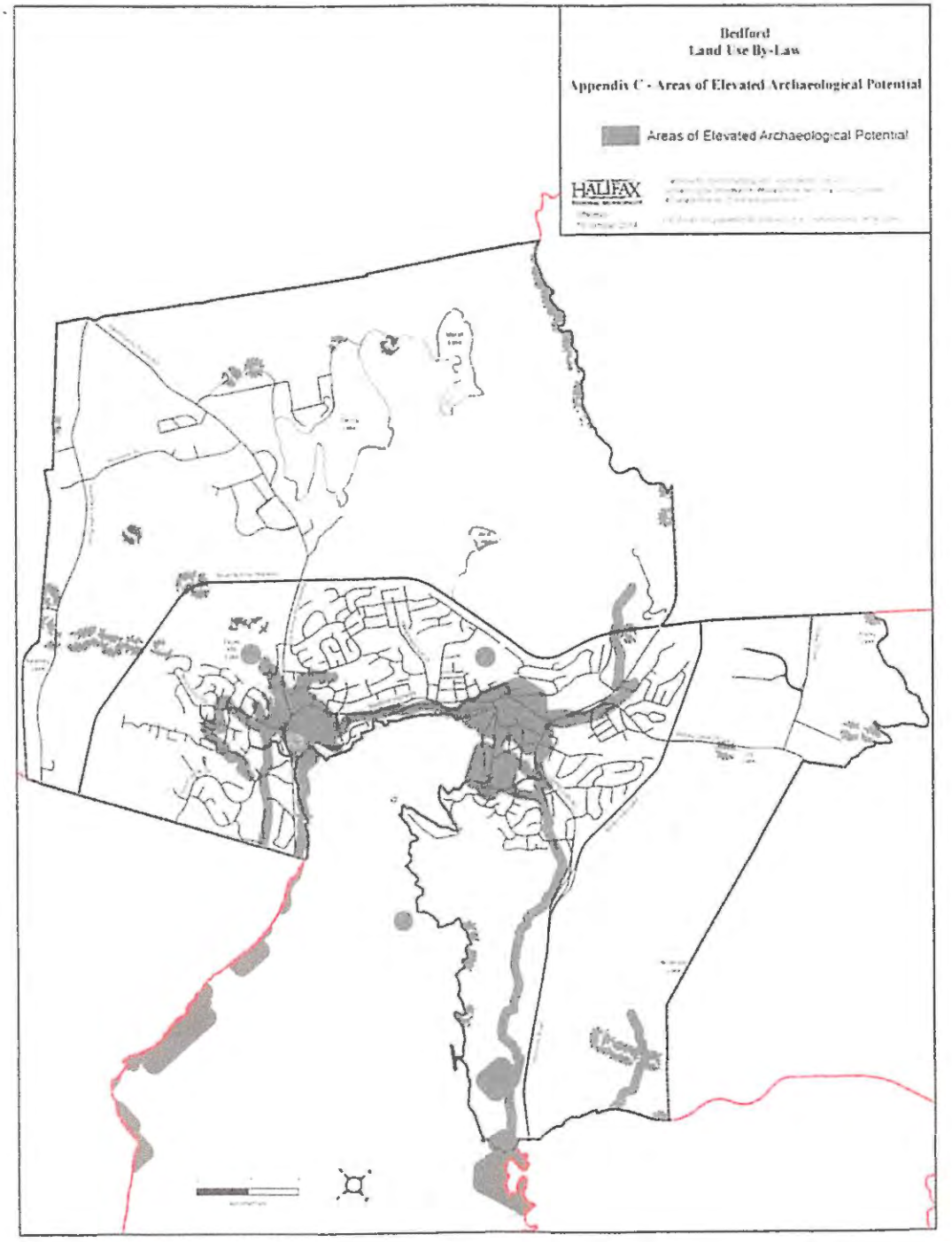
Areas of Elevated Archaeological Potential: 2016 The Bedford Land Use Bylaw Report Appendices

3 areas on the Clayton lands just west of Sandy Lake

1 on Peverell's Brook northwest just off Sandy Lake

3 areas of Jack Lake land (Bedford Barrens)

Along most of the Sackville River



APPENDIX O

Sandy Lake Protection History 2019

In 1971, nearly 50 years ago, a report by Paul Dean, Wildlife Biologist with the Canadian Wildlife Service entitled Natural Environment Survey identified seven sites in the greater Halifax/Dartmouth area of regional significance for recreation and environmental protection. http://sandylake.org/wp-content/uploads/2018/02/1971-PB-Dean-Environment-Report.pdf.

Shortly thereafter, a second background study was prepared for the Metropolitan Area Planning Committee (MAPC). Entitled Growth Through Recreation, this study estimated the amount of land required to create seven regional parks in the areas identified in the Dean report http://sandylake.org/wp-content/uploads/2018/02/1971-MAPC-Rec-Work-Group-Report-7-Regional-Parks.pdf. A draft regional development plan was released in 1973, and it included the proposed regional parks system.

On the basis of these studies, seven 'Regional Parks' were designated in the Halifax-Dartmouth Regional Development Plan of 1975, to satisfy the stated objective: "to protect areas of unique natural significance against adverse effects and to reserve sufficient open space for recreational purposes". They were the Shubenacadie Canal, Hemlock Ravine, Long Lake, McNabs Island, Admirals Cove, the Cole Harbour Salt Marshes, and Sandy Lake. Each location was seen as unique from the others and outstanding in its own right. The Sandy Lake to the Sackville River proposal was referred to as the Sandy Lake Regional Park.

In 1976, MAPC approved the establishment of a Parks Advisory Group to carry out planning studies on the regional parks. The Parks Advisory Committee came back in 1979 with a full report describing each park, with references to bio-physical date, proposed development concepts, projected development and acquisition costs, boundary recommendations, and ownership details. A key conclusion of the report was for immediate acquisition of key privately held land parcels, as such lands could be lost to development http://sandylake.org/wp-content/uploads/2018/02/1979-Halifax-Dartmouth-Regional-Parks-Short-Report.pdf .

In the intervening years, all six of the other regional park locations were preserved, but the Sandy Lake Regional Park proposal ran into difficulties of various kinds. At amalgamation, the Town of Bedford's work to acquire land and create the regional park fell by the wayside.

Previously, when Sandy Lake was in the County of Halifax (and not part of Bedford), the process for the Sandy Lake Regional Park lands to be designated as a regional park required that Halifax County, the City of Dartmouth and the City Halifax all agree. A local resident offered to give 500 acres at the west end of Sandy Lake to the Municipality of Halifax County for the Sandy Lake Regional Park, on condition that the park be named after her deceased husband. At the same time, the county warden was looking to increase tax income, and Twin Cities Dairy (the 'Dairy', renamed Farmers Dairy and currently Agropur Cooperative Dairy) was looking for a site to relocate their dairy outside the city proper. The Dairy noticed that a large property along the southwestern shore of Sandy Lake which suited their needs (proximity to the city plus lake water) came up for sale. SLCA understands that the county warden chose to approve the Dairy to increase county taxes and declined the land offer for the regional park.

At the time, there were (even) fewer regulations to protect lakes and waterways, and people were generally unaware of the consequences of some of their activities. The Dairy clear cut 50 acres and in-filled a roadway. They also added a culvert over the main lake feeder stream (visible on the Dairy access road) which caused such runoff that Sandy Lake was muddy brown for two years. The Dairy's plan was to dump the milk effluent into the lake as well. In response, the Sandy Lake Ratepayers Association was formed. The group hired consultants and worked with the politicians and the Dairy to get the plan to pump milk effluent into Sandy Lake dropped in favour of building holding ponds. These holding ponds are visible on the left of the Dairy access road. The Dairy (now Agropur) has been a good corporate citizen for the area and for Sandy Lake.

Despite the move toward industrializing lands around Sandy Lake, efforts to create the Sandy Lake Regional Park were proceeding. The impact of the Dairy's location so close to the lake was such a shock that the Sandy Lake Ratepayers Association began to work with the Town of Bedford (by then the Sandy Lake area was part of Bedford) to ensure that it become easier to protect the lake. The Mayor of Bedford, Francene Cosman, saw the importance of this area. By 1983, after failed attempts of various levels of government to create the Sandy Lake Regional Park, Mayor Cosman and the Sandy Lake Ratepayers Association hit upon a device for protecting the lake—a by-law that would allow no new development unless one owned 5 acres on a publicly serviced road that was a public road before October 9, 1991. This regulation was put in place and is still protecting Sandy Lake. (However, over the past 10 years, land assembly began as developers eyed Sandy Lake for residential development.)

Over the next few years further efforts to preserve the regional park ideal continued as Bedford purchased and acquired parts of the shore of Sandy Lake for the proposed park. In 1992 the Dairy gave 6 acres of shoreline to the Town of Bedford for the regional park with the requirement that there be no vehicular traffic permitted on that land.

The next development arose when the Bedford Lions Club expressed a desire to mark the millennium with a public project. The original proposed regional park plan (from the MAPC plans) had included a small beach park (where the Bedford Lions Beach Park now exists). HRM, the Province and the Lions Club donated $500,000 for the recreational development. The result was a portion of the original proposed Sandy Lake Regional Park was designated as park land. While surveys of the Bedford and Hammonds Plains communities for recreational preferences all suggested that people wanted an indoor year-round 'swimming opportunity' and hiking trails, the beach plan was chosen.

There were numerous environmental protection challenges in the design of the Bedford Lions Beach Park – grades, drainage and backfilling plans had to be adjusted so that there would be no washouts and flooding. The plan to remove the trees and the natural shore berm and add tons of sand to make a bigger beach, which would have destroyed a protected fish breeding area, was altered to protect the shoreline and wildlife. Planners proposed flush toilets which

would have required cutting down a football-sized area of old growth Acadian forest along the shore to create the disposal field. The Sandy Lake Ratepayers Association was able to make the case for 'trailhead' peat toilets (similar to those used by Parks Canada and the US National Parks Service) which were installed and have worked well. The trees were saved, the ecosystem and the beauty of the area were preserved, and the beach has been a fine addition to Sandy Lake. Again, residents worked with decision-makers to see to the lake's needs.

Somewhere in the midst of all the meetings and activities around the beach project some in the Sandy Lake Ratepayers Association realized that there would always be issues that could harm the lake, and that, in the end, it was the quality of the water that had to be protected. So the Sandy Lake Watershed Association was started. For several years there was regular water testing carried out by the Bedford Water Advisory Committee...that was eventually cut from the city's budget. (SLCA understands that the will to continue to spend the ~$3,500.00 a year for testing all lakes in HRM was lost somehow, so not only Sandy Lake suffered from that cut.) As the Bedford Lion's Club Beach Park progressed, the Sandy Lake Watershed Association successfully advocated for the elimination of a planned boat launch facility, reducing the number of motorized water craft using the lake and thereby further protecting the sensitive wildlife. It is important to note that this undertaking did not have the intention of removing motorized water craft from the lake, as it was recognized that a number of existing private landholders on the lake had (and continue to have) motorized water craft.

Under the Regional Municipal Planning Strategy (RMPS 2006), some lands originally proposed as part of the Sandy Lake Regional Park were designated by HRM as urban settlement, with the intention of developing the lands within 25 years. The projected 'build out' population for Sandy Lake was identified as 12,000. The current projection is for up to 16,000 residents. http://legacycontent.halifax.ca/council/agendasc/documents/101116cow3-217.pdf. In 2009, CBCL carried out a Cost of Servicing Study on behalf of HRM. The Sandy Lake Watershed Association was not aware of the new designation or the study.

In 2006 the HRM-owned Jack Lake lands together with the Lions Club Beach on Sandy Lake were identified as lands for the Jack Lake Regional Park which is still to be formally designated. Those lands have their own special attributes and should remain protected, but about 1000 acres of the critical Sandy Lake to Sackville River corridor remain to be protected. Citizens have worked since the 1970s to protect this area and to finally achieve a comprehensive Sandy Lake Regional Park.

Sandy Lake clear-cut in progress 2013, as seen from Lions' Club Beach

APPENDIX P

Excerpted from *TOWARDS THE IDENTIFICATION OF ENVIRONMENTALLY SENSITIVE AREAS FOR ENVIRONMENTAL MANAGEMENT: A CASE STUDY IN THE SACKVILLE RIVER WATERSHED, NOVA SCOTIA* by Rhea D. Mahar, Department of Geography, Saint Mary's University, 1994

This study by Rhea D. Mahar identifies 40 Environmentally Sensitive Areas in the Sackville River Watershed between Mt. Uniacke and the Bedford Basin. The top ranked ESLs are #1, Tomahawk Lake (largely because it is a water reserve for the city), #2, Sandy Lake, and #3, the Old Quarry Corridor along the Sackville River.

Mahar's thesis introduces a new criterion for Environmentally Sensitive Areas (ESAs). Previously, an Environmentally Sensitive Area (ESA) "contains features such as: headwaters, unusual plants, wildlife or landforms, breeding or overwintering animal habitats, rare or endangered species, or combinations of habitat and landform which could be valuable for scientific or conservation education." (P. 15) Mahar's new criterion is based on social significance of local natural areas. Mahar comments on the distress that is caused to people when local natural areas are destroyed. "There could be a link between the presence of natural areas for their own sake and the presence of natural areas as a "balm to the spirit". (P.10) In 2017, we know this to be so, and the Green Network itself is a result of that knowledge as much as for other important reasons.

However, the polarity between the market ethic approach and the ecological ethic is still strong. As Mahar states, "the *real* (sic) world is not simply an economic world. Should land adjacent to the periphery of urban areas be given over to development simply because the criteria for determining the value of that land is based on dollars and not necessarily on who or what resides or utilizes the land? There is a holistic quality to life that is often disregarded in arguments for preserving natural areas.

Stamps (1992, 1989, 1991) has been monitoring a trend in public expression of the importance of: the presence of trees in an urban setting, environmental aesthetics and public involvement in planning decisions. Perhaps this interest in planning decisions is from the experiences of destruction of sentimentally-valuable areas near settlements. A case in point in the Sackville River watershed is the Bedford Barrens issue. Petroglyphs were 'discovered' on prime land zoned for development (Figs. 2 & 3). Without having legislation in place to respect the intrinsic value of the Barrens to the Mi'kmaq and the local residents, an incredible amount of confusion has ensued and matters are still unsettled (Jones, 1994). Local residents who are not Mi'kmaq refer to the Barrens as "the centre of our sanity", and as a retreat where one's spirit may be refreshed (Mangalam, J. in Edwards, 1993, p.6).

On a very personal level, there is often an almost religious experience for people in natural areas (Soule, 1986). For others describing the remorse with the destruction of a natural area is like trying to describe the feeling with an old friend; it is valuable and when it is gone there is a deep sense of loss."

APPENDIX Q

Groups that Worked to Protect the Sandy Lake – Sackville River Regional Park Area's Natural Assets

The natural assets have been protected over decades by various community groups.

- SANDY LAKE – SACKVILLE RIVER REGIONAL PARK COALITION – (Since 2018. See list below)
- SANDY LAKE CONSERVATION ASSOCIATION (Since 2014)
- SACKVILLE RIVERS ASSOCIATION (for decades)

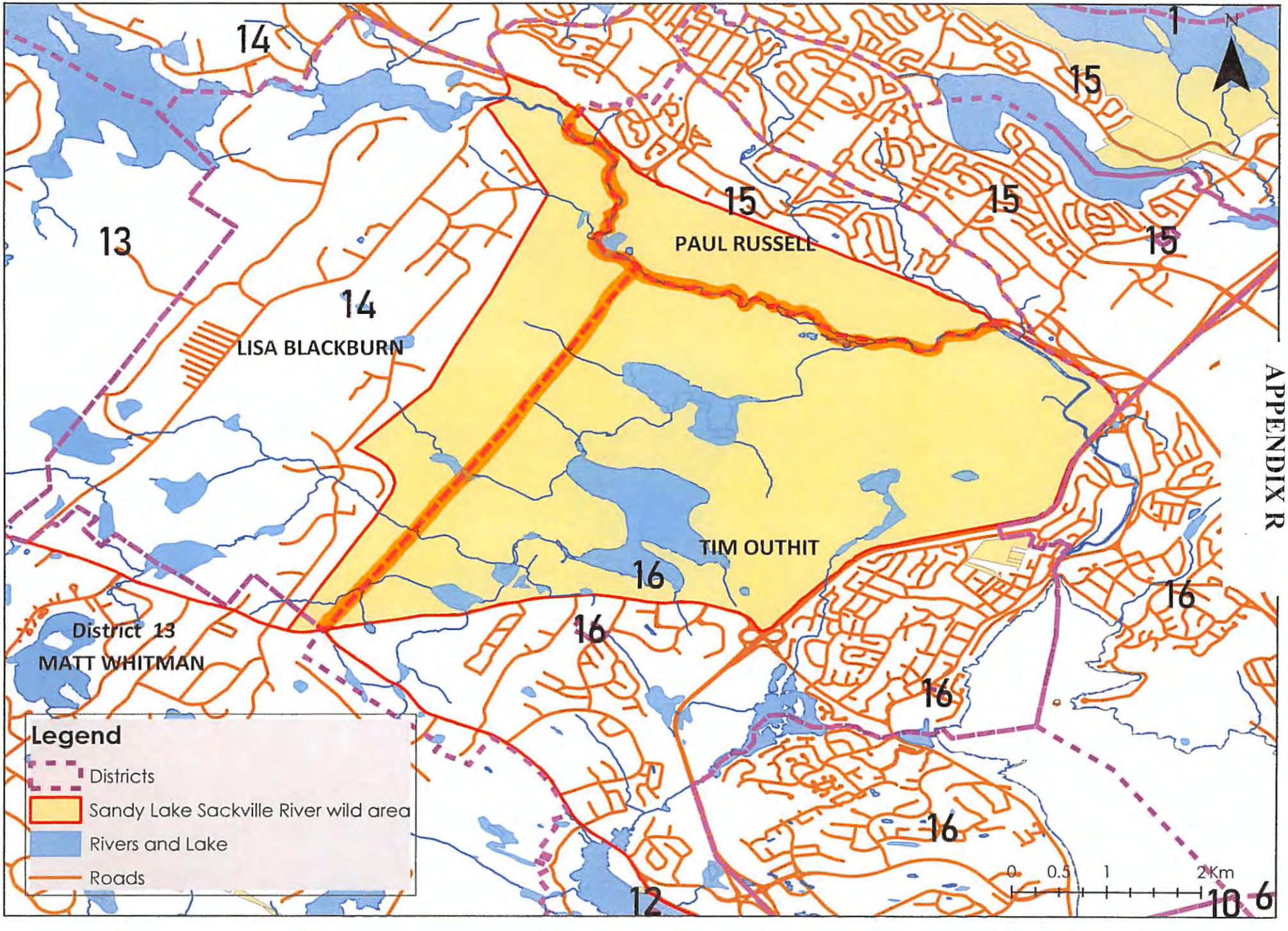
Earlier Groups:

- SANDY LAKE AREA RATEPAYERS ASSOCIATION (SLARA)
- SANDY LAKE WATERSHED CONSERVATION MANAGEMENT ASSOCIATION
- SANDY LAKE AREA RESIDENTS' ASSOCIATION
- BEDFORD LIONS CLUB

Note: There may be others, but NS Registry of Joint Stocks lists these, except the Coalition. Variations of these names can be found in some reports and documents, but it is likely the variations are rooted in the group names above.

Sandy Lake Conservation Association
Sackville Rivers Association
Agropur Cooperative Dairy Bedford Plant
Beechville Lakeside Timberlea Rails to Trails
Canadian Parks and Wilderness Society - Nova Scotia Chapter
Canoe/Kayak Nova Scotia
Ecology Action Centre
Five Bridges Wilderness Heritage Trust
Friends of Blue Mountain Birch Cove Lakes Society
Friends of McNabs Island Society
Halifax North West Trails Association
Kingswood Ratepayers Association
Lucasville Community Association
Lucasville Greenway Society
McIntosh Run Watershed Association
Mountain Bike Halifax
Nova Scotia Bird Society
Nova Scotia Salmon Association
Nova Scotia Wild Flora Society
St. Margaret's Bay Stewardship Association
The Halifax Field Naturalists
The Neighbourhood Association of Uplands Park
The Turtle Patrol
Trips By Transit
WRWEO / The Bluff Wilderness Hiking Trail

HRM polling districts for Sandy Lake and Sackville River



APPENDIX R

APPENDIX S

HALIFAX'S PUBLIC GREENBELT

The Purcell's Cove Backlands.

Blue Mountain-Birch Cove Lakes

Sandy Lake

The primary landowner is actively working with the National Conservancy of Canada, Halifax and local residents to protect this stunning landscape forever.

The "Keji of Halifax." Thanks to a surge of public support, Council recently defeated a proposal to develop these lands. After more than a decade of inaction, progress is finally being made on protecting this system of lakes, canoe routes and trails.

A stunning beach and pristine lake situated between our fastest growing communities, Bedford and Sackville. Much of the land has been acquired to create a park and only a few gaps remain.

OPPORTUNITY OF A GENERATION

Halifax: a city of beautiful wilderness at the doorstep of every neighbourhood. A place where you can raise your children near nature, where they con learn and play in healthy, thriving forests and clean lakes. Right now, we can invest to create three amazing urban parks connected to true wilderness. If we embrace this opportunity, it will be our competitive advantage for decades and centuries to come: the greenest city in Canada. Great cities have great greenbelts. Let's make ours a reality.

