NIAGARA PENINSULA CONSERVATION AUTHORITY

FULL AUTHORITY MEETING
ON-LINE VIDEO CONFERENCE
(To immediately follow the
NPCA Annual General Meeting
scheduled to begin at 9:30 A.M.)
Friday, June 18, 2021

A G E N D A

CALL TO ORDER – ROLL CALL

The Niagara Peninsula Watershed is located on the traditional territory of Indigenous peoples dating back countless generations. We want to show our respect for their contributions and recognize the role of treaty-making in what is now Ontario.

1. APPROVAL OF AGENDA

2. DECLARATIONS OF CONFLICT OF INTEREST

3. APPROVAL OF MINUTES

a) Minutes of the Full Authority Meeting dated May 21, 2021 *(For Approval)*

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4. CORRESPONDENCE

5. PRESENTATIONS

a) Presentation by Joshua Diamond, Water Quality Specialist, RE: Water Quality Monitoring Program Summary Report for the Year 2020 [Corresponds to Item 8. b) Report No. FA-38-21 RE: Water Quality Monitoring Program Summary Report for the Year 2020 *(For Approval)*]

6. DELEGATIONS

a) Delegation from Anne Yagi, President, 8Trees Inc. RE: Wainfleet Bog Restoration Project and the Biederman Drain Proposal [Corresponds to Item 8. c) Report No. FA-39-21 RE Wainfleet Bog Biederman Drain Re-Alignment Proposal *(For Approval)*]

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7. CONSENT ITEMS

a) Report No. FA-37-21 RE: New Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health *(For Receipt)*

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8. DISCUSSION ITEMS

a) Report No. FA-36-21 RE: Niagara River 'Beach Closings' Beneficial Use Impairment (BUI) Status Assessment and Re-designation *(For Approval)*

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b) Report No. FA-38-21 RE: Water Quality Monitoring Program Summary Report for the Year 2020 *(For Approval)*

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c) Report No. FA-39-21 RE Wainfleet Bog Biederman Drain Re-Alignment Proposal *(For Approval)*

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d) Report No. FA-41-21 RE: Conservation Authority Act Phase 1 Regulations Guide - NPCA Comments *(For Approval)*

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9. COMMITTEE REPORTS

9.1 STRATEGIC PLANNING COMMITTEE

9.1.1 Minutes of the Strategic Planning Committee Meeting dated May 21, 2021 *(For Receipt)*

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10. NOTICES OF MOTION

11. MOTIONS

a) Motion regarding the Canada Employment Wage Subsidy (deferred from the meeting of May 21, 2021)

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12. NEW BUSINESS

13. CLOSED SESSION

14. ADJOURNMENT

FULL AUTHORITY
ONLINE VIDEO CONFERENCE
MEETING MINUTES
Friday, May 21, 2021
9:30 a.m.

NOTE: **The archived recorded meeting is available on the NPCA website. The recorded video of the Full Authority meeting is not considered the official record of that meeting. The official record of the Full Authority meeting shall consist solely of the Minutes approved by the Full Authority Board.** *NPCA Administrative By-law*

MEMBERS PRESENT:
B. Johnson (Chair)
S. Beattie
R. Brady
B. Clark
D. Coon-Petersen
D. Cridland
L. Feor
R. Foster
J. Hellinga
J. Ingrao
K. Kawall
B. Mackenzie
J. Metcalfe
W. Rapley
E. Smith
B. Steele
M. Woodhouse
B. Wright

MEMBERS ABSENT:
D. Huson
R. Shirton

OTHERS:
S. Plugers, KPMG

STAFF PRESENT:
C. Sharma, C.A.O. / Secretary – Treasurer
G. Bivol, Clerk
R. Bisson, Manager, Communications and Public Relations
A. Christie, Director, Operations and Strategic Initiatives
C. Coverdale, Business and Financial Analyst
J. Culp, Supervisor, Permits and Compliance
D. Deluce, Senior Manager, Planning and Regulations
M. Ferrusi, Manager, Human Resources
L. Gagnon, Director, Corporate Services
N. Green, Project Manager, Strategic Plan
S. Mastroianni, Manager, Planning and Development
S. Miller, Senior Manager, Water Resources
G. Shaule, Administrative Assistant
G. Verkade, Senior Manager, Integrated Watershed Planning / Information Management

The Chair called the meeting to order at 9:31 a.m.

1. APPROVAL OF AGENDA

Resolution No. FA-82-2021
Moved by Member Beattie
Seconded by Member Brady

1. **THAT** the agenda **BE AMENDED** to allow a motion in conjunction with Correspondence Item 4.a) and to permit Item 5.a) on the agenda, the presentation by S. Plugers, KPMG to occur immediately after adoption of the minutes.