APPENDIX T

YOUR LAKE
A NATURAL RESOURCE WORTHY OF PROTECTION
November 2019

An Information Package for shoreline property owners prepared by the Sandy Lake Conservation Association with permission from the primary source: COX LAKE A UNIQUE NATURAL RESOURCE WORTHY OF OUR PROTECTION, An Information Package prepared by the Friends of Cox Lake, July 2007

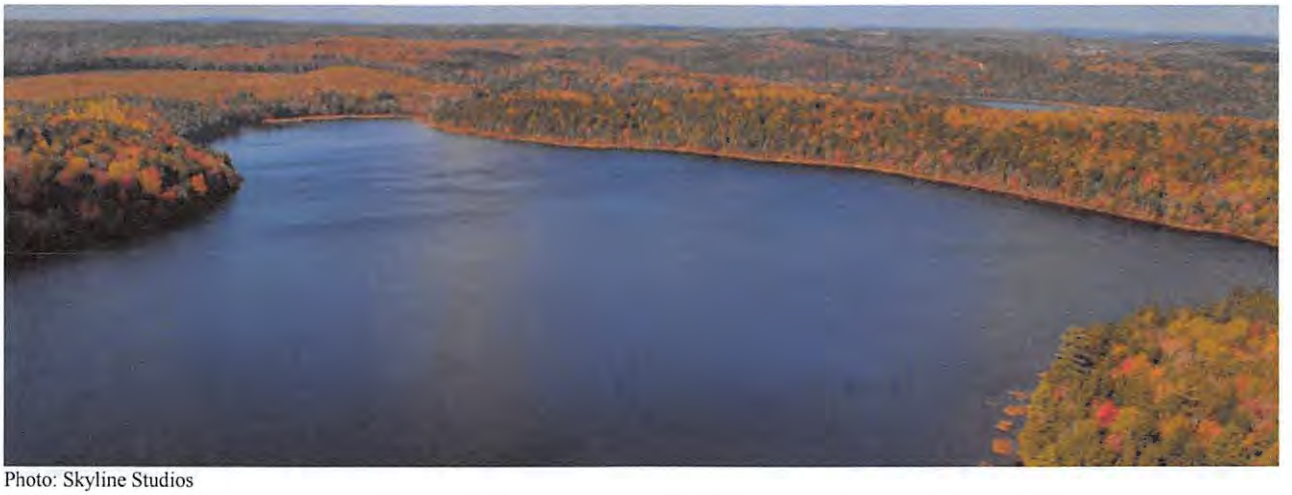


Photo: Skyline Studios

All residents share a common interest in protecting their lake and their investment in lakeside property. This package presents information on how this can be done by the community working together.

Introduction

The shoreline, the waters, and the land close to the shoreline provide essential habitat for terrestrial and aquatic wildlife and plant life. Deliberate action and decisions ensure that lakes, their shorelines and watershed are not degraded. We all have something to learn and something to gain by guarding a lake and area.

The purpose of this paper is to present some background information on lakes, the need for lake shore buffer zones, summarize existing regulations in Halifax Regional Municipality, offer recommendations for action that property owners can take to protect the lake, and discuss the need for monitoring. It is written for developers and new property owners, but existing property owners should find it useful as well.

Environmental Issues

Looking into the future, the most important environmental issues that need to be addressed are summarized as follows:

- Sediment

Perhaps the most important environmental issue, when development is a possibility, is sedimentation. Removal of vegetation during construction exposes soil to erosion. Eroded soil is carried by surface runoff

to streams and lakes. The initial impact is to create muddy water, a condition which can last for days to months depending on the grain size of the sediment particles. Turbidity is an eye-sore and interferes with recreational use, but it also blocks out sunlight which interferes with the production of food and oxygen necessary for lake organisms to survive. It also can block the gills of fish. With time, the sediment either leaves the lake through the outlet or settles to the bottom. Sedimentation usually takes place near the point of entry. The net effect of sedimentation is to reduce water depth and create a mucky bottom which is not very pleasant for swimming and encourages the growth of rooted aquatic plants. In the long term, sedimentation reduces the lake's lifetime.

- Storm water runoff

Clearing trees from sloped areas near a lake risks fast-flowing rainwater that creates gullies and washes additional sediment, debris, and warmer water into the lake. Planting grasses, shrubs and trees will help. Diverting the flow to the side and slowing the water down by placing boulders in gullies may help in the short run.

Hard-surface driveways, roofs, and parking lots all increase harmful runoff into lakes. The challenge is to control the speed and volume of surface water flowing into lake, and the accompanying pollution that flows along with it. There are ways to prevent harm while also creating a very good driving surface. Lake dwellers and nearby businesses are encouraged to look into these options before adding hard surfacing. Often among the pollution are the materials that can be prevented, such as those listed below.

- Nutrients

Nutrients are compounds of nitrogen and phosphorous which are required by aquatic plants. When nutrient levels are low and therefore the water is relatively clear, it is a healthy lake - conditions known as oligotrophic. When human activities on the lake cause the lake quality to decline, depending on the degree of stress, it may be called Mesotrophic, or even Eutrophic, which is worse. Sources include septic field drainage, animal feces, and lawn and garden fertilizers.

As development continues in a lake's watershed, nutrient levels will increase. Nutrient enrichment in lake water and sediment, known as eutrophication, stimulates the growth of aquatic plants, both planktonic algae and rooted aquatic vascular plants, which can be a nuisance to swimmers and boaters and cause numerous problems.
It is best if septic tanks in the watershed, often quite far away from a lake itself, be well maintained and pumped at least every two years.

- Salt

Road salt is used extensively in winter to remove ice and snow from local streets. Much of what is applied eventually makes its way into lakes. Rivers entering lakes also often show signs of salt "browning".

- Micro-organisms

Low levels of micro-organisms (e.g. bacteria, protozoa, viruses, etc.) occur naturally in lake waters. However, they can be increased by swimmers, animal feces and leakage from septic fields. Some micro-organisms can cause illness if ingested. Public health standards have been set for drinking water and contact sports (i.e. swimming).

- Litter

Litter (e.g. plastic, Styrofoam, glass, etc.) is caused by human carelessness and is commonly seen along

lake shore lines. Not only is it an eye-sore but it can also create hazards for both humans and wildlife.

- Toxic wastes

Toxic wastes include such things as gasoline, oil, and pesticides which usually reach lakes in runoff from lawns, gardens, driveways, storage sheds and streets. It is best to use non-toxic laundry soaps and avoid use of chemicals such as chemical cleaners and bleach.

- Acid-precipitation

Acid-precipitation has had a negative effect on many lakes in Nova Scotia, especially along the south shore. Salmonid fish (i.e. trout and salmon) are unable to breed if the pH drops below 5.

- Wildlife habitat

Wildlife needs suitable habitat for breeding, nesting, feeding and resting. It can be negatively affected by excessive wash and noise created by motorized water craft. Wildlife habitat needs to be protected from pollutants and from overdevelopment of lake shore properties. For example, property owners need to resist adding sand to their lakeshore.

Water Quality Data

When water quality decline is evident, it can still be reversed if protective action is taken, as described in this article.

Lake Shore Buffer Zones

Landowners can protect the health of the lake and its ecosystem through careful management of human activities. One very effective management tool that has been widely and successfully used in Nova Scotia, and other parts of Canada and the US, is the establishment of buffer zones of natural vegetation along streams and around lakes. Such buffer zones cost almost nothing to construct. Often the only action needed is to leave the existing vegetation in a natural state. If land has been cleared on the waterside, it is still possible to return vegetation to the site and thereby return protection to the lake. Our local trees, shrubs and plants are well adapted in our environment and do a good job intercepting sediment and nutrients. Natural buffer zones, which are important to integrate into cottage sites, offer many environmental benefits which include:

- Maintaining a zone of natural habitat around streams and lakes encourages and supports wildlife.
- Views of undisturbed natural vegetation across a water body provide aesthetic pleasure for both residents and visitors.
- If publicly owned, buffer zones provide public access to lakes and can be developed with proper care into park (beaches, walking trails, picnic tables, etc.) without disturbing their natural function.
- Most importantly, buffer zones play a very valuable role in protecting streams and lakes from pollution and therefore help to maintain acceptable water quality for recreational use.
- They require no maintenance. In fact the more they are left untouched, the better. Trees and undergrowth are so important to preserve, and for many reasons. Fallen branches and undergrowth support the health of soils and trees. They conserve moisture and conserve nutrients that might otherwise be leached from the soil. They provide support for wildlife. Consequently, many

jurisdictions in North America have by-laws that require a permit to cut even a single tree of a specified diameter. Halifax has yet to create such a by-law, although groups and individuals have been pointing out the need.

Regulations

All areas below the high water mark belong to the Province of Nova Scotia. Any shoreline alterations (i.e. moving boulders, infilling, building retaining walls, etc.) require a water rights permit granted by the Provincial Department of Environment.

There are some by-laws which help prevent more development of lake shorelines. Check your area for protective by-laws. Some examples are:

The 2016 Bedford land-use By-law (in place since 1982) requires a minimum of five acres on a public road which was a public road on or before October 9, 1991, in order to build a house or cottage.

In addition, a Land Use By-Law exists for the Beaver Bank, Hammonds Plains and Upper Sackville area of HRM. Section 4.18 deals with Water Course Setbacks and Buffers. The major points are summarized as follows:

- No development permit shall be issued for any development within 20 m (66 feet) of the ordinary high-water mark of any watercourse (i.e. lake, stream, wetland, etc.).
- Where slopes are greater than 20%, the buffer zone shall be increased by 1 m for each additional 2% of slope to a maximum of 60 m (198 feet).
- Within this buffer zone, no excavation, infilling, tree, stump and other vegetation removal or any alteration of any kind shall be permitted.
- Applications for a development permit for a building or structure must be accompanied by plans showing the required buffers, existing vegetation limits, contours, and other appropriate information.
- However, some provision is made, within certain limits, for the construction of decks, walkways and wharves.

Any questions on the interpretations of these HRM regulations should be referred to the HRM Planning Office in Sackville. Their phone number is 869-4375.

Information on the permitting of shoreline alterations can be obtained from the Provincial Department of Environment and Labour in Bedford at 424-7773.

In some instances, these lake protection buffer zones are owned and managed by the municipality. Numerous examples of this occur in Dartmouth. However, in many cases the buffer zones are owned by the individual property owners who therefore have the responsibility of maintaining them.

As stated above, the purpose of this information package is to provide information that can be used by property owners in discharging this responsibility. Positive action by all property owners will help maintain the beauty of individual properties and the overall health of a lake's ecosystem. It will protect private landowners' long term financial investments in water front property, and will protect the wildlife that lives in and around the lake.

Recommendations

Recommendations for lake protection are summarized as follows. These apply to existing homes and cottages, as well as new developments, should they occur.

- Utilize docks and swim platforms rather than creating sand beaches or removing vegetation for access.
- If damage has occurred, consider re-establishing aquatic plants along the shore, and shoreline shrubs and trees in the buffer zone.
- Most importantly, obey Section 4.18 of the HRM Land Use By-Law which stipulates the requirement for a 20 m (or greater if steep slope) lake protection buffer zone within which there can be no excavation, infilling, tree, stump and other vegetation removal, or any alteration of any kind.
- Be sure to obtain the necessary approvals and permits before starting any work.
- Keep the footprint of your home, driveway, yard and septic field as small as possible so that you can retain a maximum of the natural vegetation on your lot. Keep your lot well-treed. Never clear cut (except what is necessary of course for house, driveway, etc.).
- Re-grading of lots should be kept to a minimum.
- Schedule construction and landscaping work on your lot so that only a small area of soil is exposed at any given time. Backfilling of foundations should be done as soon as possible. All exposed areas should be stabilized with straw, seeded, or sodded as quickly as possible to reduce soil erosion into the lake.
- The use of heavy equipment should be carried out in such a manner as to prevent sediment from entering buffer zones and water courses. Driveways should be stabilized with gravel as soon as possible.
- Streets should not be used to store fill or excavated material and should be cleaned regularly.
- Give clear instructions to your contractors and monitor their work.
- All excavated material (i.e. from driveways, footings, foundations, septic fields, etc.) should be covered with polyethylene, tarps, or other suitable material to prevent erosion and be piled as far from the lake as possible.
- Any water pumped from foundation exactions should be treated on site and not disposed into the buffer zone or lake.
- Design and construct any paths to follow natural contours as much as possible. A path straight down a steep slope can lead to erosion.
- There is no need to use fertilizers in the buffer zones since they are to be left in natural vegetation. However, be very prudent in the use of fertilizers and weed killers on both lawns and gardens outside of the buffer zone. Follow directions carefully for best doses and application times. Don't over use them. Remember that fertilizers are very soluble and amounts not used by plants will quickly find their way into the lake where they will stimulate the growth of nuisance vegetation. Also don't forget that HRM has a pesticide by-law.
- Where older shore line developments do not have the 20 m buffer zone required today, consider replanting open areas with native species of shrubs and trees.
- Don't dump toxic waste such as oil, paint, and pesticides, etc. on your property as they will end up in time in the lake. Cleanup any spills as quickly as possible.
- Maintain your septic system. Extend its life by avoiding tank additives and minimizing water consumption. Periodically have the tank pumped and contents removed.
- If you are deciding what kind of watercraft to buy, remember that muscle-powered or wind-powered

craft are much more environmentally friendly. They are quiet, don't create waves or use fossil fuels.

- If you do operate a motorize craft, remember to watch your wake and steer clear of loons and other wildlife, also of occupied shoreline such as swimming areas and docks. When loons are nesting, avoid creating waves that could drown baby loons. Be very careful not to spill fuel.
- Transport Canada's Vessel Operation Restriction Regulations (VORR) Local Authorities Guide states that in Nova Scotia inland waters boat speed is limited to 10km/hr within 30M (98'5") of shore. And there is a Boating Safety Information line (1-800-267-6687) that may be helpful.

A large number of very useful recommendations are also offered by the Waterfront Living Program sponsored by numerous environmental organizations and government departments. These are found on their website at www.livingbywater.ca. Of particular interest are those dealing with the maintenance of septic systems. More detail on loons can be found on the Bird Studies Canada website at www.bsc-eoc.org. An excellent summary of lakeshore protection can be found at: https://www.michigan.gov/documents/deq/Wateredge_340005_7.pdf

"If buying property, look for shoreline and lake bottom that match your desires. Don't expect to change it into something it isn't." *(The Water's Edge: Helping fish and wildlife on your lakeshore property, Michigan Department of Natural Resources and Environment)*

Monitoring

The effectiveness of lake management measures is best evaluated by monitoring lake water and habitat quality on regular basis and sharing the results with neighbours, advisory bodies such as Our HRM Alliance, and regulatory agencies. Residents are encouraged to have the water off their property (or from the tap) tested for coliform bacteria. This can be done for a modest cost at the Environmental Services Laboratory in the Queen Elizabeth II Health Sciences Centre at 5788 University Avenue in Halifax. For details, call 473-8466.

Reporting Violations

If anyone sees any apparent violations, they should immediately question the person doing the work. The operator of a chain saw or back hoe can do irreparable damage in a matter of minutes. The operator may not have been given clear instructions of may be unaware of the regulations in force. A second course of action is to contact the developer or owner as soon as possible and express your concern. Remind them that everyone shares the responsibility of protecting the lake and that their actions are eroding the value of everyone's property. The third course of action is to call the HRM Planning Office in Sackville (869-4375).

Authors of general information about lake preservation in this paper include professional aquatic scientists who have studied environmental issues while employed by Dalhousie University, the Provincial Department of Environment and Labour, and the Federal Department of Fisheries and Oceans. Two have also served as members of the Dartmouth Lakes Advisory Board.

Thank you to the Cox Lake document authors of COX LAKE A UNIQUE NATURAL RESOURCE WORTHY OF OUR PROTECTION for their generosity, their professional input, and much of the text in this document. Also, thank you to the Michigan Department of Natural Resources and Environment for their clear and informative paper: The Water's Edge: Helping fish and wildlife on your lakeshore property, https://www.michigan.gov/documents/deq/Wateredge_340005_7.pdf)

A lake at extreme risk:

A Lake with a healthy future:

Photos: The Water's Edge: Helping fish and wildlife on your lakeshore property

"Overdeveloped shorelines can't support the fish, wildlife, and clean water that are so appealing to the people attracted to the water's edge." *(The Water's Edge: Helping fish and wildlife on your lakeshore property, Michigan Department of Natural Resources and Environment)*

The care and efforts of lake residents can preserve the natural habitat and lake area for the benefit of all today as well as for future generations.

APPENDIX U

Clayton Position as communicated to Sandy Lake Conservation Association

Notes from Sandy Lake Conservation Association (SLCA) and Clayton Developments Meeting June 1, 2018: *Present: Mike Crosby, Ann Crosby, Michele McKenzie, Karen Robinson, Kevin Neatt, Richard Butts. SLCA gave a brief history and requested help from Clayton to save these ecologically valuable lands for a long-hoped-for regional park. Clayton representatives said to "Look for solutions", that it is fortunate they are still in the paper stage. They need to have their raw materials (land) replaced, and assessing a trade will cost. Encouraged SLCA to get organized, find a champion in city hall, and seek the support of the city. Until then, they intend to proceed toward full development. Their position will appear different, but they are willing to work with us and the city on a "win-win". Invited us to meet with them again and to keep in touch any time because rumours and such too easily could start.*

Follow-up email:

Subject: RE: Good News at Sandy Lake
Date: Thu, 14 Jun 2018 18:08:43 +0000
From: Kevin Neatt [redacted]
To: Karen Robinson [redacted]
CC: Outhit, Tim [redacted] mikercrosby [redacted]

Hi Karen

Thank you for sending us a copy of your correspondence. As a courtesy, we have provided Councillor Outhit an update of our meeting, as follows:

- Sandy Lake is identified as a growth area under the Halifax Regional Plan;
- Our company has full intentions on developing the land;
- We are still in the design stage;
- We are not interested in "direct acquisition" or bulk sale of our raw land inventory
- **We would be open to a land trade to replace our inventory.**
- We recommended they proceed with:

o Seeking guidance from the City to see if there is willingness for a land trade;
o Consider what would be acceptable to meet in the middle. i.e. not all park.

- We left the meeting with an agreement to get back together when more information is available.

Regards,
Kevin

Clayton Position reaffirmed November/December 2018 via emails w Kevin Neatt
Also: Clayton has not identified possible lands to trade. They have continued acquiring land (total approaching 600 acres) and plans have been drafted for the development. Secondary Planning not yet applied for.

Clayton position February 12 2019: Phone conversation between K. Robinson and K. Neatt.
Mr. Neatt reconfirmed that his email of June 14 2018 still stands, saying it was "to encourage the city. That if the city really wants to get behind this and really thinks these are special lands, & how about X, Y, Z, then sure." (Discussed possible trades) "I don't see anywhere else that makes sense other than Jack Lake now. Its critical mass is there. Fifty acres already owned by a developer Sobeys and so it makes sense. Don't get me wrong we're still open, but not in a place like Burnside. Not interested in council's money either. We need our raw goods." KR confirmed SLCA agrees with the city, no trades of park land for park land.

APPENDIX V

Regional Plans 1975 to 2015: The Sandy Lake Mistake

The objectives for Regional Parks, as outlined in our 2014 Regional Plan, are *"to preserve significant natural or cultural resources, and to be large enough to support both ecosystem protection and human enjoyment at the same time."* (page 57) Historical documents show the importance of including the Sandy Lake watershed within the park. If anything, its importance has elevated with the closing-in of development on all sides of the watershed, and also with the need for recovery of growth in the 300 acres of forest that were cut down in 2013.

All Regional Plans since the 1970s state the intent to create a regional park at Sandy Lake and to acquire lands for that park. However, a mistake was made. Housing development is now a serious risk to the watershed that protects the entire park. We have an opportunity to intercept harm now.

1975 Halifax-Dartmouth Regional Development Plan defines and separates regional parks and development areas and identifies seven unique areas to become regional parks: Hemlock Ravine, Schubenacadie Canal system, McNab's island, Admirals Cove, Cole Harbour/Lawrencetown Beach, Long Lake/Chain Lake, and **the Marsh and Sandy Lakes, Sackville Flood Plain.**

1982 Halifax-Dartmouth Regional Development Plan states concerns about urban sprawl, and a shift from "*development at any cost"* toward quality of life. Metro has not been harmed by the industrial revolution, and has clean lakes and clean air. **Page 20-21 describes regional parks using similar descriptive words still found in the 2014 RP, and the seven proposed regional parks are again listed.**

2004 Town of Bedford Municipal Planning Strategy Environmental Policies:
"Policy E-18:It shall be the intention of Town Council to identify the Sackville River as a conservation corridor because of its importance as a salmon fish habitat and its significance as a natural amenity to the community, and to work towards improving the quality of water in the Sackville River, in cooperation with appropriate agencies."
"Policy E-20: It shall be the intention of Town Council upon the adoption of this plan to undertake an in-depth environmental study of the Sandy Lake watershed which will include input from the N.S. Department of Environment as well as area residents, and shall examine present water quality, watershed land use practices increased rates of sedimentation, and the development of a recovery and protection program for Sandy Lake if warranted by the study."

2006 Regional Plan identifies six areas for **future growth (housing) in HRM**: Bedford South, Morris-Russell Lake, Bedford West, Port Wallis, **Sandy Lake** and Highway 102 west corridor adjacent to Blue Mountain - Birch Cove Lakes Park. (*One has to ask what changed to make this happen. Where were the voices of the community and scientists who previously identified this as ecologically important? A mistake was made here that we must correct.*

- *2006-2010 Kingswood North is built west of Sandy Lake. Developers are land-banking.*
- *2009 Developers submit applications for developing Sandy Lake west.*

- *2009 CBCL Cost of Servicing Study to proceed, and developer proposes oversized sewer pipe.)*

2011 Halifax Regional Municipality MPS for Bedford *"Town Council shall continue working towards the establishment of major parks at Admiral's Cove,* ***Sandy Lake,*** *and within the Waterfront Development Area (Policy P-6)" "…policies P-8 and P-9 indicate Town Council's intentions to designate future parkland within the Jack Lake assembly…"p.126 "…the future development of existing open space is now seen as a higher priority than the acquisition of additional open space. Exceptions to this would be land acquired in relation to subdivision development, land for neighbourhood parks, specialized land for linkages or unique sites,* ***and Sandy Lake."*** **p.128**

2012 - A memorandum of Understanding was made between Armco and Halifax Water for Armco to contribute $1mil of the $3.1mil estimated cost of upsizing the wastewater pipes of Bedford West to accommodate possible future development at Sandy Lake. Item 5 of the MOU states, "Armco shall make the above-noted upfront payment recognizing and accepting that the decision to approve a secondary planning strategy for all or a portion of the Sandy Lake lands is ultimately in the sole discretion of HRM Regional Council"

July 3, Council Report, Wastewater Oversizing for Future Development of Sandy Lake Lands. *"HRM is not a party to the proposed Armco-HWRD contract. As such, the terms and conditions do not commit a future council to any planning approvals in either Bedford West or the Sandy Lake lands."* p.1

2014 Regional Plan (RP+5) *"The primary objective of a Regional Park is to preserve and protect significant natural or cultural resources. The essential feature of a Regional Park may include, but not be limited to, open space, wilderness, scenic beauty, flora, fauna, and recreational, archaeological, historical, cultural and/or geological resources." p.26*

"HRM intends to create additional Regional Parks at various locations throughout HRM including the Blue Mountain Birch Cove Lakes, Feely Lake, ***Jacks Lake****, Second Lake, and Porters Lake." p.28*

2.2.7: E-11 *"(a) coordinating and managing a program to research, identify and designate potential natural areas, systems and distinct landscapes, natural corridors and critical ecosystem linkages, and significant natural habitats to guide future development (see Map 5, Significant Habitats and Endangered Species and Appendix C: Species at Risk in HRM 2013);*

(b) coordinating and managing a program to research and identify potential public open space parks and corridors for the provision of quality open space for recreational and social development, restoration of natural corridor and urban ecosystem function, greenway networks to connect communities and provide mobility options and significant natural habitats to guide considerations of future development;

(c) establishing selection criteria, investment and management guidelines for public open space lands, infrastructure and sustainable natural open space management strategies;

(d) examining criteria for classifying and developing HRM parks including comprehensive criteria for designating regional parks;

(e) assessing opportunities to further the development and establishment of management plans for the 1975 Regional Park System, the new Regional Parks proposed under this Plan, and other areas identified for their potential as regional parks;

(f) developing an evaluation methodology and criteria for determining land capability and functionality in meeting standards for the delivery of public open space services, open space conservation, community development and growth management;
(g) developing a system of interconnected public and natural undisturbed open spaces throughout HRM to include HRM parks, coastal areas and watercourse shorelines, water route and land-based greenways as illustrated on the Trails and Natural Network Map (Map 3), multi-functional streets, environmental and cultural conservation areas, schools, natural corridors, habitats as well as other public and community facilities;
(h) establishing a green-way network that includes a variety of corridors such as linear parks, hiking trails, nature trails and scenic loops;
(i) including a comprehensive planning approach for the retention of coastal and freshwater lake access and incentives for the protection of watercourse buffers;

"Policy E-12 – HRM shall prepare a Greenbelting and Public Open Space Priorities Plan and preserve connectivity between natural areas and open space land, to enable their integration into sustainable community design, to help define communities, to benefit the municipality's economic and physical health of its people and to reflect and support the overall purposes of this plan."

(Note: All of these points are directly relevant to SL-SRRP.

2015 Halifax Municipal Strategy for Bedford The wording is exactly the same as in 2011, but the pages are 122-125. *"…shall continue working towards the establishment of major parks at Admiral's Cove, **Sandy Lake**, and within the Waterfront Development Area (Policy P-6)" …Policies P-8 and P-9 indicate Town Council's intentions to designate future parkland within the **Jack Lake assembly**…"*
*…" the future development of existing open space is now seen as a higher priority than the acquisition of additional open space. Exceptions to this would be land acquired in relation to subdivision development, land for neighbourhood parks, specialized land for linkages or unique sites, and **Sandy Lake**."*

The Sandy Lake and area is clearly still seen as important park land, but watershed that protects those park assets is now on a parallel path toward housing. Protecting the Sandy Lake watershed from development is critical to the entire park/watershed through to Sackville River and basin. We have a mistake to correct.

APPENDIX W

HALIFAX

P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 11.1.4
Halifax Regional Council
August 4, 2015

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original signed by
Richard Butts, Chief Administrative Officer
Original Signed by
Mike Labrecque, Deputy Chief Administrative Officer

DATE: June 8, 2015

SUBJECT: **Off-site Parkland Dedication Request – Marsh Lake Lands, Bedford**

ORIGIN

- Request by Armco Capital Inc.
- Order M06387 from the NS Utility and Review Board dated December 23, 2014

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter:
Subsection 283(2) – "Where a subdivision by-law provides for the transfer to the Municipality of useable land, the applicant may provide land, equivalent value or a combination of land and equivalent value equal to the amount of the transfer required by the subdivision by-law."

Subsection 283(11) – *"An applicant may, with the approval of the Council, convey to the Municipality an area of land in the Municipality of equal value outside the area being subdivided, in lieu of land in the subdivision."*

RECOMMENDATION

It is recommended that Regional Council accept the transfer of the Marsh Lake lands as shown on Map 1 of this report as public parkland with a value of $1,620,000, for the benefit of Armco Capital Inc. and its affiliates, as lands of equal value outside the area being subdivided, for their various subdivision application requests.

BACKGROUND

In new subdivision projects along with providing the necessary streets, services and utilities to service the new lots to be created, developers are required to provide a public park dedication to the Municipality. Generally, a land dedication must equal not less than 10% of the total area of all newly created lots and a cash-in-lieu of land dedication must equal 10% of the assessed market value of the newly created lots.

While park dedications in the form of land are most common, the dedication may also take the form of equivalent value such as park site development or be composed of a combination of land, cash and equivalent value. Proposed subdivision plans are reviewed by staff against the requirements of the Regional Subdivision By-law with the form of park dedication being determined by staff as follows:

(a) land, where a deficiency in parkland exists;
(b) cash, where sufficient parkland or recreation facilities are available;
(c) site development, where sufficient parkland is available but a deficiency in recreation facilities exists; or
(d) a combination of land, cash and site development, where the 10% dedication will result in more than sufficient parkland to serve the surrounding area.

HRM's authority to require parkland dedication is contained within the provisions of the *HRM Charter* and regulated through the Regional Subdivision By-law. Cash-in-lieu of land payments are collected by the Development Officer at the time of final subdivision plan approval and are deposited into the Parkland Reserve account (Q107). Where cash is paid in lieu of transferring land, the *HRM Charter* requires that these funds are to be used for the acquisition of, and capital improvements to, parks, playgrounds and similar public purposes.

Further to this, the *HRM Charter* also enables a subdivider, with the approval of Regional Council, to convey to the Municipality parkland outside of the area being subdivided provided the lands are of equal value to that which is required by the Subdivision By-law. Armco Capital Inc. has a number of active subdivision applications on file where park dedications in the form of cash-in-lieu of land are required. As per the provisions of the Regional Subdivision By-law, cash-in-lieu of land is required where staff determines that sufficient parkland or recreation facilities are available. Rather than provide the dedications in the form of cash, Armco has requested instead that the Municipality accept two large tracts of land in Bedford totalling 160 acres and known as the Marsh Lake lands (see Map 1), as public parkland of equal value.

The consideration of this matter is also an item that is contained in the December 23, 2014 Order[1] of the NS Utility and Review Board regarding an alternative dispute resolution for a number of issues arising from Armco's appeal of HRM's refusal of the Twin Brooks Development Ltd. subdivision application. Among other matters, the Order requires that the Municipality will accept the transfer of the Marsh Lake lands as a parkland dedication bank for the benefit of Armco and its affiliates, subject to the approval of Regional Council. Subsequent to their Order, the Board dismissed Armco's appeal on January 29, 2015 and ruled that the Municipality was entitled to receive the quantity of parkland dedication that it had requested. In this case, a cash-in-lieu of land dedication in the amount of $449,472 is payable to HRM.

DISCUSSION

Requests to convey parkland outside of the area being subdivided are very rare. While the former Halifax County Municipality did previously approve a small number of these requests, this is the first such request to HRM since municipal amalgamation in 1996.

In reviewing a request to accept a parcel of parkland outside of the area of land being subdivided, staff must consider how doing so would serve the recreational needs of the residents within the area being subdivided. As it would be difficult to identify how a park dedication in one community could serve the residents of a distant community, these requests typically would not receive staff support. However, in

[1] See Staff Information Report on this item at: http://www.halifax.ca/council/agendasc/documents/150113cai11.pdf

this particular instance, the request to dedicate land outside of the area being subdivided would apply only to those cases where cash-in-lieu of land is required.

As noted above, funds received through cash-in-lieu of land dedications may be used by the Municipality to acquire land for parks. The acquisition of the Marsh Lake lands has been reviewed by Parks and Recreation staff and based on their review, they advise that it is appropriate for the Municipality to acquire the lands for public parkland purposes.

Suitability for Parkland

The subject lands at Marsh Lake are immediately adjacent to municipal lands being assembled for Jacks Lake Regional Park. The Jacks Lake Regional Park is identified in the Halifax Regional Plan as one of six (6) regional parks to be created over the life of the plan. The park's focus is to:

1) provide a Regional Near Urban Wilderness Park adjacent to the Bedford /Sackville Area;
2) protect representational Acadian Inland forest habitats;
3) provide water quality protection of Sandy Lake, Jacks Lake and Marsh Lake;
4) provide access to and protect the ecology of the Sackville River; and
5) provide continuity of a wilderness corridor along the Sackville River stretching from the 102 highway at Bedford to the Pockwock Municipal Watershed.

Staff have conducted field work on the Armco Marsh Lake lands and assessed them in terms of the above objectives. The Armco lands:

- add 160 acres of desirable forested recreation lands to the Jacks Lake Regional Park land assembly. The lands help create a loop trail around Marsh Lake and have the potential to provide low impact access to undeveloped sections of the Sackville River with desirable aesthetic value;
- host a variety of successional Acadian forest types including complexes and ages which are near to being classed as rare old growth forest as well as former industrial forest;
- offer a buffer to Marsh Lake from future development, helping to protect water quality and habitat within the Sackville River watershed;
- extend from Marsh Lake to the banks of the Sackville River and add another ½ km of shoreline protection for the watercourse;
- protect habitat presently functioning as an un-official wildlife corridor extending from the Bicentennial Highway at Bedford along the Sackville River to Hants County. This corridor's viability is presently ensured by public ownership of the lands associated with Jacks Lake Regional Park, the Dept. of National Defence Rifle Range, the former Sackville Landfill and the Pockwock/Tomahawk Watershed lands. The Halifax Green Network Plan, currently underway, will be recommending that this corridor be one of several key wilderness corridors penetrating into the urban area to be incorporated into land use and park planning.

Staff has been assembling lands at Marsh Lake since 1999, first following direction set out in the former Town of Bedford's MPS policy and then in the 2006 Regional Plan. If these lands were currently available for sale on the open market, staff would be recommending to Regional Council, independent of this request, that they be purchased using the funding from the Park Land Reserve account.

Valuation & Allocation

To provide a valuation of the lands, the subdivider provided an independent appraisal prepared by Ingram Varner and Associates dated July 2014. Staff has reviewed the appraisal report and agrees with the assigned market valuation of $1,620,000 for the Marsh Lake lands.

Staff recommend that Council accept the land transfer at this valuation and that the value be used as a credit to be drawn down and applied to cash-in-lieu of park land dedications owing for various Armco subdivision projects throughout the Municipality. Under this program, the $1,620,000 balance would be drawn down to $0 by deducting the cash-in-lieu of land dedication values that are payable to the Municipality only in those instances where a cash-in-lieu of park land dedication is required as per the Regional Subdivision By-law. Staff would keep an accounting of these transactions and provide a report to Council identifying the individual subdivisions and the respective cash-in-lieu of land values owing and deducted from the credit.

As noted above, Armco Capital Inc. has a number of active subdivision applications on file throughout the Municipality where park dedications in the form of cash-in-lieu of land are required. Armco may proceed with approval of some or all of these applications at the present time based on their business needs. The dedications for these projects, including the $449,472 owing for Twin Brooks, would more than exhaust the $1,620,000 value of the Marsh Lake lands.

Conclusion

In keeping with the policies of the Regional Plan, the Marsh Lake lands are highly desired for regional park purposes. In consideration of the request by Armco Capital Inc. and the December 2014 Order of the NS Utility and Review Board, staff recommend that Regional Council accept the transfer of the Marsh Lake lands as public parkland with a value of $1,620,000.

FINANCIAL IMPLICATIONS

None identified. The request is based on an equal value transfer, accordingly there is no budgetary effect.

COMMUNITY ENGAGEMENT

At the September 15, 2014 meeting of North West Community Council, a petition was received from the Sandy Lake Conservation Association supporting that the Municipality expand the park lands surrounding Marsh Lake and Sandy Lake to create a regional park and wilderness area. Staff responded with an Information Report to Community Council indicating that planning and land acquisitions for the Regional Park were continuing.

ENVIRONMENTAL IMPLICATIONS

This land will serve as a positive move to protect and preserve high value ecological lands associated with the Sackville River Corridor.

ALTERNATIVES

Regional Council may choose to refuse to accept the transfer of the Marsh Lake lands as equal value park lands outside the areas of land being subdivided by Armco or its affiliates. Should this be the case, Armco will be required to provide payments of cash-in-lieu of land to HRM prior to receiving approval of their subdivision applications.

ATTACHMENTS

Map 1 Marsh Lake lands, Bedford

A copy of this report can be obtained online at http://www.halifax.ca/council/agendasc/cagenda.php then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 902.490.4210, or Fax 902.490.4208.

Report Prepared by: Kelly Denty, Manager, Development Approvals, 902.490.4800

Peter Bigelow, Manager, Policy & Planning, Parks, 902.490.6047

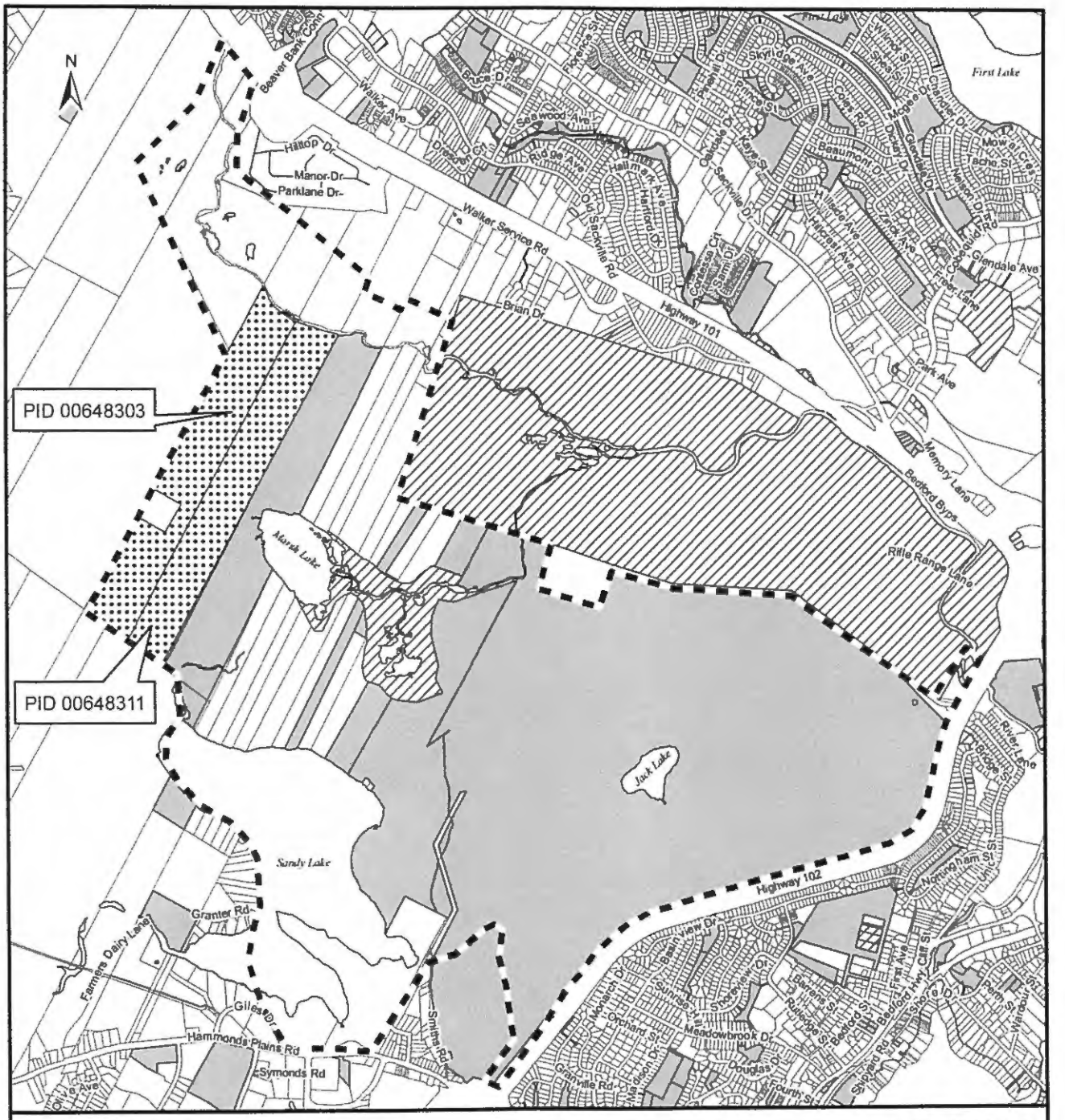
Report Approved by: Bob Bjerke, Chief Planner and Director, Planning & Development, 902.490.1627

Report Approved by: Brad Anguish, Director, Parks & Recreation, 902.490.4933

Financial Approval by: Bruce Fisher, Manager, Financial Policy and Planning 902.490.4493

Legal Approval by: John Traves, Director, Legal Services, 902.490.4219

Original signed



Map 1 - Marsh Lake Lands, Bedford

HALIFAX

Subject Properties

HRM Owned Parcels

Federal Government Owned Parcels

Conceptual Boundary of the Jack's Lake Regional Park

Bedford
Plan Area

0 200 400 600 800 m

The accuracy of any representation on this plan is not guaranteed.

11 June 2015

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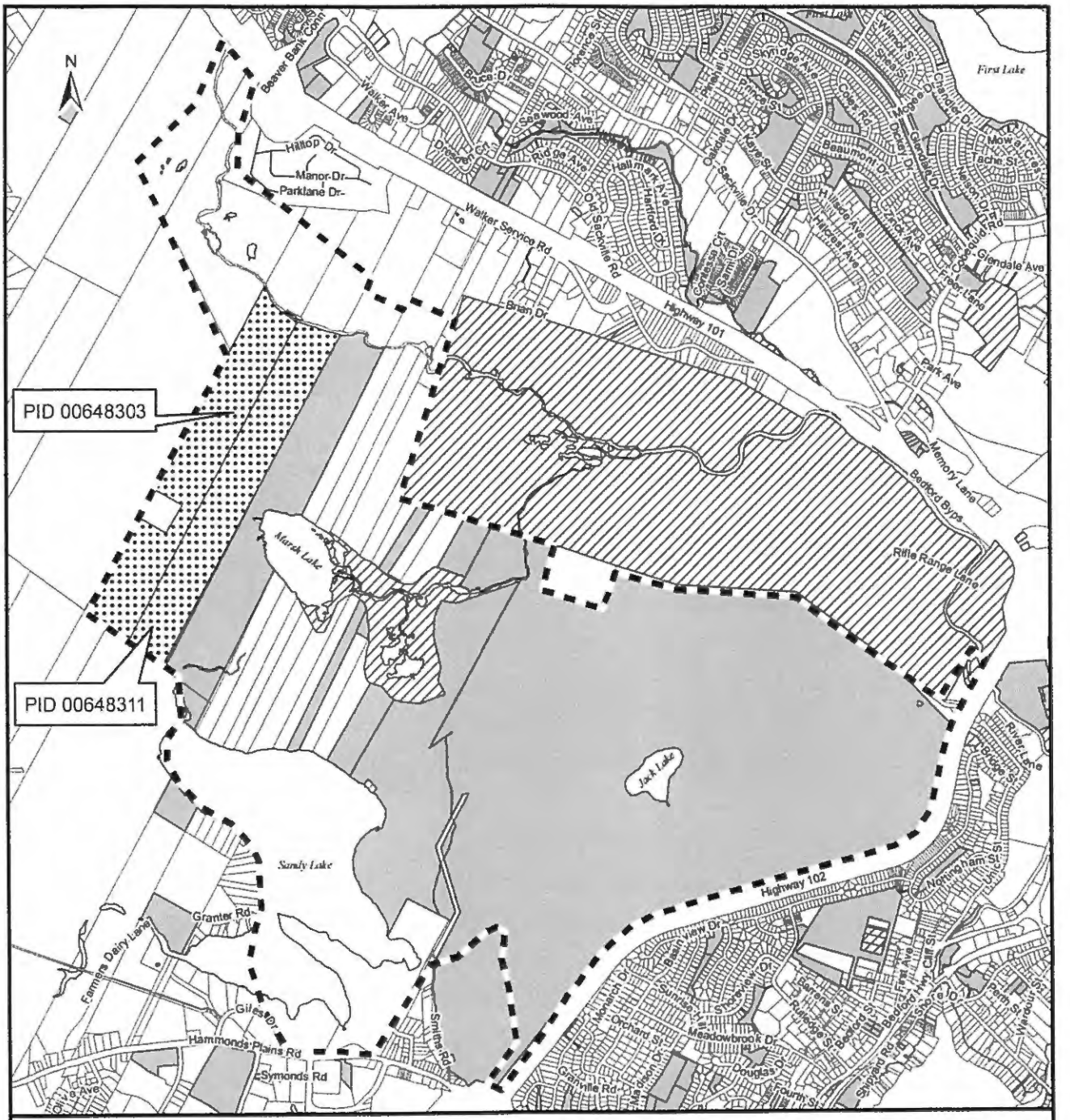
APPENDIX X



Map 1 - Marsh Lake Lands, Bedford

HALIFAX

- Subject Properties
- HRM Owned Parcels
- Federal Government Owned Parcels
- Conceptual Boundary of the Jack's Lake Regional Park

Bedford
Plan Area

0 200 400 600 800 m

The accuracy of any representation on this plan is not guaranteed.