2. **AND THAT** the Full Authority Agenda dated May 21, 2021 **BE APPROVED** as amended.

CARRIED

2. DECLARATIONS OF CONFLICT OF INTEREST

None declared.

3. APPROVAL OF MINUTES

a) Minutes of the Full Authority meeting dated April 16, 2021

b) Minutes of the Full Authority Closed Session Meeting dated April 16, 2021

Resolution No. FA-83-2021
Moved by Member Clark
Seconded by Member Coon-Petersen

THAT the minutes of the following meetings **BE ADOPTED** as presented:
- Minutes of the Full Authority Meeting dated April 16, 2021; and
- Minutes of the Full Authority Closed Session Meeting dated April 16, 2021 to remain private and confidential.

CARRIED

5. PRESENTATIONS (As Per Resolution No. FA-82-2021)

a) Presentation by Scott Plugers, KPMG RE: Financial Statements and Audit Findings [Corresponds to Item 9.1.3 Report No. FA-31-21 RE: 2020 Audited Financial Statements & Audit Findings Report] – In accordance with Resolution No. FA-82-2021, C.A.O. Sharma introduced Scott Plugers, Auditor, KPMG. Mr. Plugers presented and discussed revenues, the financial statements and audit findings report. Questions were posed by Members and discussion ensued.

Resolution No. FA-84-2021
Moved by Member Cridland
Seconded by Member Feor

THAT the presentation by Scott Plugers, KPMG RE: Financial Statements and Audit Findings **BE RECEIVED**.

CARRIED

Resolution No. FA-85-2021
Moved by Member Kawall
Seconded by Member Mackenzie

1. **THAT** Report No. FA-31-21 RE: 2020 Audited Financial Statements **BE RECEIVED**.

2. **THAT** the 2020 Audited Financial Statements and the 2020 Audit Findings Report **BE APPROVED.**

CARRIED

4. CORRESPONDENCE

a) Conservation Ontario Council Report dated March 29, 2021 RE: Proposed Conservation Ontario Governance Accountability and Transparency Initiative and Endorsement of Steering Committee Representatives

Resolution No. FA-86-2021
Moved by Member Metcalfe
Seconded by Member Rapley

THAT the Conservation Ontario Council Report dated March 29, 2021 RE: Proposed Conservation Ontario Governance Accountability and Transparency Initiative and Endorsement of Steering Committee Representatives **BE RECEIVED**.

CARRIED

Resolution No. FA-87-2021
Moved by Member Metcalfe
Seconded by Member Rapley

WHEREAS the provincial government has passed legislative amendments related to the governance of Conservation Authorities;

AND WHEREAS the Conservation Authorities remain committed to fulfilling accountable and transparent governance;

NOW THEREFORE, BE IT RESOLVED:

1. **THAT** the Niagara Peninsula Conservation Authority **ENDORSE** the three key actions developed by the Conservation Ontario Steering Committee to update CA Administrative By-laws, to report proactively on priorities, and to promote/demonstrate results.

2. **AND THAT** staff **BE DIRECTED** to work with Conservation Ontario to implement these actions and to identify additional improvements and best management practices.

CARRIED

b) Correspondence dated April 23, 2021 from Town of Pelham RE: Motions and Notice of Motions RE: Request for Erosion Mitigation – Headwaters of Twelve Mile Creek

Resolution No. FA-88-2021
Moved by Member Metcalfe
Seconded by Member Rapley

THAT the correspondence dated April 23, 2021 from Town of Pelham RE: Motions and Notice of Motions re: Request for Erosion Mitigation – Headwaters of Twelve Mile Creek **BE RECEIVED**.

CARRIED

c) Correspondence dated April 27, 2021 from Town of Fort Erie to the Honourable Doug Ford, Premier of Ontario RE: Province Investigating and Updating Source Water Protection Legislation – C.A.O. Sharma indicated that this matter was going before the relevant Conservation Ontario committee and that correspondence so apprising of the Town of Fort Erie would be sent.

Resolution No. FA-89-2021
Moved by Member Smith
Seconded by Member Steele

THAT the correspondence dated April 27, 2021 from Town of Fort Erie to the Honourable Doug Ford, Premier of Ontario RE: Province Investigating and Updating Source Water Protection Legislation **BE RECEIVED**.

CARRIED

Resolution No. FA-90-2021
Moved by Member Feor
Seconded by Member Smith

THAT the correspondence dated April 27, 2021 from Town of Fort Erie to the Honourable Doug Ford, Premier of Ontario RE: Province Investigating and Updating Source Water Protection Legislation **BE ENDORSED**.