11 June 2015

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APPENDIX X

Important Information About the 2015 Conceptual Map for Sandy Lake and Area

We are asking that within the RP+10 the city investigate and redraw the arbitrarily drawn 2015 Conceptual Map boundary line using currently available scientific data, ecological information, and natural boundaries of the Sandy Lake - Sackville River watershed, in addition to baseline data gathered over 50 years, in order to determine the appropriate ecologically sensitive, science-based park boundary that will protect park assets. Include examination of the watershed to the west and north of Sandy and Marsh Lakes that lie between the Hammonds Plains Road, Kingswood North, and Sackville. Examine all areas within the boundary identified in the document, *Sandy Lake-Sackville River Regional Park Planning Vision January 2020*, which also suggests land acquisitions for park access.

The Sandy Lake-Sackville River Regional Park Coalition learned recently that the 2015 conceptual map (see below) is being used as the city's guide for acquiring property for Sandy Lake - Sackville River Regional Park. While we are very grateful that the city is acquiring land for the park, we are concerned because that map was drawn for a specific purpose and does not reflect actual watershed lands that are needed in order to protect even the existing park assets.

We were told by individuals close to the drawing of the map that the line was drawn not to protect water assets, not based on research, but only to acquire the 160 acres. It was drawn for a transaction. To include more of the developer's lands at the time would have created controversy and likely would have caused the 160-acre acquisition to fail. If this map is being used as a defining boundary for park acquisition now, it is being used for a purpose for which it was not designed.

However, we were also told that the rationale for acquiring the 160 acres that is contained in the 2015 document is the same rationale that the city can use to protect the rest of the watershed. The watershed of Sandy Lake is of vital importance for the ecological integrity of Sandy Lake, and Sandy lake is vital to protect the rest of the entire park system through to the Sackville River. The area is a rich and diverse ecological system. Three kinds of lakes (a deep blue lake, a boreal lake and a marsh lake) and a major river sit side by side, each surrounded by vegetation as diverse as the water bodies. It is an outstanding location for educational purposes.

Dr. Patriquin has studied water data dating back several decades and has been testing the waters in and around Sandy Lake since 2017. The lake has marginal Oxygen in deeper waters now. It was Oligotrophic in the 1970s and is now mid-mesotrophic. It is already on the edge and any significant development in the remaining watershed will impact the entire system. Dr. Patriquin says the goal should be to return the lake to its previous Oligotrophic condition to preserve and enhance what is there.

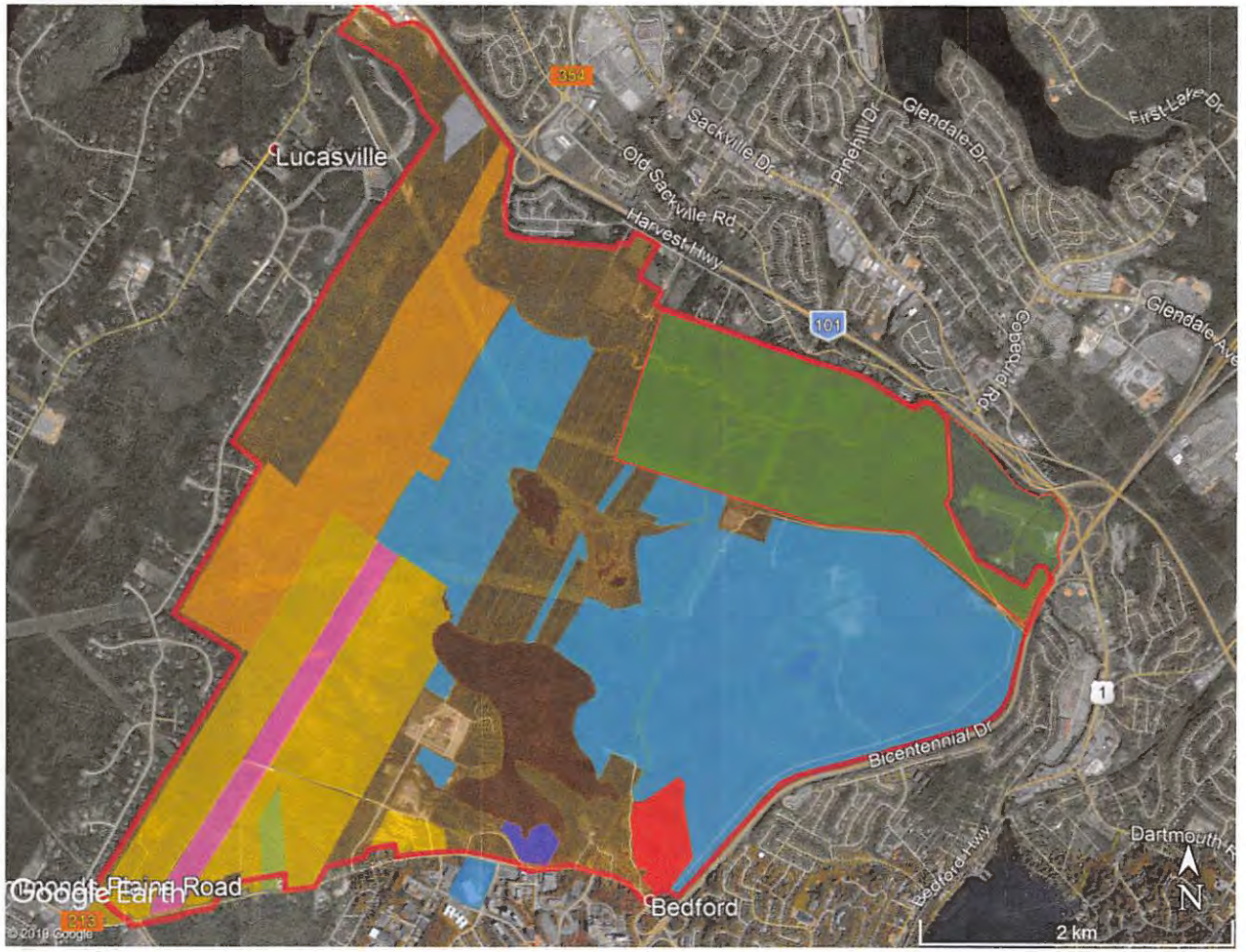
He tells us the acres that were cut in 2013 are filled with the full suite of Acadian forest and they are already helping to protect the lake. They need to be allowed to grow. The protection of developers lands west of the lakes, and control of what can happen on that land, is critical to the entire system. The developers offered to trade if the city will recognize this importance.

Suggested scientific studies and ecological information to include:

- Sandy Lake-Sackville River Regional Park Planning Vision January 2020 (Appendix I)
- Dr. David Patriquin and other scientists' recent findings. www.sandylakebedford.ca and on www.sandylake.org and Appendix F
- Flora and Fauna studies (Appendices G and H)
- Several studies conducted over five decades (Appendices D and E)
- The Halifax Green Network Plan (See Section C)

APPENDIX Y

Sandy Lake – Sackville River Regional Park
Planning vision



Land ownership in area of Sandy Lake – Sackville River Regional Park

- Land owned by HRM
- Land owned by Clayton Developments
- Land owned by United Gulf Developments
- Land owned by Azmi Armaout
- Land owned by Sandy Lake Developments
- Land owned by Crombie
- Land owned by Khalid Shabban
- Land owned by Armco Developments
- Land owned by DND
- Proposed Sandy Lake – Sackville River Regional Park boundary

APPENDIX Z

Park Land Acquisition at Sandy Lake, to 2019

At Sandy Lake, there is a strong history of park land acquisition by the municipality and city. Attached is a map of all city-owned park land up to 2019. This is what we know:

c.1974, Mrs. Pender (widow of Pender sawmills owner) offered a gift of ~500 acres west of Sandy Lake if the park would be named in her late husband's honour. Ira Settle, County Warden, reportedly wanted the taxes from the Twin City Dairy's proposed move to Sandy Lake instead, and vetoed the 3-way vote (city, municipality, Province). In 1986 she offered to sell the same lands to Bedford. Again, the she was turned down. (They became Armco's 550 acres, and now Clayton's. Armco clear-cut 300 in 2013.)

In 1983, although the Province withdrew from the plan for the 7 regional parks, **the local areas decided to do it themselves.** Bedford's Mayor Cosman championed the park idea still, but Bedford Council rezoned the area for development for complex reasons touched on in the Time Line. To preserve the area in hopes that a park plan would evolve eventually, Sept 26, 1983, Council passed a zoning bylaw to restrict any new construction to a minimum 5-acre lot on a publicly serviced road that is publicly serviced as of October 9, 1991. This zoning protected the lake from in-fill development ever since, and is still in the 2016 Bedford Land-use By-laws. (Appendix AA) However, with the zoning change, developers began to buy up land.

Bedford continued to purchase land around Sandy Lake toward this future park purpose:
On **July 22, 1985**, a 50/50 purchase by the Province and Town acquired 236 acres for Sandy Lake Park and 61 for Admirals Cove Park for $700,000 from McCulloch and Co. We are not sure which parcels.

In 1992, 6 acres were given to Bedford by Farmers Dairy specifically for public parkland, with a covenant requiring the land be used only for public parkland, no buildings, and no travel over the lands or parking, no motor vehicles of any kind.

In 1986 CMHC gave its Jack Lake lands to the province. The large public housing development they were planning for Jack Lake would not happen because of the need for 2 expensive highway interchanges and for extensive mitigations required to prevent environmental damage to Jack, Sandy and Marsh lakes. (Jack Lake Environmental Report, 1986, http://sandylake.org/1986-jack-lake-environmental-evaluation-final-report-2/.

Subsequently, **the Province gave the ~1000 Jack Lake acres, minus 50 acres, to the municipality for the park.**
Those 50 acres were later considered for a prison but eventually went to the park instead.

In 2006, the same year that the First Regional Plan, Sandy Lake is listed as Urban Settlement area, a successful lobby by Sackville Rivers Association and others made the Jack Lake lands a Regional Park. It remains identified as park today, but is not being managed as an active park.

2013, the city traded Sobeys/Crombie 50 acres of the Jack Lake lands (across from the BMO) to protect Morris Pond. Thus, the city unfortunately traded out park land to protect other park land without the community knowing.

At the September 15, 2014 meeting of North West Community Council, a petition was received from the Sandy Lake Conservation Association requesting that the municipality expand the park lands surrounding Marsh Lake and Sandy Lake to create a regional park and wilderness area. Staff responded

with an Information report to Community Council indicating that planning and land acquisitions for the Regional Park were continuing, and directing community efforts for the park into the Halifax Green Network Plan HGNP. http://sandylake.org/wp-content/uploads/2020/04/NWCC-response-and-SLCA-petition-2014.pdf

October of 2015, HRM purchased the 160 acres from Armco. Most developers' lands west of Sandy Lake were not included in the conceptual map. *"In keeping with the Regional Plan, the Marsh Lake lands are highly desired for regional park purposes…" "…This land will serve as a positive move to protect and preserve high value ecological lands associated with the Sackville River Corridor."*

Early in 2019, very good news came as an internal report is apparently authorizing future acquisitions for the park, and by December, 2019, Sandy Lake is a line item along with Blue Mountain Birch Cove Lakes in the city's Capital Projects Budget.

* * *

Map of park land at Sandy Lake-Sackville River as of 2019:

APPENDIX AA

PART 11 RESIDENTIAL RESERVE (RR) ZONE

No development permit shall be issued in a Residential Reserve (RR) Zone except for one or more of the following uses:

a) single unit dwellings;
b) neighbourhood parks;
c) homes for special care for up to 10 residents;
d) uses accessory to the foregoing uses.

ZONE REQUIREMENTS RR

In any Residential Reserve (RR) Zone no development permit shall be issued except in conformity with the following requirements:

Minimum Lot Area	5 acres
Minimum Lot Frontage	360 feet
Minimum Front Yard	30 ft. setback
Minimum Rear Yard	50 ft.
Minimum Side Yard	8 ft.
Maximum Height of Building	35 ft.
Maximum Number of Dwelling Units on Lot	1
Lot Coverage	10%

SPECIAL REQUIREMENTS - UNSERVICED LOTS

Notwithstanding anything else in this By-law, the minimum lot frontage for unserviced lots within as RR zone may be reduced to one hundred twenty (120) feet and the minimum lot area reduced to one (1) acre where the following conditions are met:

a) the original parcel of land contains a dwelling which was constructed on or before October 9, 1991 by-law: and,
b) the lot completely fronts on a street which was public on or before October 9,1991.

Notwithstanding anything else in this By-law, for 700 Kearney Lake Road (PID 40648370), the minimum lot frontage is reduced to one hundred fifty (150) feet and the minimum lot area is reduced to two (2) acres. (RC-Apr 24/01;E-May 25/01)

APPENDIX BB

Wildlife Corridors

Map 2 From Avian and Species at Risk Surveys of the proposed Sandy Lake-Sackville River Regional Park

March 2020
Prepared by Natural Wonders Consulting Firm

Legend

Points 1A and 1B mark the northern and southern extents of a major wildlife corridor identified in this report as the Sandy Lake Wildlife Corridor.

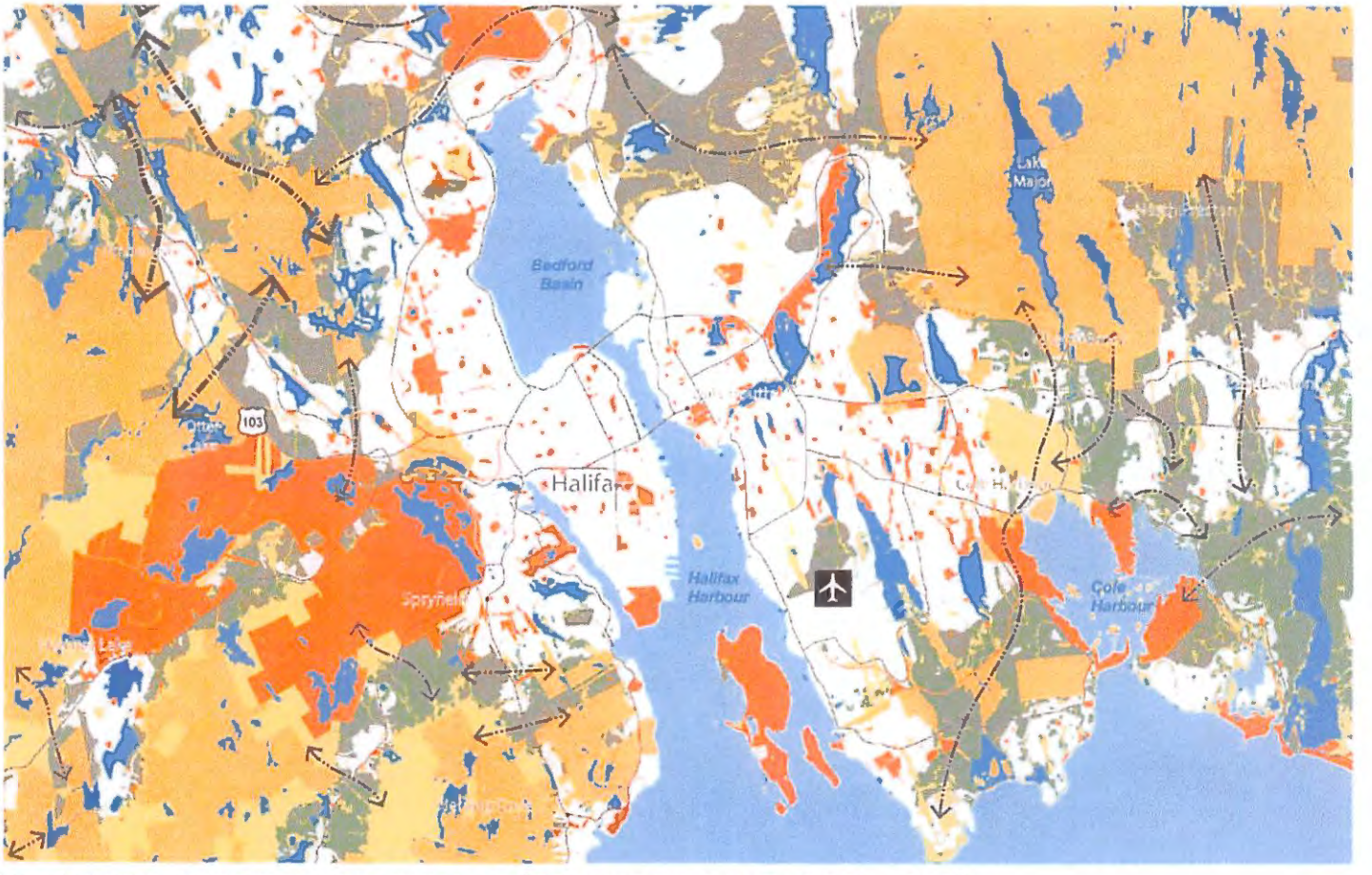
Points 2A and 2B mark the western and eastern extents of a major wildlife corridor identified in this report as the Sackville River Valley Corridor.

Points 3-8 represent smaller but important riparian wildlife corridors that feed the Sandy Lake Wildlife Corridor.

Point 9 marks the key wildlife connector between Marsh Lake and the Sackville River Valley Corridor.

Point 10 marks the key wildlife connector between Jack Lake and Paper Mill Lake.

Points 11 & 12 mark a wildlife corridor where animals cross over the Hammonds Plains Road. Corridor 12 also feeds into Sandy Lake Wildlife Corridor.



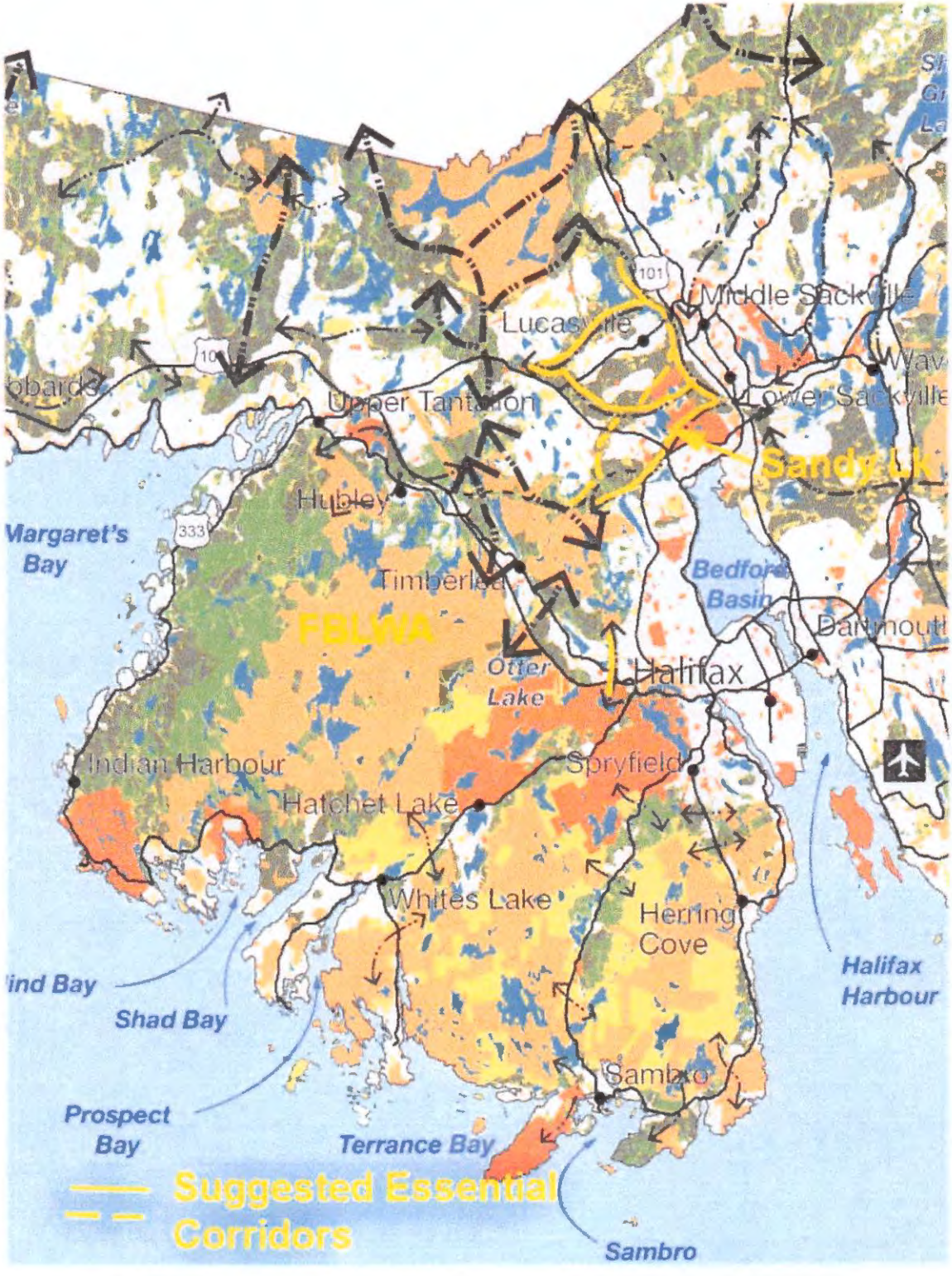
Map 6: **GREEN NETWORK ECOLOGY MAP (ZOOMED INTO THE URBAN CORE)**