CARRIED

d) Correspondence dated April 30, 2021 from Jim Bradley, Chair Niagara Region to the Honourable Caroline Mulroney, Minister of Transportation (Ontario) and the Honourable Omar Alghabra, Minister of Transport RE: Surplus Lands in Niagara-on-the-Lake, Ontario - The Board requested that the NPCA's letter of endorsement be sent to the federal Minister of Transport, provincial Minister of Transportation as well as copied to all parties noted in Chair Bradley's correspondence. The Board also directed that separate correspondence from the NPCA Chair and CAO be sent to the four Members of Parliament within the watershed encouraging them to actively pursue this transaction on behalf of the NPCA.

Resolution No. FA-91-2021
Moved by Member Steele
Seconded by Member Metcalfe

THAT the Niagara Peninsula Conservation Authority Board of Directors **RECEIVES** and **ENDORSES** correspondence dated April 30, 2021 from Jim Bradley, Chair Niagara Region to the Honourable Caroline Mulroney, Minister of Transportation (Ontario) and the Honourable Omar Alghabra, Minister of Transport RE: Surplus Lands in Niagara-on-the-Lake, Ontario.

CARRIED

5. PRESENTATIONS (CONTINUED)

b) Presentation by C.A.O. Chandra Sharma RE: Bill 229 Conservation Authorities Act Update on Regulatory Proposal Consultation Guide – Ms. Sharma presented and Members posed questions. Staff was directed to send comments to partner municipalities for support as soon as possible.

Resolution No. FA-92-2021
Moved by Member Woodhouse
Seconded by Member Wright

THAT the PowerPoint presentation by C.A.O. Chandra Sharma RE: Bill 229 Conservation Authorities Act Update on Regulatory Proposal Consultation Guide **BE RECEIVED**.

CARRIED

6. DELEGATIONS

None.

7. CONSENT ITEMS

a) Report No. FA-29-21 RE: 2020 Year End Status Report of the NPCA-Ontario Power Generation Welland River Watershed Account Memorandum of Understanding

Resolution No. FA-93-2021
Moved by Member Hellinga
Seconded by Member Beattie

THAT Report No. FA-29-21 RE: 2020 Year End Status Report of the NPCA – Ontario Power Generation Welland River Watershed Memorandum of Understanding **BE RECEIVED**.

CARRIED

b) Report No. FA-35-21 RE: Hamilton – Binbrook Capital Funding Plan – Update

Resolution No. FA-94-2021
Moved by Member Brady
Seconded by Member Clark

THAT Report No. FA-35-21 RE: Hamilton – Binbrook Capital Funding Plan – Update **BE RECEIVED**.

CARRIED

8. DISCUSSION ITEMS

a) Report No. FA-28-21 RE: Niagara Peninsula Conservation Authority (NPCA) Officer Appointments

Resolution No. FA-95-2021
Moved by Member Clark
Seconded by Member Cridland

1. **THAT** Report No. FA-28-21 RE: Niagara Peninsula Conservation Authority (NPCA) Officer Appointments **BE RECEIVED**.

2. **THAT** the Board **APPOINTS** the following NPCA staff as Officers of the Conservation Authority pursuant to Section 28.1 (e) of the Conservation Authorities Act, R.S.O. 1990 for the term of their employment with the NPCA for the purpose of enforcing Section 29 of the Conservation Act:
   CUMMING, Brent
   POWELL, Alicia
   RUTKA, Josie.

CARRIED

b) Report No. FA-34-21 RE: Natural Resources Canada 2 Billion Trees Request for Information (RFI) Submission

Resolution No. FA-96-2021
Moved by Member Feor
Seconded by Member Foster

WHEREAS the federal government has announced the "Growing Canada's Forests" program as part of its 2 Billion Trees initiative, making substantial matching funding available to support reforestation efforts across Canada;

WHEREAS this is a timely opportunity to attract federal investment towards implementing nature-based climate solutions and enhancing natural cover through a strong and coordinated multi-partner approach across the Niagara Peninsula watershed;

WHEREAS the NPCA has a well-established track record of reforestation with private and public landowners, non-governmental organizations, nature clubs, academic institutions and community groups, has the scientific know-how to identify land and tree species with the biggest ecological and climate benefits, and has partnerships in place to mobilize volunteers to plant and monitor trees;

WHEREAS municipalities in the NPCA jurisdiction and other community partners have shown interest and support for a 10-year planting initiative to leverage the Growing Canada's Forest Funding Program;

NOW THEREFORE, BE IT HEREBY RESOLVED:

1. **THAT** Report No. FA-34-21 RE: Natural Resources Canada 2 Billion Trees Funding Request for Information (RFI) Submission **BE RECEIVED** and staff **SUBMIT** the RFI to Growing Canada's Forests 2 Billion Trees initiative.

2. **AND FURTHER THAT** staff continue to **COLLABORATE** with municipalities and other partners in identifying planting opportunities to be included in the full funding application should the Request for Information submission as an expression of interest be successful.