LEGEND

- Airports
- Roads
- Planned Roads
- Lakes

OVERLAPPING VALUE

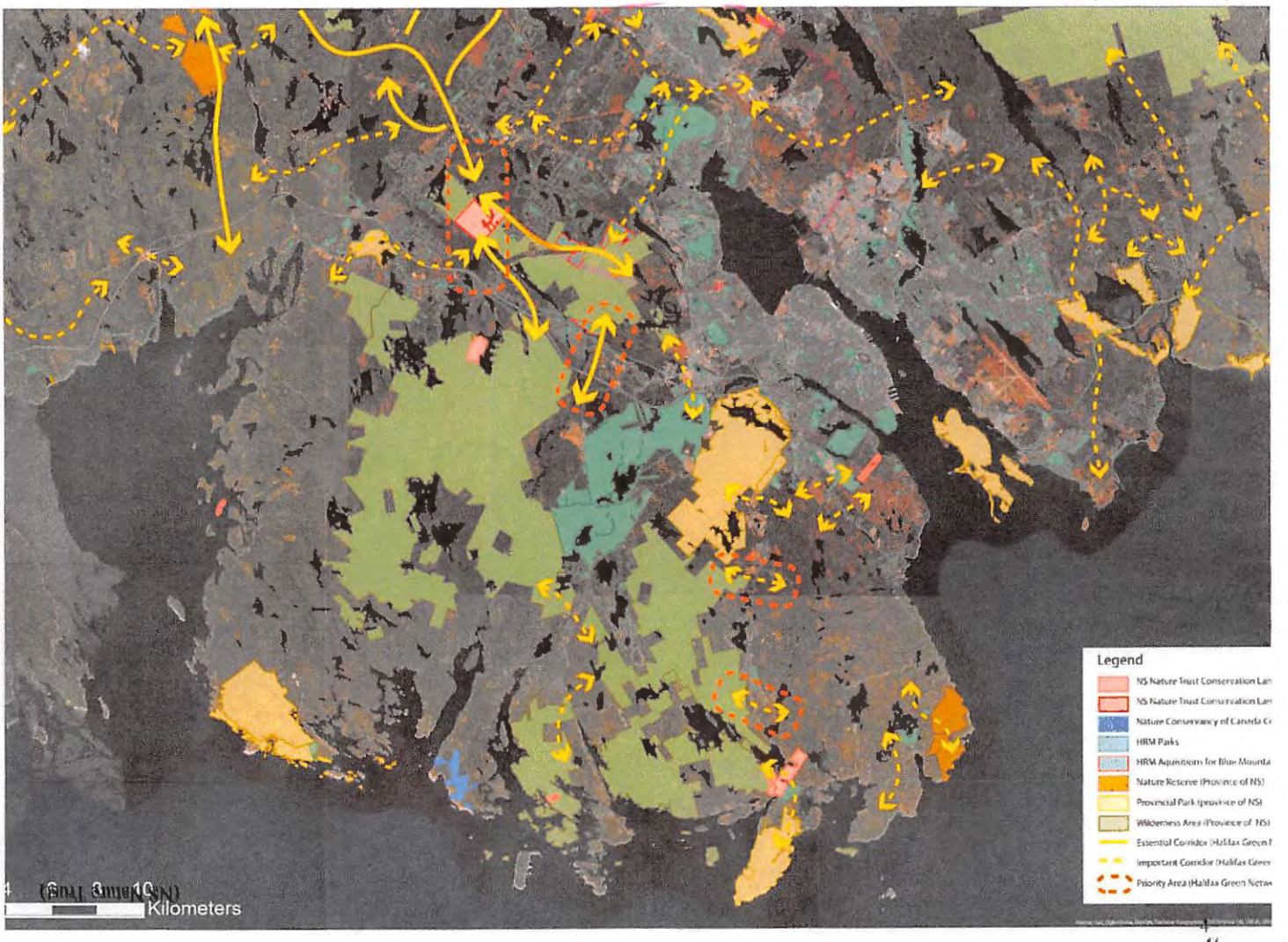
- Parks
- Protected Areas
- Proposed Protected Areas
- Essential Corridor
- Important Corridor
- Regulated Areas
- Areas of High Environmental Value Overlap
- Core Areas and Corridors
- Minimal Value to Regional Green Network



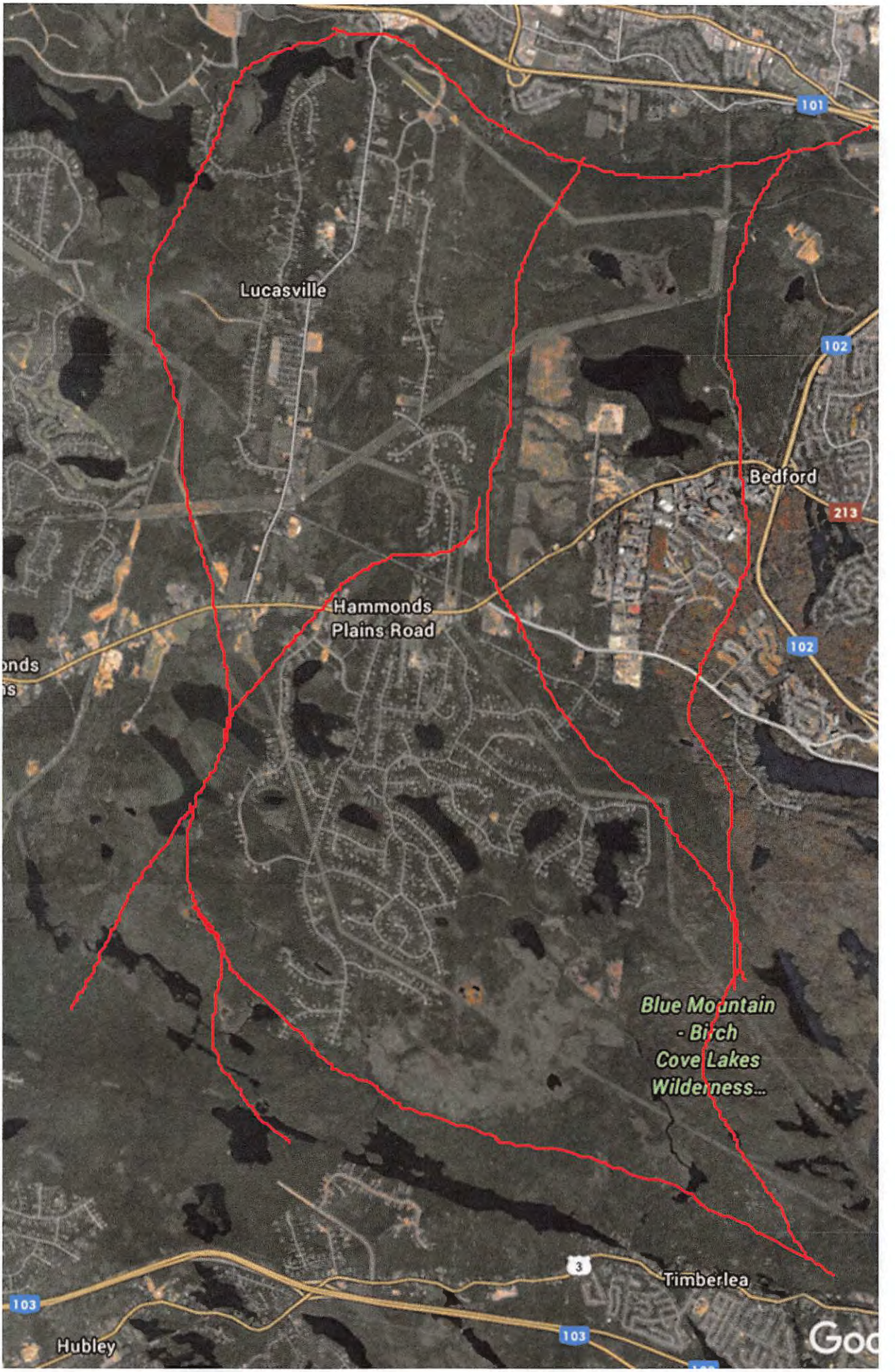
Section of HGNP Map 5 with modifications to show suggested 2nd Essential Corridors

Chebucto Peninsula Protected Areas and Connectivity Corridors

(NS Nature Trust)



Map #5: Main Wildlife Corridors Sandy Lake, Sackville River, BMBCL, The Bluff Trails (source: Stevens)



APPENDIX CC

Why Expand Sandy Lake Sackville River Regional Park by 1800 acres? January 2020

The Sandy Lake Sackville River Regional Park is currently one thousand acres. It has been recognized for five decades, provincially and municipally and in multiple reports and studies, to be a special landscape worth protecting, but the final ~1800 acres have never been saved.

In 1971, P.B. Dean identified the Sandy Lake to Sackville River area as one of seven "jewels in the crown" - areas that are "Unique in the Halifax Dartmouth area or important on a regional or provincial scale - priority areas to be protected for their ecological richness and for community education and recreation."

In 2006, HRM created Sandy Lake/Jack Lake Regional Park, leaving over 1800 acres of the originally identified lands in private ownership and not protected. Housing development, on a parallel path, will happen if action is not taken.

Citizens are working to save this irreplaceable natural area. The city acquired 160 acres in 2015 and has more in mind. A developers who owns ~550 of the 1800 acres is willing to trade if the city will step up. Planners tell us a trade is very possible.

Why expand the park by the further 1800 acres?

The area is a long-recognized unique ecological unit. Sandy and Marsh lakes are bordered by rich drumlins that support magnificent mixed, multi-aged Acadian forest with striking "pit and mound" topography and significant old-growth stands, some trees over 200 years old. In Nova Scotia less than 1% of forests are old growth. This is one of few remaining large Acadian forest stands near Halifax. A variety of significant natural elements exist all in one place - The 3 lakes are examples of diverse yet related ecologies - one a big marsh, one a deep "blue lake" (Most in this part of NS are "tea lakes") and the third a boreal forest lake. The lands and waters west and north of Sandy Lake are species-rich, including rare species including wild Atlantic Salmon and American Eel, and important turtle and moose habitat. Recent studies show their ecological value remains intact today.

Watershed protection: The watershed west of the lakes is slated for housing development. Instead, we must protect this area where most of the surface waters enter the system. Dirty water already enters there. Damaging organics and salts need to be reversed rather than added to. To understand why in more detail, refer to the observations at www.sandylakebedford.ca . Hear the presentation at http://goo.gl/ipYCR2, and see the attached, **Map 1**.

The Halifax Green Network Plan (HGNP) identifies Sandy Lake's rich lands and waters as important to the welfare of the Sackville River system, one of HRM's five major natural corridors identified in the Green Network Plan. See attached, **Map 2**. Also, the area contains at least 3 important wildlife corridors plus "stepping stone" links that connect the mainland to the Chebucto Peninsula which is of primary importance to the Green Network Plan.

Outdoor Recreation: "The objectives for Regional Parks are to preserve significant natural or cultural resources, and to be large enough to support both ecosystem protection and human enjoyment at the same time." The area proposed for Sandy Lake Sackville River Regional Park is already used unofficially by citizens for multi-recreational purposes through a network of existing trails, for birdwatching, dog-walking, mountain biking, cross-country skiing and snowshoeing, swimming, paddling, fishing, to name a few. **Map 3**, attached, shows the integration between Conservation and Recreation. The west side is needed primarily for conservation. The east side for conservation and recreation.

Sandy Lake is a popular location for research for schools, universities and community. Since the 1970s, aquatic studies point to deterioration in oxygenation and increased salt loading of Sandy Lake related to urbanization and some clearcutting. Significant further settlement within the Sandy Lake watershed would make the lake inhospitable to the migratory fish, reduce wildlife diversity, as well as increase flooding downstream in the Sackville River flood plain.

What of the disturbed land to the west of Sandy Lake? It is already a young Acadian Forest with vigorous regeneration of the full suite of Acadian forest species that is already protecting the lakes and rivers as the ecological system re-establishes itself. Park planners can make educational use of it as a living example of how Acadian forests recreate themselves. The three main tributaries flow across this essential land. By letting the 300 acres heal, they will heal the watershed so it can once again help maintain water quality in the lake for wild Atlantic Salmon, other fishes and wildlife, and will benefit the watershed all the way to the Bedford Basin.

In a nutshell: why we need to protect lands on the west side of Sandy Lake

http://versicolor.ca/sandylakebedford/2019/01/19/in-a-nutshell-why-we-need-to-protect-lands-on-the-west-side-of-sandy-lake/#more-2410

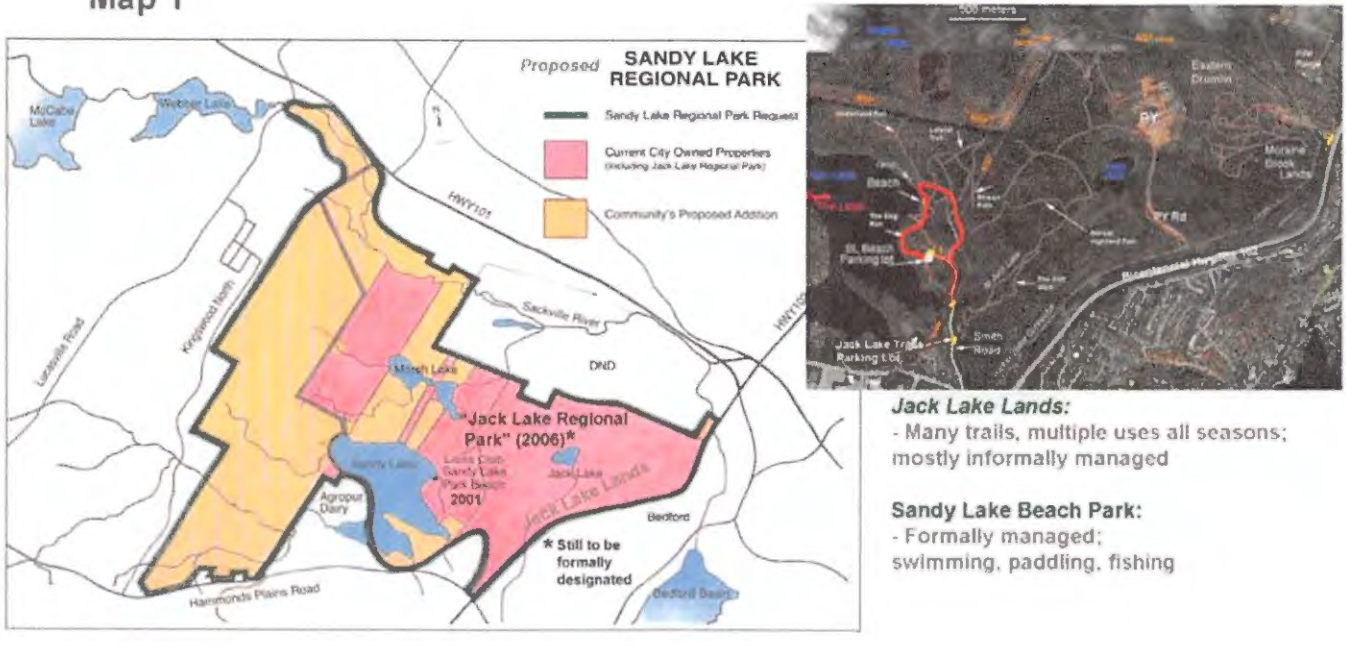
Posted on January 19, 2019 by admin: Dr. David Patriquin

(These slides are taken from or modified from slides that were in Dr. David Patriquin's presentation to the SRA on Dec 6, 2018.
View the slides/audio for more explanation of it all: http://goo.gl/ipYCR2)

We already have ~1000 acres protected, most of it on the east side of Sandy Lake. So why did Walter Regan ask at the Dec 6, 2018 presentation: "Why do we need those lands on the west side?" (I am pretty sure Walter knew the answer.)

The following slides/maps explain it all "in a nutshell":

Map 1



Jack Lake Lands:
- Many trails, multiple uses all seasons; mostly informally managed

Sandy Lake Beach Park:
- Formally managed; swimming, paddling, fishing

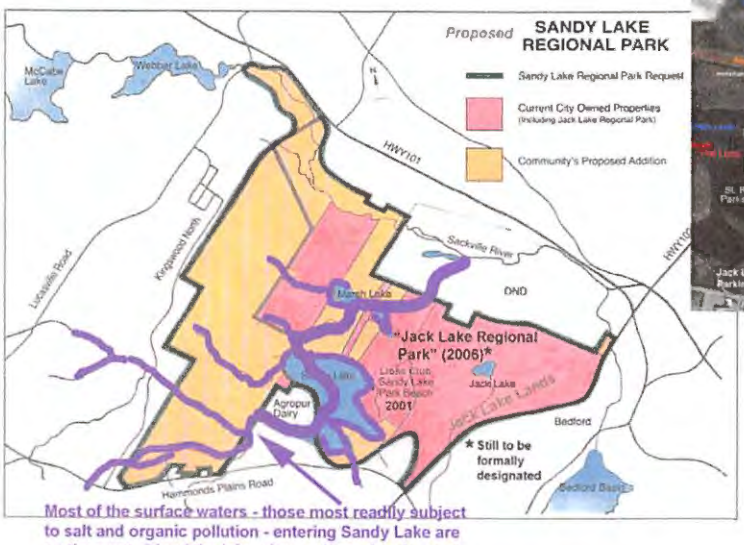
The proposed SLRP embodies more of the original concept of a Regional Park at Sandy Lake, which was for parkland around the lake, not to one side of it, and that of the 1979 MAPC plan which would "include more area on all sides, from the Sackville River to the Hammonds Plains Road and from the Bedford RifleRange west toward the Lucasville Road (including buffers and flood plains)."

Major reasons to expand the Park

#1 - Historical

- Protection of the Sandy Lake to Sackville River watercourse for migratory fish, reptiles, amphibians, waterfowl, otters... water quality/aquatic recreation; reduce downstream flooding
- Provide a forested wildlife corridor connecting lands of the Chebucto Peninusla with central and eastern mainland

Map 2



Jack Lake Lands:
- Many trails, multiple uses all seasons; mostly informally managed

Sandy Lake Beach Park:
- Formally managed; swimming, paddling, fishing

Most of the surface waters - those most readily subject to salt and organic pollution - entering Sandy Lake are on the west side of the lake where a large development is planned. Already these waters are the major source of pollutants entering Sandy Lake

The proposed SLRP embodies more of the original concept of a Regional Park at Sandy Lake, which was for parkland around the lake, not to one side of it, and that of the 1979 MAPC plan which would "include more area on all sides, from the Sackville River to the Hammonds Plains Road and from the Bedford RifleRange west toward the Lucasville Road (including buffers and flood plains)."

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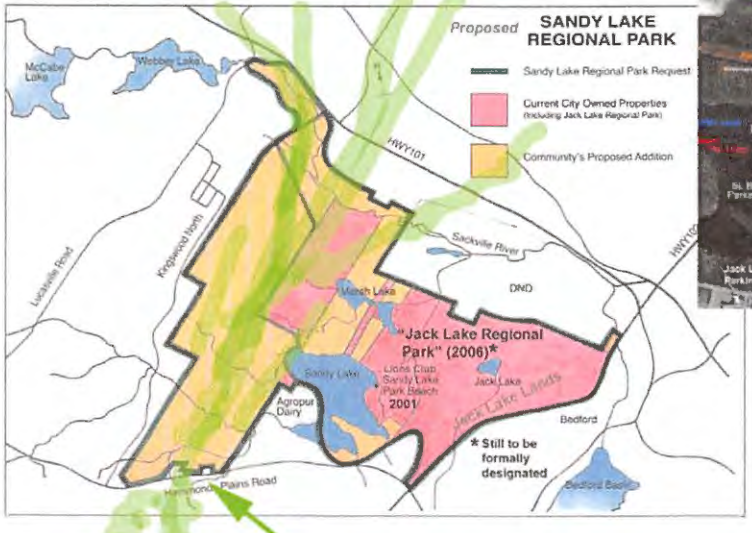
#2

Map 3



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- Provide a forested wildlife corridor connecting lands of the Chebucto Peninsula with central and eastern mainland

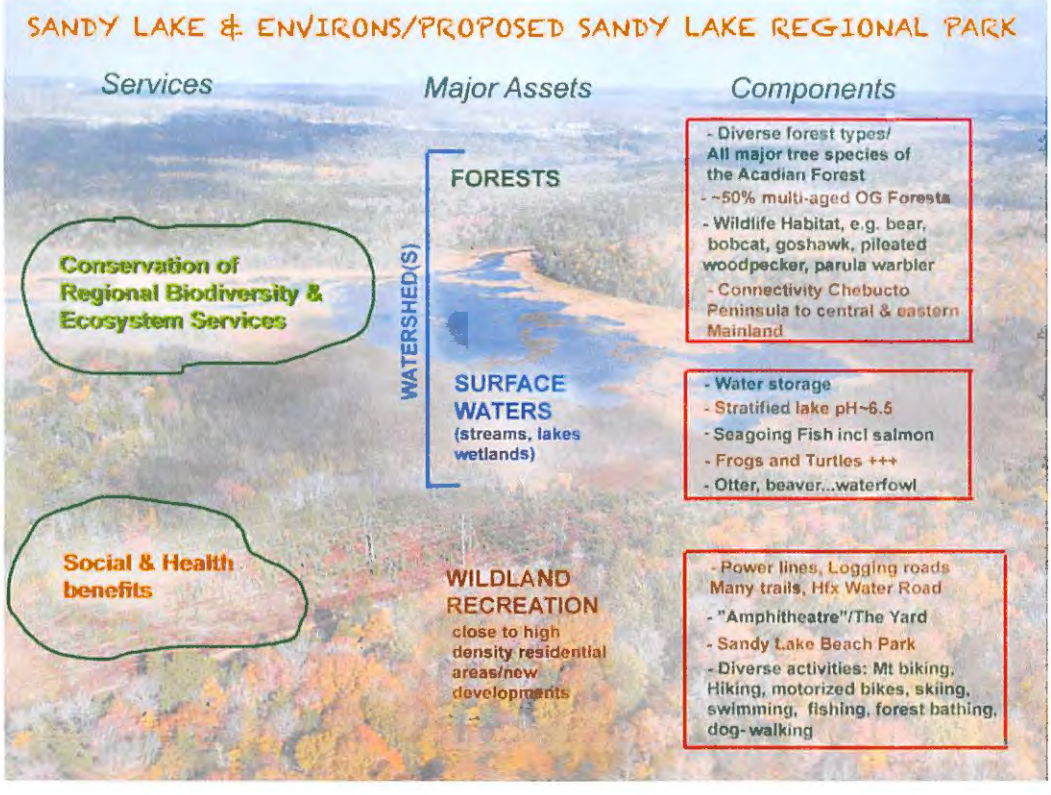
#3

Map 4: Putting it all together: Conservation Priority on west side

Mixed Recreation and Consrevation on east side
(where recreational activities are currently focussed)

A couple of related questions:
(i) OK, but what about the clearcuts of the West Side – Isn't it already too late?
(ii) OK, but with some development already in place at the upper part of the corridor, isn't it already too late?
My answers to both questions: NO. I will explain in subsequent posts.

I should have added "The Big Picture". Here it is:



APPENDIX DD

HALIFAX
REGIONAL MUNICIPALITY

P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 10.2.1 (ii)
Halifax Regional Council
July 3, 2012

TO: Mayor Kelly and Members of Halifax Regional Council

Original Signed by Director

SUBMITTED BY: Peter Stickings, Acting Director, Planning & Infrastructure

DATE: June 19, 2012

SUBJECT: Wastewater Oversizing for Future Development of Sandy Lake Lands

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INFORMATION REPORT

ORIGIN

- Report from Community Planning & Economic Development Standing Committee
- Financial Proposal received from Armco Capital Inc.

BACKGROUND

At the May 10, 2012, meeting, the Community Planning & Economic Development Standing Committee approved a motion recommending to Regional Council that the Municipality agree in principle to participate in funding the oversizing of wastewater infrastructure through Bedford West to service the future development of Sandy Lake through this year's and future year's budgets, and direct staff to provide Regional Council with details on how this will be accomplished in this year's budget.

DISCUSSION

Subsequent to the deliberations of the Standing Committee, Armco Capital Inc., the major property owner in the Sandy Lake area, proposed that it would provide HRWC with a contribution of $1 million towards the financing of the oversizing costs. The terms and conditions, negotiated between Armco and Halifax Water, are presented as Attachment A to this report. The agreement does not provide Armco with any legal rights but raises concerns of a perception of entitlement when Council must decide issues related to development of this area.

Staff supports HRM funding of the Sandy Lake oversizing under the conditions:

- HRM is not a party to the proposed Armco-HRWC contract. As such, the terms and conditions do not commit a future council to any planning approvals in either Bedford West or the Sandy Lake lands.
- In the event that a future council decides not to support development of the Sandy Lake lands or the property owners decide not to seek approval, the Municipality will forego only $2 million rather than the $3 million cost, should the Municipality accept full responsibility to fund the oversizing. It is possible that HRM's risk can be mitigated with supplying the $2 million should they decide to re-allocate the capacity to an alternate development area as described in Clause 10 of the agreement.
- The developer's contribution makes the remaining costs more manageable for HRM. The developer's contribution is a first contribution, and decreases the largest single expenditure which is required in 2013/2014. Furthermore, the remaining two-thirds of the costs are spread over the last eight years of the implementation schedule.

BUDGET IMPLICATIONS

The estimated cost of oversizing wastewater infrastructure through Bedford West, adjusted for anticipated inflation, over the next ten years is $3.1 million. With the Armco contribution, the estimated expenditures for the Municipality are broken down as follows:

2012/13 - $0.00
2013/14 - $52,487
2014/15 - $669,676
2015/16 - $93,093
2016/17 - $484,735
2017/18 - $0
2018/19 - $37,507
2019/20 - $195,300
2021/22 - $98,024
2022/23 - $510,410
Total: $2,141,232

No funding from the Municipality would be required from this year's budget.

FINANCIAL MANAGEMENT POLICIES/BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Project and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Project and Operating reserves, as well as any relevant legislation.

COMMUNITY ENGAGEMENT

The request to initiate secondary planning on the Sandy Lake land was discussed by RPAC at numerous meetings and the issue of financing oversized wastewater infrastructure as an issue that would have to be brought back before Regional Council, was specifically identified in the staff report. These meetings were open to the public and, on several occasions, the Committee agreed to receive presentations from the proponents, non-government organization groups and members of the public.

ENVIRONMENTAL IMPLICATIONS

The Regional Plan identifies the Sandy Lake lands as a future growth area which is to be planned and designed for mixed use transit oriented development. In the event that funding for oversizing of the wastewater system is not provided with the build out through Bedford West, it is unlikely that development of the Sandy Lake lands will be achievable.

ATTACHMENTS

Attachment A: Terms and Conditions of Financial Agreement between Halifax Water and Armco Capital Inc.

Attachment B: Map of Sandy Lake referenced as Schedule A in Clause 10 of the MOU

A copy of this report can be obtained online at http://www.halifax.ca/council/agendasc/cagenda.html then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Paul Morgan, Planner, 490-4482

Report Approved by: Austin French, Manager, Planning, 490-6717

Report Approved by: Peter Duncan, Manager, Infrastructure, 490-5419

Report Approved by: Bruce Fisher, Manager, Financial Policy & Planning, 490-4493

Financial Approval by: Greg Keefe, A/Director of Finance & Information, Communications & Technology/CFO, 490-6308

Original Signed

Report Approved by: Peter Stickings, Acting Director, Planning & Infrastructure, 490-7129

MEMORANDUM OF UNDERSTANDING (MOU)

THIS MEMORANDUM OF UNDERSTANDING made this day of ,

2012.

BETWEEN:

ARMCO CAPITAL, a body corporate, ("Armco")

OF THE 1ST PART

-and-

HALIFAX REGIONAL WATER COMMISSION (Halifax Water") , a body corporate

OF THE 2nd PART

Each a "Party" and collectively referred to as the "Parties".

WHEREAS Armco is seeking the oversizing of certain wastewater infrastructure in the Bedford West Master Plan area to facilitate a potential future servicing to Armco's lands in Sandy Lake (the "SL oversizing");

AND WHEREAS the estimated cost of such oversizing is approximately $3.1 million;

AND WHEREAS Armco proposes to make an upfront contribution of $1,000,000 towards the SL oversizing cost in advance of HRM Regional Council considering approval of a secondary planning strategy for the Sandy Lake lands;

AND WHEREAS Armco's proposed upfront contribution is conditional on the balance of the SL oversizing cost, namely $2,000,000.00 being contributed by HRM;

AND WHEREAS Halifax Water is prepared to facilitate construction of the SL oversizing without any capital contribution by Halifax Water;

AND WHEREAS the parties wish to set out the terms and conditions under which the SL oversizing can occur;

NOW THEREFORE Armco proposes to make the upfront capital contributions to fund the SL oversizing as follows:

1. The estimated total cost of the SL oversizing is approximately $3.1 million. The parties acknowledge and agree that the estimated project cost is subject to change;

2. Armco's land holdings in Sandy Lake are shown and better described in Schedule A attached hereto (the "Sandy Lake lands");

3. Halifax Water shall facilitate the completion of the Sandy Lake oversizing project through implementation of the Bedford West Master Plan. Construction is expected to commence in 2013 and be completed by 2024;

4. Armco shall contribute funds in the amount of $1,000,000.00 to the Sandy Lake oversizing costs, with such funds to offset the initial costs of the SL oversizing (Armco's contribution). Halifax Water will provide Armco with an invoice for Armco`s contribution, including reasonable supporting information and documentation. Within sixty (60) days of receipt of the request for payment, Armco shall forward payment to Halifax Water;

5. Armco shall make the above-noted upfront payment recognizing and accepting that the decision to approve a secondary planning strategy for all or a portion of the Sandy Lake lands is ultimately in the sole discretion of HRM Regional Council ("Council");

6. Should Council decide not to grant approval for the Sandy Lake lands, then Armco's contribution is non-refundable and Armco shall have no claim for recovery of such funds except as hereinafter provided;

7. Should Council decide not to grant approval for the Sandy Lake lands or, alternatively, grant approval in a form that does not utilize the full capacity of the SL oversizing, Armco acknowledges and agrees that any re-allocation of capacity from the SL oversizing (to other Armco owned lands or other landowners) shall be in the sole discretion of HRM in consultation with Halifax Water;

8. Should Council grant approval for the Sandy Lake lands in whole or in part, then Armco's contribution with interest thereon shall be credited towards any future CCC charges owing in respect of the Sandy Lake lands at such time as they are approved for development in accordance with Halifax Water's CCC policy. Any unused portion of Armco's contribution shall remain to the credit of Halifax Water subject to the terms hereinafter provided;

9. Should Council grant approval for the Sandy Lake lands in whole or in part, HRM's contribution shall be reimbursed by Halifax Water from recovery of CCC charges as and when approved for Sandy Lake;

10. In the event that lands outside Sandy Lake (as defined in Schedule "A") are approved by HRM for (i) an increase in density within existing service boundaries or (ii) an extension to existing service boundaries based on servicing capacity from the SL oversizing, then HRM and Armco shall be reimbursed their proportionate contribution of the upfront payments from payment of any funds resulting from the allocation of such additional density;

11. With regard to the repayment methods described in paragraphs 9, 10 and 11 above, Armco shall receive its $1,000,000.00 upfront payment in full before any repayment of HRM's contribution;

12. To mitigate risk to Halifax Water, Armco shall provide Halifax Water with acceptable mortgage security in respect of the $1,000,000.00 payment by Armco to be held pending full and final payment of Armco's share of the SL oversizing cost;

13. The payment of Armco's share is to facilitate timely completion of the SL oversizing as part of the Bedford West Master Plan. The parties acknowledge and agree that any future CCC charge for the Sandy Lake lands is subject to NSUARB review and approval;

14. Armco shall have the right to assign all of its rights and obligations under this memorandum only with the prior written approval of HRM and Halifax Water;

15. The parties shall bear their own costs in connection with the up-front payments including, without limitation, all legal, accounting and other professional fees;

16. It is understood that this memorandum is not a binding agreement, but is intended to set forth the intentions of the parties to conclude, as soon as possible, arrangements for the execution of a contribution agreement consistent with the general terms and conditions set forth herein and containing such further matters as may be agreed upon by the parties.

IN WITNESS WHEREOF this Memorandum has been signed by the parties as of the date first written above.

SIGNED, SEALED AND DELIVERED

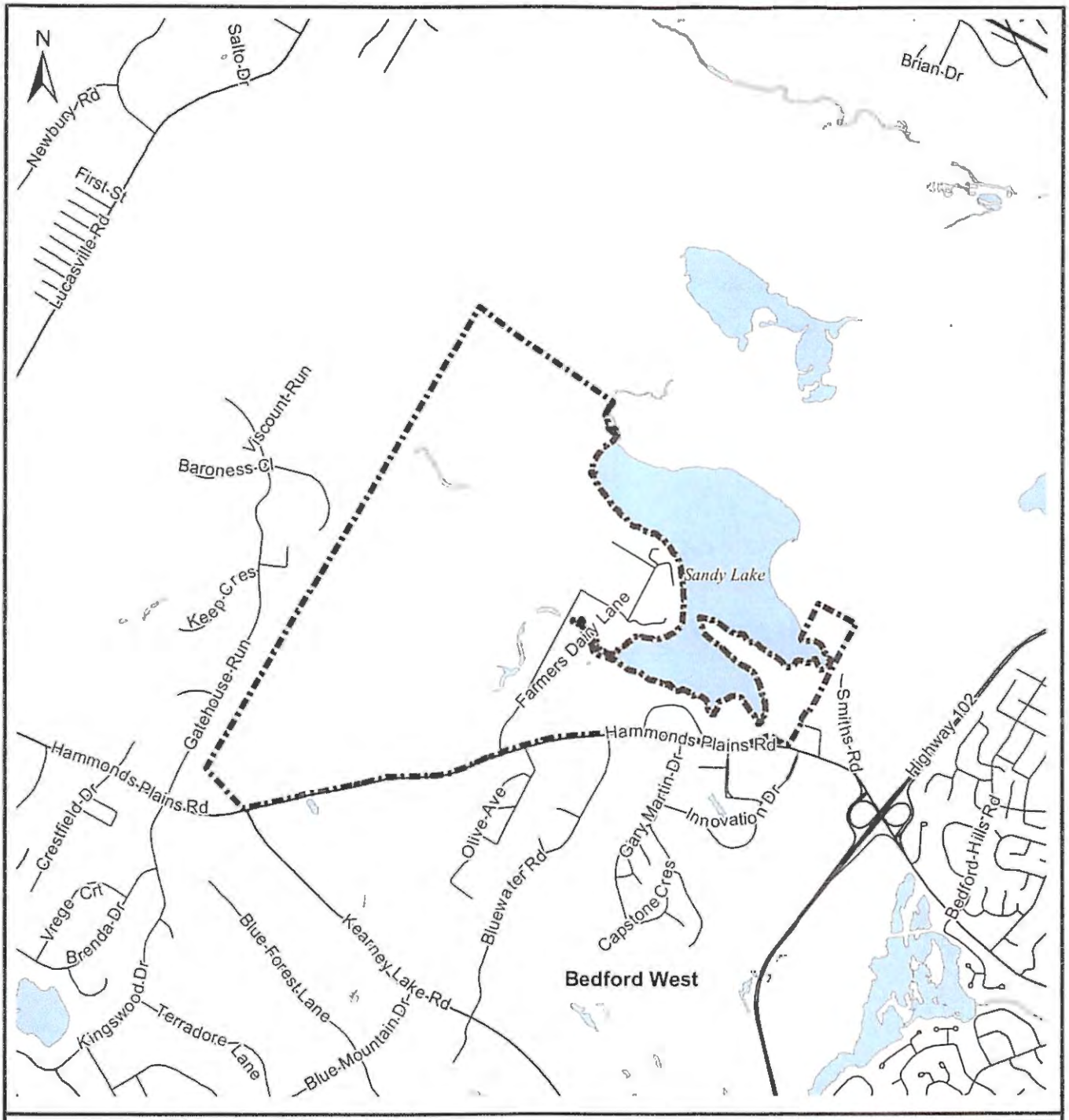
In the presence of:

Witness ARMCO CAPITAL, as represented by

Date

Witness Halifax Regional Water Commission, as represented by

Date



Map 1:

Sandy Lake

CBCL Study Area Boundary for Sandy Lake

HALIFAX
REGIONAL MUNICIPALITY
PLANNING AND INFRASTRUCTURE
REGIONAL AND COMMUNITY PLANNING

500 250 0 500 Meters

Bedford and Beaver Bank/Hammonds Plains/Upper Sackville Plan Areas

HRM does not guarantee the accuracy of any representation on this plan.

October 14, 2011

file: T:\work\planning\Scott\2009\RCP-CD\PMorgan\Vacant Suburban Lands in Urban Service Area\Maps\Sandy Lake.pdf (SML)

APPENDIX EE

Talks with Scientists and Planners about Sandy Lake - Sackville River

The entire proposed park has ecological value. **Sandy lake is an essential part of this system that protects the rest of the entire park/watershed through to the Sackville River and basin. If Sandy Lake is not protected, the entire system suffers.** The entire area needs a special analysis to determine the proper boundary of the park.

In a proper assessment, topography is the start, then vegetation and so on. Protection needs to be based on a rational scientific approach. Look to protect wetlands and also wildlife connectivity.

Property lines are not considered. It has to be an ecological approach. That's where the watershed comes in, both the Sandy Lake sub watershed and the main Sackville River watershed.

The city is taking steps that show it is serious about this regional park - documents from as far back as 1970 identify it as a valuable place for a regional park. The city has acquired property recently and has plans to acquire more. They must not ignore the west of Sandy and Marsh lakes just because someone failed to see the consequences of what they were doing and allowed the area to be rezoned for development.

What are the key assets? Sandy Lake is one. Sackville River another. Marsh Lake, the streams, the rich drumlins, old forests, diverse species, endangered plants and fauna.... To repeat, the entire proposed park has ecological value. Sandy Lake is an essential part of this system that protects the rest of the entire park/watershed through to the Sackville River and basin. If Sandy Lake is not protected, the entire system suffers.

In conducting the special analysis to determine the proper boundary of the park, understanding there are several layers to a park boundary.

1. Sandy Lake and the other major assets are within the body (all vegetation, Sackville River, Lakes, brooks, and so on). Some interaction is permitted to a carefully determined degree, depending on topography, land quality, etc.

2. A buffer which allows more interaction with the public. Ideally it is also within the park boundary (If we don't protect the buffer, it is a matter of time before it disappears and harm to the essential assets happens.)

3. Then there is the impact area boundary which may go into residential or even commercial areas. Use the authority of city to impose regulations on the existing development or industrial area on the way the run off is treated before it reaches the park.

Including the watershed in the park plan will allow for real protection of the richest assets in the centre.

In the Regional Plan review this time round there is a change from the past. Regional Parks used to be all about people not connection. Sandy Lake will be first, one of these first, to be viewed with connectivity as part of it, how the park will be utilized and how it ties in with the Green Network Plan connectivity.

You've already used up the rivers capacity to absorb run off, so wetlands need to be taken out of development to protect the watershed. Protect wetlands first. There is already compromise on the lake with existing development.

The feeder streams into Sandy Lake get relieved on their way if they are protected. Those three feeder streams come through already developed areas, and are already needing relief when they reach the lake. It becomes even more important to clean them before the lake as they cross the buffer.

Sandy Lake is at the edge of quality already from the industrial area and housing and the highways. The entire watershed must be part of the plan for park because outside the park boundary DOES interact with the park.

Conduct research with university students on how to mitigate the run off from Kingswood North now, and other areas such as Bluewater Road, to clean the water to enhance Sandy Lake water quality. There are projects for several departments with each contributing components.

The protection of developers lands west of the lakes, where the feeder streams and drumlins are, and control of what can happen on this land, is critical. Ownership is the best way. Developers' assertions that they can protect water quality in lakes they build around hardly deserves comment. Lake quality always go down. Habitat is altered and lost. Systems are destroyed. Some argue that birds will not be harmed because they can fly away. This is not true. Most birds are territorial and anywhere they go is already inhabited.

The Green Network Plan is based on environment/ecology first not people first, but the GNP is high level and existing ecological maps in NS are very poor. So, you need to show the old and new documentation and all the ground-truthing that's been done at Sandy Lake to show why this place is worth protecting. Map 13, the Conceptual boundary is subject to ground truthing, and that applies to regional parks too. It says so in the document.

The GNP has a watershed approach. The entire Sackville River Watershed is very important, with Sandy Lake as part of that greater system. View it regionally. It is a regional park for a reason. Sandy Lake is part of a regional network of protection concept. Blue Mountain Birch Cove Lakes and Sandy Lake are part of those big systems to be preserved. **This is the kind of place to put effort to protect. It is Worthy.**

Protection should happen all along this system. Need to understand it differently to see how its place in the system is important. This is an Important Natural Corridor and the city has created commitments in the green Network plan. Sackville River is the spine of this watershed network.

Sandy Lake is also in the GNP because of connectivity to the Sackville River and the Chebucto Peninsula. Stepping stone corridors are even more important to enhance now, because in the GNP the visible link on the Google Map is already being eclipsed by development. That makes the stepping stones even more important to Blue Mountain Birch Cove Lakes and the Chebucto Peninsula. And protecting essential and important corridors that remain.

Developers will tell you they can control what goes into the streams. They will tell you they can use sediment ponds and retention and other controls, but it is a natural process and way too expensive to really control. Preventing flow toward the Sackville River is important. Direct downslope discharge can't be controlled.

Anything on the slope of the Sackville River should not be developed. As soon you put it in a storm water pipe it is direct flow into the Sackville River. This is a priority. Protect the Sackville River. The watershed slope around Webber Lake needs protection. Priority 2 is water quality of feeder bodies including Sandy Lake. You can only control what happens if it is publicly owned.

The key is the Sackville River, everything that contributes to the Sackville River. To protect the Sackville River, acquire the necessary components - direct components and up water attributes. If you don't, these problems get larger. For example, Paper Mill Lake is already compromised. Building above what's already there will compromise the feeder reservoirs. That means you have to treat the water between the layers. It will cost more, and you will not be able to satisfy the requirements of your constituents because it will be unreachable to the municipal and provincial coffers.

Sandy lake is not entirely developable land. Challenges on the site are many. A need for housing would be a factor of course, and the city has already told smaller developers up the road they can't develop, so how can they say yes here?

The Sobeys piece is very attractive land for the park. Development of that piece will be extremely difficult because Smiths road makes it extremely difficult to access. Smith's road can't be upgraded and development would require two exits. But developers might make a play for Jack Lake lands behind it. Still, access is difficult because roads must be a hundred and fifty meters from the highway exit.

They are planning homes for 16,000 people at Sandy Lake. 16000 people is 8,000 cars. 5000 cars at peak times. Hammonds Plains Road is not configured to carry so much volume. The exit upgrade has helped the current overuse but not solved it. Same for the upgraded part from the BMO to the highway. And there are limitations too where Hammonds Plains Road hits the Bedford Highway, which is totally overcrowded.

Also there are developments existing in the watershed where we need to change our stormwater management because they are having a negative role on the overall system, and Uplands Park sewer system needs to be replaced.

More development upstream equals more flooding Downstream. Already properties are of lower value in the Bedford floodplain and little Sackville River. The recent CBCL floodplain report was the first time ever that climate change was figured into their assessment. It calculated a 70% increase in runoff for 100 Year storms. So Bedford Place Mall and Superstore would be under three feet of water, almost all of Union Street. The report was accepted. We don't need three feet to be unviable. only one foot.

The report did not include an evaluation of the effects of future development of Sandy Lake. That is a huge oversight. At least make flooding no worse.

Do no additional harm. That equals no further development on the Sackville River, plus allow natural processes that exist to take care of it. And augment it by vegetating clear cuts. Try to change 70% run off to 25% just by vegetating.

At Sandy Lake the 200-acre clear-cut has plants that are young and aren't functioning completely yet. So, foster them and let them grow. **It needs to be in your modeling plan to let them grow. It protects runoff into the lake. protect it within the park plan. Then do legislation to ensure it doesn't happen again.**

So far Sandy Lake has turtles. One of 3 lakes out of 22 that used to in the region. Turtles are an indicator species. Bad decisions equals no turtles. But we must see the entire system, not just turtles. Sandy Lake is uniquely rich. It is the beginning of the rich interior - the biome of fertile soils, river valleys that reach the interior. Sandy Lake has that richness and diversity as it has been fed by the Sackville River, and it goes both ways. From a gravity perspective the water flows down but from the biodiversity perspective it flows the other way, back up the river from the reservoirs. It runs back and forth. If it is degraded up here it affects downstream, and vice versa.

Drumlins are rich. West of Sandy Lake has big ones. They usually have bogs at the bottom and good stands of trees and are a refuge for animals and plants if you just leave them alone. Those drumlins west of Sandy Lake could help with connectivity to BMBCL just because of their richness. Even with some stepping stone corridors below.

With respect for the GNP and for all of this, the city will be compelled to require a thorough analysis before there is any discussion about development.

The document with the 160-acre acquisition is about protection of the Sackville River. Council voted for that to protect the Sackville river. Council took one step. Now let's take the next step.

The city has already been acquiring park land based on this approach- for example the 160 Acres. Some councillors likely don't know they have that approach, but that overall 160-acre plan gave them the solution for gaining 160 Acres and it helped also to achieve the city's Green Network goals. It made people happy. Read the 160-acre report. This is why we should acquire those lands. Those principles still hold true.

The city has done things consistently to enable things to happen such as preventing the dairy from dumping effluent in the '70s, acquiring 160 Acres, and others, all to protect the lake. You have to ask them, "Do you want all that to be for nothing?" You've made decisions based on protecting water quality. Here's why you were protecting water quality. whether they know it or not this is why. It was not for the residents. it was for the ecological system.

Residents work hard to protect an area because they're the ones who noticed the potential harm. That's where politicians get confused. They think residents are fighting for their backyard. It will be a task to find land to trade for Sandy Lake, but it can be done. It is right to ask for staff to look for options.

Educate councillors and the people. Tell the developer we don't want to fight with you. Offer them the elements they need. Tell them we want them to be successful because it is true. If we work together this plan will help the municipality deliver something it can't deliver otherwise.

People kill lakes. The City has a responsibility not only to protect, but to enhance, all elements of the quality of the park. With a proper assessment the city can then say to the public "Yes we did everything possible to protect Sandy Lake park, the Sandy Lake system including Sackville River and all the critical components of the park".

APPENDIX FF

SACKVILLE RIVER WATERSHED, NOVA SCOTIA

Towards the identification of Environmentally Sensitive Areas for Environmental Management

Rhea D. Mahar 1994 Thesis

MAP 10: ENVIRONMENTALLY SENSITIVE AREAS

ESA #	ESA	ESA #	ESA
1	Tomahawk Lake Watershed	21	Thompson's Run
2	Sandy Lake Marsh Lake	22	McCabe Lake Webber Lake Corridor
3	"Old Quarry" Corridor	23	Thompson's Run To Beaver Lake
4	Millwood Wetlands	24	Outlet of Webber Lake Drumlin
5	Mt. Uniacke Wetland	25	Sackville Rivers Conservation Corridor
6	Mt Uniacke Drumlin - 1	26	Mt. Uniacke minor Wetland, 16-2
7	Mt Uniacke Drumlin - 2	27	Wetland A-30
8	DND Rifle Range	28	Ellen Settlement Wetland
9	Little Lake-Fourth Lake	29	Upper Sawmill Culvert Brook Wetland
10	Ponds Lake	30	County Line Wetland
11	Lewis Lake	31	Downes Sawmill Culvert Brook Wetland
12	Webb Property	32	Midway Culvert Brook Wetland
13	Sackville Wetland	33	Little Deadwaters Wetland
14	Bedford Barrens	34	Horse Pond Wetland
15	Ellen Barrow Pit	35	Campsite Wetland
16	Drain Lake	36	Sanitary Landfill Wetland, A-14
17	Little Springfield Lake	37	Wetland A-13
18	Hwy 101-Dean Lake Slope	38	Wetland B-1
19	Webber Lake	39	Wetland B-4
20	McCabe Lake	40	Duck Pond Wetland

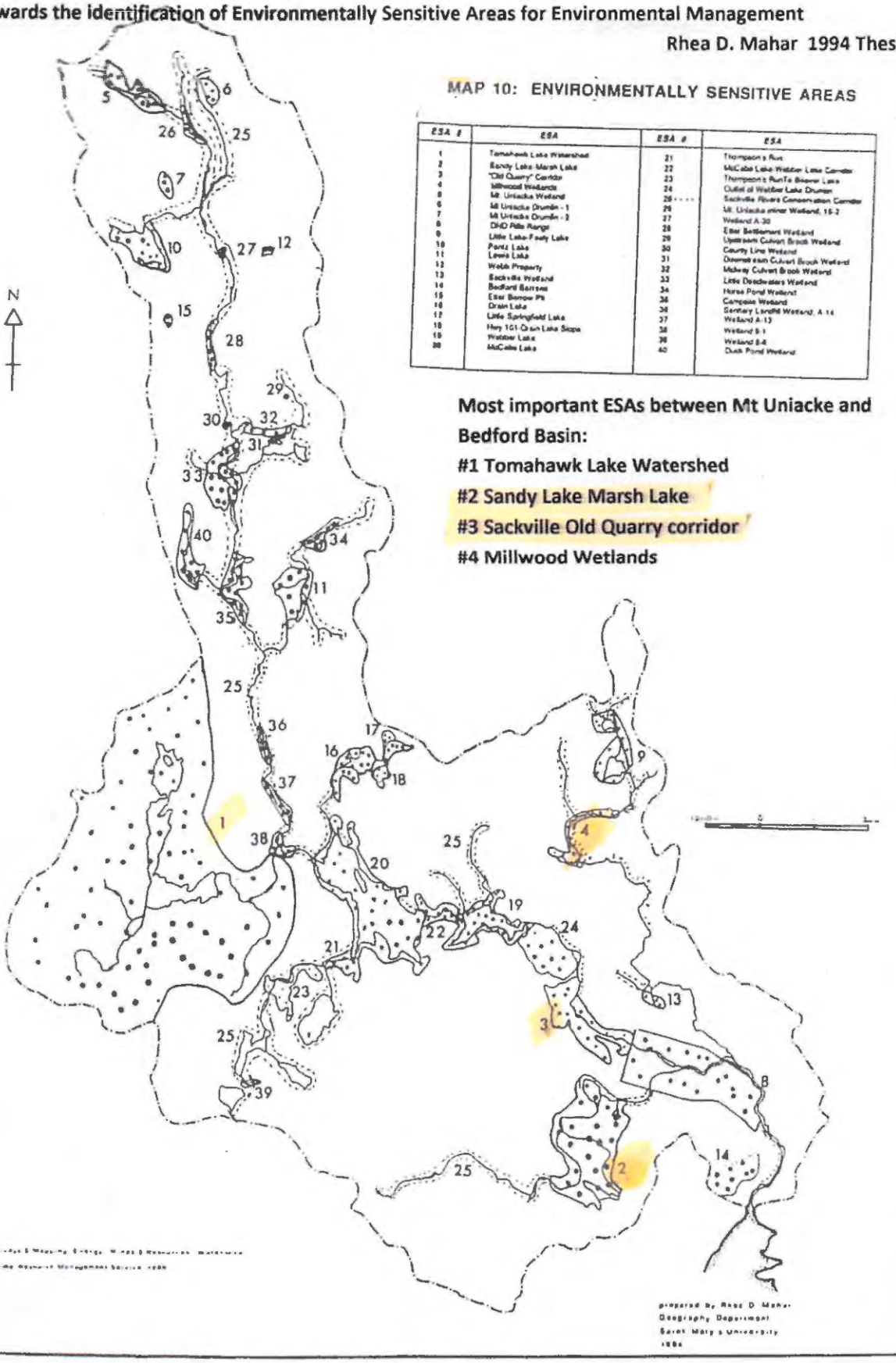
Most important ESAs between Mt Uniacke and Bedford Basin:

#1 Tomahawk Lake Watershed

#2 Sandy Lake Marsh Lake

#3 Sackville Old Quarry corridor

#4 Millwood Wetlands



prepared by Rhea D. Mahar
Geography Department
Saint Mary's University
1994

APPENDIX GG

Halifax Needs a Tree-Retention By-law: *the Sandy Lake Story* *2019*

Sandy Lake is surrounded by mature Acadian forest with rich flora and fauna. As is so often the case for special places, there is a long history of concerned citizens protecting Sandy Lake and its surroundings. Sandy Lake would not be the beautiful area it is today without those decades of effort.

By 1971 plans were underway to preserve this unique area as a regional park to serve the growing city. The Regional Plans have continued to list priority for creating the regional park there, but without the citizens knowing it, the plan for critical parts of the watershed was somehow switched to allow housing development.

Residents awoke one June morning in 2013 to the sound of tree removal near the lake. We learned that a developer owned 550 acres, including part of the lakefront, and had a license to put in a road. He planned to build a housing development for 16,000 new residents. This large area was being advertised on-line and in roadside signs as a "green" housing development "coming soon". However, the city had received no application. There was no Master Plan, no watershed study, no public process. The website claimed the land was being "selectively cut", but other than green buffers (we measured buffers along streams varied from 8ft to 20 meters) it was being clear-cut.

We learned the city was taking legal action to have the misleading, and premature, sign removed. The city was not happy with the cutting, but seemed unwilling or unable to do anything to stop it. We spoke to representatives of the company. We begged the company to stop until the issues we were finding could be settled. What happened to the plan to put a regional park there? They said they had every right to take the trees off their land. Turns out they did.

We contacted the city, the Department of Natural Resources, anyone who might help and inform us. Over 100 hectares of Acadian Forest were being cut without any permits and prior to a watershed study taking place. Natural Resources was not overseeing this clear-cut because no forestry permit had been applied for. HRM was not overseeing this clear-cut because no application for development had been applied for. We learned that property owners can do whatever they want with their land, including clear it of all vegetation. The developer said we should be happy that they left buffers along streams, although some were only 8 feet wide.

Thanks to what is known as the Five Acre By-Law there had been a ten-year moratorium on development around the lake, the result of hard work by an earlier organization. It turned out that developers had been buying land, and the zoning on that side of the lake had been changed. The by-law wouldn't apply to their lands.

Our local councilor said he had no knowledge that there was ever supposed to be a regional park at Sandy Lake. So, we set about finding the historical documents others from previous organizations assured us existed. We found them, and provided them to the city. We were told that huge amounts of

documentation had been lost during amalgamation, and we were thanked for our contribution to the city's archives.

We found city records that showed this and other developers had been buying up land in the area. We learned that the community organization had retired after years of effort once the regional park seemed sure. So, no-one was watching when developers were buying land and working to convince the city first to zone for development, and then to allow development to happen as soon as possible. Letters from 2012 show that in hopes of ensuring early development at Sandy Lake he paid $1million in an agreement with Halifax Water to upsize the Bedford West wastewater pipes to handle the future needs of his Sandy Lake development.

By August, the tree stripping machines were nearing the lake, and our concerted and nearly frantic efforts to get this stopped had failed at every turn. With the help of the Ecology Action Centre we held a protest on the Hammonds Plains Road and the media covered it well.

The cutting stopped the next day and the developer agreed to meet with us. He told us his mother had seen the media coverage and told him to "stop upsetting those people". He explained that he had two sons graduating from university and wanted them to have this project if he could get the city to allow it to proceed. He told of how he had lost his argument with the city's head planner in June, and stood on the steps of City Hall and made a phone call, "Cut the trees." He said he did it out of anger. He has since sold the land to another developer, but the damage is done.

The city needs a tree retention by-law with teeth to prevent unnecessary damage to single trees and to prevent larger cuts such as were done at Sandy Lake, along the Purcell's Cove road, and in other areas. It is time to see urban trees as valuable infrastructure, as assets that contribute to cities, as is discussed in this article: https://www.climate-kic.org/opinion/trees-as-infrastructure-pt-1/

We are aware of a successful and inexpensive self-regulating program in New Hampshire. It is based on education and community advocacy. Something similar could protect trees here.

Other places rely on by-laws. For example, the August 24, 2009, media release from Ottawa:

"The City of Ottawa's Urban Tree Conservation By-law, which places restrictions on the cutting of trees on private property in urban Ottawa, takes full effect on September 1, 2009.

Under the by-law, owners of urban properties larger than one hectare are required to produce a City-approved tree conservation report to remove a tree 10 centimetres ar greater in diameter. This portian af the by-law came into effect when the by-law was passed by City Council on June 24, 2009.

As of September 1, owners af urban properties ane hectare or less in size must abtain a permit from the City to remove a tree that is 50 centimetres (20 inches) in diameter or greater. There is no permit fee.

The by-law does not apply to rural properties, with the exception of a small area in the city's east end between the urban boundary and Ted Kelly Lane, nar daes it apply to normal farming practices, orchards, tree farms, golf courses and cemeteries anywhere in the city.

The goal of the by-law is to protect the city's urban forest. Before enactment of the by-law, the City had no process in place to prevent the clearing of forests in suburban areas before development occurred, nor could it regulate the cutting of large, distinctive trees that stand out in the city's urban communities.

Unauthorized removal or destruction of the trees covered under the by-law could result in fines ranging from $500 to $100,000, with the exception of the contravention of a stop work order, where the fine is not limited to $100,000."

Part of the role of a park is to protect the Watershed. Even single urban trees are assets. We are encouraged that the first Annual Review of the Halifax Green Network Plan (HGNP) mentions the intention to improve this issue. However, as the HGNP is written now, there is no concrete action or regulation being proposed. At Sandy Lake the 300 clear-cut acres now has young plants that aren't functioning completely yet. They are beginning to protect the lake again, but we need to foster them and let them grow. It needs to be in our modeling plan to let them grow. Protect them within the park plan, and make legislation to ensure it doesn't happen again anywhere in HRM.

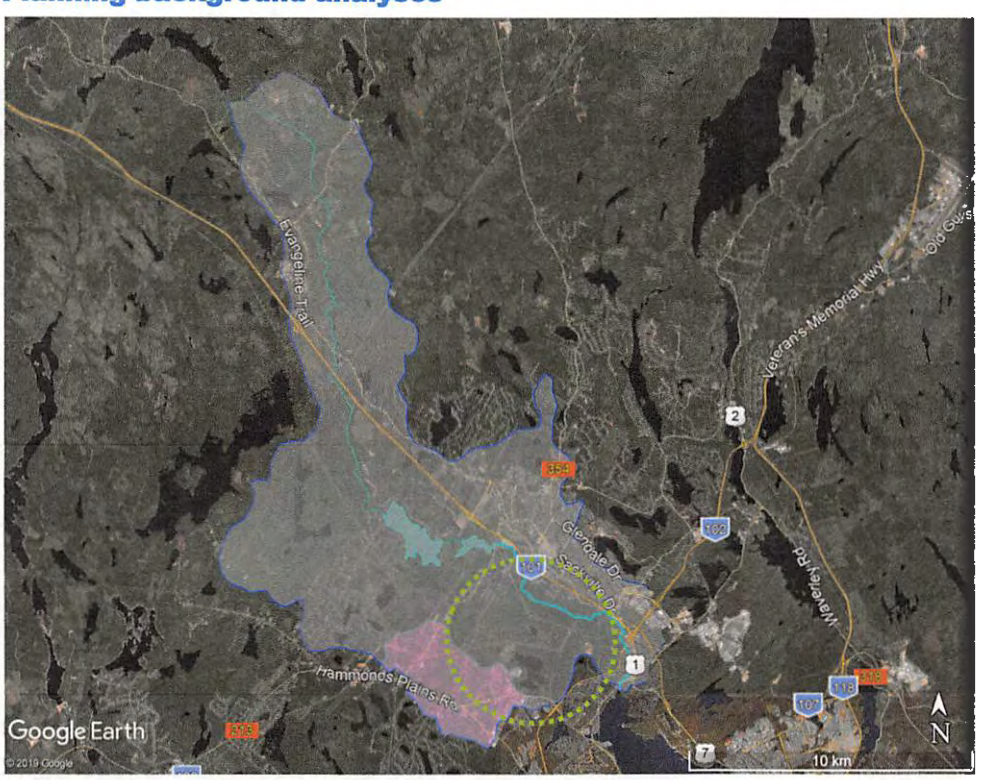
We request that the city provide the needed protection to the urban forest in the RP+10 review.

- *Sandy Lake Conservation Association (www.sandylake.org)*

APPENDIX HH

Sandy Lake – Sackville River Regional Park

Planning background analyses



Location of Sandy Lake – Sackville River Regional Park within Sackville River watershed

General area of Sandy Lake – Sackville River Regional Park

Boundary of the Sackville River watershed

Boundary of the Johnson Brook watershed

Almost the entire area of Sandy Lake – Sackville River Regional Park area is located within the Sackville River watershed. The Johnson Brook watershed which is part of this watershed discharges directly to Sandy Lake. A large portion of this sub-watershed is developed and the remaining undeveloped area could also be developed in the near future. This may create a significant impact on water quality discharging to Sandy Lake. As a result this will have a significant impact on the Lake water quality and overall environmental and ecological sustainability of Sandy Lake- Sackville River Regional Park.

10. Policy E-17 Objectives

A complementary objective of the study is to provide a number of guidelines and recommendations for the planning, design and implementation of new developments that will protect water quality from further degradation. More specifically, the objectives of a watershed study are listed in Policy E-17 of the Regional Plan. Each sub-heading of Policy E-17 is listed below with a reference to where the item is addressed within the report, or if the sub-heading is not addressed directly in the report, it is addressed below.

a) **Recommend measures to protect and manage quantity and quality of groundwater resources.**

As summarized in Section 2.6 (Groundwater) and **Appendix A** (Environmental Conditions), groundwater is a source of domestic water for many residents living within watershed and contributes 11 % of the flow from the watershed (**Appendix** D). The constraints mapping (Section 3.3) identifies areas with high recharge rates (>150 mm/yr) as Tier 2 constraints that can allow for development, but with controls in place to allow for recharge to continue to contribute to groundwater quantity and with controls that protect water quality. These areas provide pathways for water to enter the groundwater system at higher rates than other areas in the watershed. Protection measures during future development are recommended to preserve the hydraulic properties of these areas. Recommendations to protect these areas include maintaining a high proportion of permeable surfaces, maintaining native plants, avoiding compaction of soils and use of rain gardens. Protecting the areas with high recharge rates to encourage sustainable groundwater use will need to be coupled with measures to protect the quality of water entering the groundwater system. Recommendations to protect the quality of recharge water include prohibition of bulk fuel storage, prohibition of hazardous material facilities, prohibition of aggregate extraction, spill prevention for home heating fuel tanks, limited lawn fertilizer use and reduced use of road salts in these areas of high recharge potential.

b) **Recommend water quality objectives for key receiving watercourses in the watershed.**

Water quality objectives are established in Section 7 Receiving Water Quality Objectives for nitrate, un-ionized ammonia, total suspended solids, chloride, *E. coli* and total phosphorus objectives for each lake based on maintaining the current lake trophic state as measured by TP concentrations. The objective, an early warning alert value and the method of determining each was provided.

c) **Determine the amount of development and maximum inputs that receiving lakes and rivers can assimilate without exceeding the water quality objectives recommended for the lakes and rivers within the watershed.**

It is very difficult to provide a single expression of the amount of development or nutrient inputs that a lake can assimilate before the water quality objectives are exceeded. This is because of the inter-connectedness of the lakes and streams within a watershed and because of the range of nutrient concentrations derived from different development types (that is, different land uses). With respect to the inter-connectedness, "using up" the available capacity on an upstream lake will also use some portion of available capacity on all downstream lakes. Alternatively, using available capacity on a downstream lake may eliminate or preclude the development on an upstream lake. With respect to the effect of different types of development, for example, the phosphorus export coefficient used in the LCM in this study ranges from 200 g/ha/yr to 600 g/ha/yr for large lot residential and commercial land uses, respectively. This means that a given watershed can accommodate more hectares of large lot residential development than of commercial development. Given this variability in export coefficients, the type of development must be known before the amount of allowable development can be defined. In addition, municipal policy requires that stormwater management plans, designed to manage both runoff water quality and quantity, are submitted in support of applications for development agreement. These stormwater management plans use various combinations of best management practices and engineered facilities to manage runoff and each of these practices and installations have different efficiencies and effects on water quality.

With this variability in mind, the effects of the different development scenarios modeled for this study are described in Section 8 Lakeshore Capacity Model. The results of Scenario 2 (Planned Developments) indicate that water quality objectives are not exceeded for Sandy Lake and Marsh Lake.

Table 16 summarizes the estimated residual phosphorus concentration "capacity" for each lake in the watershed following the completion of the approved developments as per Scenario 2.

Table 16. Estimate of Conceptual Residual Capacity Remaining for Each Lake Following Approved Developments as per Scenario 2

Lake	Measured and Predicted TP Concentration Following Implementation of Approved and Planned Developments from Table 21 (Scenario 2)	Water Quality Objective	Early Warning Alert Value	Conceptual Residual Capacity (Difference Between Objective and Modeled Concentration Following Implementation of Scenario 2)
Sandy Lake	16	18	15	2
Marsh Lake	13	15	13	2

d) Determine the parameters to be attained or retained to achieve marine water quality objectives

The Sandy Lake Watershed does not have a marine component. Due to the relatively good quality of Sandy Lake and Marsh Lake, existing and future inputs from the Sandy Lake Watershed to the Sackville River and Bedford Basin will not have a measureable effect on marine water quality. In fact, nitrate loadings (which are more important in saltwater ecosystems than in freshwater systems) and other nutrient inputs due to changes in upstream land use will be minimal compared to discharges from the Mill Cove Sewage Treatment Plant.

e) Identify sources of contamination within the watershed

Several sources and potential sources of contamination are located in the Sandy Lake watershed. Non-point sources of contamination are distributed throughout the watershed and point sources of contamination have discreet locations. Both types of contamination present risks and impacts to the water quality of the waterbodies in the Sandy Lake watershed. The sources and potential sources are identified and discussed, while mitigation and prevention methods are presented in Section f, below.

Non-point sources:

- Deforestation
  - Deforestation may impact water quality by increasing the organic content and sedimentation of runoff. Studies completed in the Pockwock watershed (NFA 2005) indicate the impact of deforestation on water quality is negligible when compared to the changes in phosphorus, chlorophyll-a, Secchi depth or pH from seasonal variations. However, best management practices for logging will limit the potential for impacts on water quality from deforestation.
- Stormwater runoff
  - Stormwater runoff directs overland flow from developed areas through rudimentary drainage systems to streams and lakes. Sandy Lake is the primary receiving waterbody in the Sandy Lake watershed. Overland flow from developed areas represents a significant urban non-point source of pollution and contributes sediments, oil, anti-freeze, road salt, pesticides, nutrients and pet and waterfowl droppings to Sandy Lake. This urban runoff generally accelerates the eutrophication or natural aging process of urban lakes by adding sediment and nutrients. The added nutrients can contribute to algal blooms, decreased water clarity, and an increase in the amount of rooted aquatic plants growing in the shallow near-shore waters of a lake. All of these can reduce the recreational value of a lake by hindering swimming, boating, fishing and reducing its overall aesthetics.

- Bedrock
  - Acid rock drainage (ARD) is a naturally occurring process that results from the oxidation of sulphide minerals when the rock is exposed to oxygen. The breakdown of the sulphide minerals releases sulphuric acid, iron, and may also release arsenic, aluminum, cadmium, copper, manganese and zinc into the environment. The oxidation process and release of ARD is accelerated when bedrock is exposed to air by excavation or blasting. In HRM, several examples of ARD impacting water quality (Fox et al. 1997) are documented, resulting in low pH surface waters that were attributed to fish kills (Scott 1961, Porter-Dillon 1985). The Nova Scotia Environment Act limits the excavation and requires disposal of displaced rock with sulphide weight more than 0.4%. Detailed bedrock mapping and chemical analyses of distinct lithologies by White and Goodwin (2011) identify the Cunard Formation of the Halifax Group (northwest area of Sandy Lake watershed) and the Beaverbank Formation of the Goldenville Group (~1km band trending northeast near Lucasville) have acid generating potential. The Beaverbank Formation also displays high concentrations of metals such as arsenic, copper and zinc. The remaining bedrock underlying the Sandy Lake watershed is composed of Taylors Head Formation of the Goldenville Group and is not anticipated to have significant acid generating potential (White and Goodwin 2011). Despite the generalizations of White and Goodwin (2011), water quality results from the tributary draining into the northwest arm of Sandy Lake displayed decreased pH and elevated metal concentrations compared to other Sandy Lake water quality data (Conrad 2002). Development, excavation or aggregate removal that disturbs bedrock in Sandy Lake will generate acidic discharge. The north western portion of the watershed is more likely to have significant ARD and development in that area should avoid exposing bedrock to air and in situations where this is unavoidable, mitigation measures should be put in place to prevent ARD entering Sandy Lake.
  - Historic mine shafts: Five historic mine shafts are located in the northwest area of the Sandy Lake watershed. The Nova Scotia Abandoned Mine Database indicates the mine shafts were for gold exploration and reached a depth of 12 m. The mine shafts are filled in and considered to have low hazard potential.
- Road salt application: road salts pose a risk to plants and animals in the aquatic environment. Road salt application can also impact groundwater quality, leading to elevated concentrations of chloride in drinking water. HRM recognizes the potential impacts to surface and groundwater quality and utilizes several best management practices to reduce the impacts when possible (HRM 2012). However, the application of road salts along Hammonds Plains Road and to a lesser extent on secondary residential roads contributes to chloride loading in Sandy Lake.

Point sources:

- Septic systems: Properly functioning septic systems allow the infiltration of clarified discharge to soils. Nutrients and bacteria are utilized by organisms in the soil. Septic systems less than 300 m to water bodies and malfunctioning septic systems likely contribute nutrients and bacteria to the water bodies in Sandy Lake. There are approximately 20 residences within 300 m of Sandy Lake and approximately 200 residences within 300 m of watercourses that utilize septic systems.
- Illegal garbage disposal occurs when garbage is dumped in ditches, forests, pits or ponds that are not designated for waste disposal. Contamination from illegal dumping depends on the quantity and type of materials disposed of. Sandy Lake watershed is not known to have significant illegal dumping; however illegal dumping is known to occur in rural Nova Scotia and has likely occurred within the watershed. If illegally dumped material is found on HRM property, the municipality should be notified. The municipality is not responsible for removing illegally dumped material on private property. If dumped material is found on private property it should be placed for curbside collection or arrangements should be made for the material to be removed from their property.
- Wastewater treatment facilities: The Uplands Park Wastewater Treatment Facility (WWTF) is located in the Sandy Lake watershed. It has been operational since 1969 and is a source of nutrients to Sandy Lake. The facility may overflow and bypass the treatment cycle during storms or malfunctions. Untreated wastewater discharge carries high nutrient loads, especially phosphorus and can significantly add to the natural and non-point loading of phosphorus to lakes resulting in their rapid eutrophication. The impact of the wastewater overflows is difficult to quantify for several reasons:

- Overflows typically occur during extreme weather events. The timing, frequency and severity of these events are not possible to predict and so the water quality impacts from overflows cannot be quantified or modeled.
- Halifax Water monitors the volumes and locations of overflows but does not measure the concentration of effluent released to the environment during an overflow event. Given this, it is not possible to gauge the nutrient loading that may occur during these events.

We assume that reduction and ideally elimination of these overflows will be a priority within the plans for expansion of the waste water collection and treatment system within the watershed.

- Timber Trails mobile home park: Timber Trails is serviced by a private communal septic system. Approximately 233 homes are located in Timber Trails and a proposed expansion of the park is conditional on improvement and expansion of the septic system. The septic system is a source of phosphorus, nitrate and bacteria to surface water and groundwater. In the past, the park has struggled with wastewater treatment issues such as overflow and seepage during rain events. The park is approximately 4 km from Sandy Lake, so it doesn't represent a direct impact on the water quality of Sandy Lake. However, the septic system can impact local groundwater which is used for potable water supply in the area.
- Gas Stations: gas stations hold large quantities of fuel in underground and above ground storage tanks. Under typical conditions gas stations represent a minor risk of hydrocarbon impact from small spills during fuel transfer. However, the large volume of fuel represents potential large impacts to groundwater and surface water. Leaks of fuel and large releases of fuel are not common, but are known to occur.
- Residential oil tanks: Nova Scotia Environment considers a domestic oil spill to be a release of petroleum at a private residence such as an oil tank leak. A domestic fuel spill can impact soils, groundwater and potentially surface water. Hundreds of residential oil spills occur in Nova Scotia each year (NSE 2013). The risk of residential oil spills on the surface water of Sandy Lake is low considering the small volumes of oil and the distance of most residences from water bodies.
- Landfills (current or historic): There are currently no active landfills in the Sandy Lake watershed. However, considering the watershed has been populated for a long period of time, there is potential for historic landfills or dumping areas that have been abandoned. Neglected historic landfills could leach metals and toxic chemicals into the waterbodies of Sandy Lake.
- Motor boats: Motorized water crafts can impact water quality and lake ecology by increasing turbidity and re-suspension of sediments which can increase phosphorus concentrations. They can also lead to an increase in hydrocarbons.
- Animal feces: Animal feces contribute bacteria and nutrients to Sandy Lake. Bird populations such as ducks, loons and gulls contribute the nutrient and bacteria load to Sandy Lake. However, the excrement of pets also contributes to the loading of Sandy Lake through the stormwater drainage system and more directly at the Sandy Lake Park on-off leash area. Sandy Lake was closed for swimming in July 2013 because of high bacteria levels. It is not clear what the source of the bacteria was, but pet feces may have contributed.
- Fertilizers used on lawns and gardens are used to promote healthy lawns and gardens on residential and commercial properties. Excessive or improper application of fertilizers can lead to nutrient loading of surface water bodies.

f) Identify remedial measures to improve fresh and marine water quality

There are several ways that water quality can be improved. These improvements generally fall into two categories: management practices and engineered solutions. Not all the improvements identified below are necessarily practical or viable: some may be cost prohibitive, technically impossible, or lack a regulatory requirement or enforcement mechanism. Nevertheless, these remedial measures represent options that may be considered to improve water quality.

1. Undertake a survey of septic systems to better characterize their age, maintenance and functionality. Older systems (more than 15 years) can be subjected to a dye test to verify they continue to function as designed.

Replace degraded septic systems or require alternatives (aerobic systems, holding tanks etc.) if the site is not capable of accommodating a conventional septic system under current design specifications. Encourage residents to have systems inspected and pumped on a regular basis. HRM can consider adopting a by-law that requires period inspection, testing and pumping of private septic systems, similar to that enacted in Chelsea, QC.

2. Retrofit or improve existing stormwater management systems through the introduction of sediment/water control basins, constructed wetlands, vegetated swales, flow-through filter strips, stormwater infiltration systems and disconnection of roof drains from stormwater systems.

3. Ban phosphorus-containing fertilizers and encourage proper and minimal use of other fertilizers and herbicides.

4. Encourage homeowners to plant naturalized riparian buffers or increase the width and density of existing buffers.

5. Encourage homeowners to pick up after pets.

6. Educate residents to use non phosphate soaps when washing vehicles or use a car wash.

7. Educate residents to refrain from disposing of oil, antifreeze or other potentially harmful wastes into municipal drains and provide collection centers for these liquid wastes for safe disposal.

8. Require sediment management on construction projects including silt fencing to control runoff and washing of vehicles prior to departing the site to avoid mud and dirt being deposited on roadways for eventual runoff into storm sewers.

9. Report illegal dumping or unusual conditions in lakes and streams (high suspended sediments, oil sheens, algae blooms).

10. Strive to eliminate sewage system overflows through expansion of the system and upgrades as appropriate.

11. Maintain the water quality and water quantity monitoring program at a base level such as recommended here to ensure compliance with water quality objectives and expand the database for future modeling enhancements.

12. Apply a no net change to flow, suspended sediment and phosphorus loads from new developments by requiring site specific evaluations and implementation and maintenance of storm water mitigation measures.

Marine water quality was not considered during this study since the watershed does not include a marine estuary component.

g) Recommend strategies to adapt HRM's stormwater management guidelines to achieve the water quality objectives set out under the watershed study

HRM's Stormwater Management Guidelines (Dillon Consulting Ltd. 2006) describes criteria for the design of stormwater management best management practices (BMPs) to minimize the negative water quality effects of stormwater runoff from urban development. In this report, the term "best management practice" applies to both in-ground infrastructure (pipes, retention basins, etc.) as wells as activities, such as street cleaning and land use restrictions, that may impact water quality. As the report notes:

> There is no single BMP that suits every development, and a single BMP cannot satisfy all stormwater control objectives. Therefore, cost-effective combinations of BMPs may be required that will achieve the objectives.

At this time, stormwater control infrastructure requires provincial approval from Nova Scotia Environment under the Environment Act and in accordance with the Storm Drainage Works Approval Policy. HRM's authority with respect to stormwater management comes from the HRM Charter Act, which allows HRM to make and enforce municipal by-laws related to land use. Existing municipal planning strategies already include certain land use restrictions that have beneficial effects on water quality. These restrictions include, for example, prohibiting or limiting construction within flood plains, wetlands and steep slopes. In addition, municipal planning strategies also include stormwater management provisions, such as the requirement to obtain municipal approval of stormwater management plans, water quality monitoring plans and erosion control plans prior to development approval.

Other strategies that may be useful in adapting HRM's stormwater management guidelines to achieve the water quality objectives include:

- Implementation of financial resources or financial mechanisms (including cost sharing) to fund infrastructure, testing, operating and maintenance;
- Exploration of new stormwater management and treatment technology;
- Educational programs to encourage homeowners to reduce sediment and other pollutant discharge (fertilizers, grass cuttings) to storm sewers; and
- Apply a no net change to flow, suspended sediment and phosphorus loads from new developments by requiring site specific evaluations and implementation and maintenance of storm water mitigation measures.

h) Recommend methods to reduce and mitigate loss of permeable surfaces, native plants and native soils, groundwater recharge areas, and other important environmental functions within the watershed and create methods to reduce cut and fill and overall grading of development sites;

The protection of areas and functions that are important to a healthy watershed can be achieved through the implementation of general planning principles and through the integration of site specific design plans.

The replacement of permeable soils by roads, sidewalks and roofs can be reduced during the planning process and through specific design features. An effective planning method is to cluster buildings and infrastructure in defined, less permeable or otherwise less sensitive areas in order to maximize permeable vegetated open space.

Stormwater management best management practices and design standards aimed at promoting infiltration rather than runoff can be required during the site plan approval process. These measures are described in detail in HRM's Stormwater Management Guidelines and would include, for example, discharge of roof drainage to infiltration trenches or ponds, the use of vegetated swales and perforated conveyance pipes, and the installation of wet ponds and artificial wetlands. Design of properties and landscape provides opportunities to improve infiltration and partially offset the loss of permeable surfaces. Lawns and driveways can be designed to promote infiltration and water from roof drains can be collected in rain barrels, discharged to rain gardens or retained with roof top gardens. Disconnecting foundation drainage from storm sewer reduces the flow to the stormwater system and increases infiltration. Landscaping effects water drainage and when used effectively can be designed to encourage infiltration and reduce runoff.

Reducing the loss of native plants and soils is an effective way of reducing sediment and water runoff to stormwater systems. The design of new developments requires the removal and displacement of some native soils and plants, but the extent of the displacement can be mitigated through planning and local design.

Development may inadvertently disturb or destroy vegetation communities such as wetlands, riparian buffers and vegetation found in indistinct flow conveyance channels that play a significant role in maintaining water quality.

Developers should be requested to provide detailed "wet areas mapping" of properties proposed for development so these vegetation communities can be accurately delineated and their hydrological functions maintained.

Groundwater recharge in the Sandy Lake area is presented in **Figure 6**. The areas of highest recharge are located near Sandy Lake and Marsh Lake. These areas contribute to local groundwater and to Sandy Lake. The surficial aquifer located in the northeastern part of the watershed is not well defined and has not been tested and characterized. However, considering its proximity to Sandy Lake, Marsh Lake and the Sackville River, it is likely hydraulically connected to the surface water bodies. Development in the areas of high recharge should include specific plans to reduce impermeable surfaces. In addition, development in the areas of high recharge should include aquifer protection measures similar to wellhead protection areas. Recommended land use restrictions include prohibition of bulk fuel storage, prohibition of hazardous material facilities, prohibition of aggregate extraction, spill prevention for home heating fuel tanks, limited lawn fertilizer use, and reduced use of road salts.

i) Identify and recommend measures to protect and manage natural corridors and critical habitats for terrestrial and aquatic species, including species at risk

As noted in Appendix A Section 5.1, Atlantic salmon of the Nova Scotia Southern Upland population are known to be in Sandy Lake. Atlantic salmon are listed by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered. Fish habitat in Peverills Brook was modified in 2012 by the Sackville Rivers Association to encourage salmon migration and spawning. Maintenance of the fish stream modifications and upgrading as needed will ensure the modifications continue to function as designed. A monitoring program of salmon populations in the Sandy Lake watershed is recommended to evaluate the salmon population and identify measures to encourage growth in the population. Additional design measures aimed at maintaining water quality, especially mitigating stormwater quality, will equally protect aquatic habitat. These measures are described above.

Within the Sandy Lake watershed, no plant species of federal conservation concern have been recorded. Seven vascular plants of provincial concern have been recorded within five kilometers of the centre of the watershed; of these seven species, two – the wavy leaved aster (*Symphyotrichum undulatum)* and the Greenland stitchwort (*Minuartia groenlandica)* have been observed in the Marsh Lake area. Both plants are listed as S2 (provincially rare); their general status rank is sensitive. Constraints to development on slopes will help to protect and preserve these species.

The Atlantic Canada Conservation Data Centre records 25 animal species of conservation concern within the Sandy Lake watershed (Appendix A). Although most of these species are birds, there are two amphibians present: the snapping turtle and the wood turtle. The wood turtle is classified as threatened under Canadian Species at Risk Act (SARA) and COSEWIC. Wood turtles are fairly tolerant of changes to adjacent land uses, but require stream and woodland habitat to remain intact. An assessment of the wood turtle habitat range in the Sandy Lake watershed would provide site specific information that could be used to assess habitat improvements and protection. Until a habitat assessment can be completed, it is recommended that a 20 m buffer to all streams and waterbodies be kept free from disturbance and development.

j) Identify appropriate riparian buffers for the watershed

Under Watercourse Setbacks and Buffers The Halifax Mainland Land Use By-Law" [14QA(1)] states:

> "No development permit shall be issued for any development within 20 m of the ordinary high water mark of any watercourse. Where the average positive slopes within the 20 m buffer are greater than 20%, the buffer shall be increased by 1 m for each additional 2% of the slope, to a maximum of 60 m."

As noted in Section 3.3 Development Constraints, a 20 m buffer along all water courses is reported to eliminate more than 70% of suspended sediment and more than 60% of phosphorus (Hydrologic Systems Research Group

2012). The maintenance of a minimum 20 m wide riparian buffer is appropriate for all watercourses within the watershed.

k) Identify areas that are suitable and not suitable for development within the watershed

Please refer to Section 3.3 Development Constraints and Figure 7, which identifies areas suitable and not suitable for development. Unsuitable areas include:

Type 1 Constraints
- Watercourses, wetlands and riparian buffers

Type 2 Constraints
- Slopes greater than 20%
- Bedrock with acid generating potential
- Groundwater recharge (>150 mm per year)

If land is not constrained, then it is potentially suitable for development. The total area that can or should be developed and the nature of the development both need to be carefully planned so that established water quality objectives will be maintained following development.

l) Recommend potential regulatory controls and management strategies to achieve the desired objectives

Regulatory controls and programs already in place that contribute to the maintenance of water quality include:

- Halifax Water Regulations and Guidelines for Stormwater Management;
- Design and Construction Specifications (referring to quantity of stormwater only);
- HRM Municipal Design Guidelines 2013; and,
- 2009 Stormwater Inflow Reduction program.

A stormwater management by-law would be helpful to manage and enforce stormwater related nutrient and sediment inputs to watercourses. In addition to such a by-law, the following additional controls and strategies are recommended for consideration:

1. Adopt the proposed water quality objectives.

2. Preserve natural storage, infiltration and filtration functions; develop SWM systems that reproduce or mimic natural functions.

3. Revisit land use planning restrictions that provide for stormwater management (such as restricting development in flood zones, in sensitive areas, on slopes, in wetlands, etc.) and compare them with similar policies in other jurisdictions to determine if these policies should be updated or upgraded to improve their effectiveness.

4. Require developers to demonstrate no net increase of sediment and TP loadings to adjacent water features.

5. Require developers to financially support a water quality monitoring program to assess compliance with the water quality objectives.

6. Enforcement of stormwater management for quality and quantity as per the HRM Stormwater Management Guidelines.

7. Elimination of sanitary sewer overflows within the watershed.

8. Elimination of Waste Water Treatment Plant by-passes.

9. Inspection and testing of septic systems in the watershed; phased replacement if they are not functioning due to high water table, poor design, inadequate maintenance, close to surface water. Consideration of alternative treatment systems to replace existing septic systems.

m) Recommend a monitoring plan to assess if the specific water quality objectives for the watershed are being met

The monitoring plan is described in Section 9: Recommendation for Water Quality and Quantity Monitoring.

11. Summary and Conclusions

The Sandy Lake watershed is designated as an Urban Settlement area and currently hosts urban development along main thoroughfares (Hammonds Plains Road, Lucasville Road), in industrial areas and in suburban style communities. Portions of the watershed are serviced with municipal water and wastewater services and portions of the watershed utilize on-site water wells and septic systems.

A development constraints map of the watershed identifies areas that are not suitable for development (wetlands, watercourses and riparian zones) and areas that may require environmental mitigation to be included in development plans if the areas are developed.

Possible future development scenarios are identified in the watershed and land use maps depicting existing conditions and three future development scenarios were prepared. The land use maps were used as inputs to a phosphorus load model (Lake Capacity Model) to predict how future development may impact the phosphorus concentrations of the lakes. Phosphorus is identified as a key water quality parameter to assess the trophic status of the lake.

Historic water quality samples and water samples collected during the course of this study were used to identify water quality objectives for parameters that are influenced by development. The water quality in Sandy Lake and Marsh Lake is currently being affected by urban development in the water as displayed by the increasing phosphorus concentration in Sandy Lake. Both Sandy Lake (12 µg/L) and Marsh Lake (10 µg/L) have median phosphorus concentrations that place them in the lower end of the mesotrophic range. Water quality objectives and early warning values are set at 18 µg/L and 15 µg/L for Sandy Lake and 15 µg/L and 13 µg/L for Marsh Lake respectively.

Cumulative impacts of development on phosphorus concentrations are predicted to increase to 16 µg/L for Sandy Lake and 15 µg/L for Marsh Lake when mitigation measures to decrease phosphorus loading are not implemented. These levels are above the early warning values, but below the water quality objectives. Removing point sources of phosphorus such as the Uplands WWTF and septic systems near Sandy Lake by connecting them to municipal wastewater services decreases the predicted phosphorus concentrations to 15 µg/L and 14 µg/L for Sandy Lake and Marsh Lake respectively. Additional phosphorus mitigation measures using advanced stormwater management that reduces phosphorus runoff by 50% is predicted to decrease the phosphorus concentration of Sandy Lake to 13 µg/L and of Marsh Lake to 12 µg/L.