CARRIED

9. COMMITTEE ITEMS

9.1 FINANCE COMMITTEE

9.1.1 Minutes of the Finance Committee Meeting dated April 28, 2021

Resolution No. FA-97-2021
Moved by Member Kawall
Seconded by Member Ingrao

THAT the minutes of the Finance Committee Meeting dated April 28, 2021 **BE RECEIVED**.

CARRIED

9.1.2 Report No. FA-30-21 RE: 2021 Operating and Capital Budgets – FINAL – Finance Committee Chair Kawall and Director of Corporate Services L. Gagnon spoke.

Resolution No. FA-98-2021
Moved by Member Kawall

Seconded by Member Metcalfe

1. **THAT** Report No. FA-30-21 RE: 2021 Operating and Capital Budgets – FINAL **BE RECEIVED**.

2. **THAT** the Final 2021 Operating and Capital Budgets **BE RECOMMENDED** to the Board of Directors for approval.

3. **THAT**, in accordance with the Board approved Reserves Policy, the following 6 projects in the amount of $1,757,204 **BE FUNDED** from Reserves:
   a. $392,171 – General Capital Reserve
   b. 32,126 – Niagara Levy Differential Reserve
   c. 800,000 – Land Acquisition Reserve – Niagara
   d. 390,411 – General Operating Reserve
   e. 63,746 – Restoration Reserve
   f. 78,750 – Tree By-law Reserve

4. **AND FURTHER THAT** the 2021 Unfunded Budget Priorities list (Appendix 1) **BE ADOPTED** and staff **BE AUTHORIZED** to update the list and address critical pressures as funding becomes available through external funding sources and/or within the approved budget.

CARRIED

9.1.3 Report No. FA-31-21 RE: 2020 Audited Financial Statements & Audit Findings Report – This item was addressed in conjunction with Agenda Item 5. a) Presentation by Scott Plugers, KPMG RE: Financial Statements and Audit Findings.

9.1.4 Report No. FA-32-21 RE: Financial Report – Q4 – 2020

Resolution No. FA-99-2021
Moved by Member Kawall
Seconded by Member Rapley

THAT Report FA-32-21 RE: Financial Report – Q4 - 2020 **BE RECEIVED**.

CARRIED

9.1.5 Report No. FA-33-21 RE: Financial Report – Q1 – 2021

Resolution No. FA-100-2021
Moved by Member Kawall
Seconded by Member Smith

THAT Report FA-33-21 RE: Financial Report – Q1 - 2021 **BE RECEIVED**.

CARRIED

9.2 PUBLIC ADVISORY COMMITTEE

9.2.1 Minutes of the Public Advisory Committee Meeting dated April 29, 2021

Resolution No. FA-101-2021
Moved by Member Steele
Seconded by Member Woodhouse

THAT Minutes of the Public Advisory Committee Meeting dated April 29, 2021 **BE RECEIVED.**

CARRIED

10. NOTICES OF MOTION

None.

11. MOTIONS

a) Canada Employment Wage Subsidy - A waiver of the Administrative By-law was undertaken in order to allow Member Kawall to bring forward a motion in respect of the Canada Employment Wage Subsidy. Staff provided background information on the matter. Discussion ensued with staff requesting an opportunity to investigate and report back to the next meeting of the Board.

Resolution No. FA-102-2021
Moved by: Member Kawall
Seconded by: Member Ingrao

THAT in accordance with Section 9, Appendix 4 of the NPCA Administrative By-law, the Board **WAIVES** the notice provisions of the by-law to address a motion regarding the Canada Employment Wage Subsidy.

CARRIED

Resolution No. FA-103-2021
Moved by: Member Kawall
Seconded by: Member Wright

THAT the Niagara Peninsula Conservation Authority **ACCEPTS** the Canada Revenue Agency determination and **DIRECTS** that the Canada Employment Wage Subsidy be returned.

Resolution No. FA-104-2021
Moved by: Member Kawall
Seconded by: Member Wright

THAT the motion to accept the Canada Revenue Agency determination and direct the return of the Canada employment wage subsidy **BE DEFERRED** until the June meeting of the NPCA Board of Directors.

CARRIED

12. NEW BUSINESS

a) Verbal Update from the C.A.O.- The Chair noted that Vice Chair Mackenzie had recently been named by the Rotary Club of Grimsby as recipient of its Paul Harris Fellowship award. C.A.O. Sharma updated the Board on the Strategic Plan public survey, parks and Conservation Area operations for the Victoria Day weekend and the Wainfleet wetlands and quarry.

b) Niagara Peninsula Conservation Foundation – Member Foster updated the Board on the activities of the Foundation.

13. CLOSED SESSION

None.

14. ADJOURNMENT

Resolution No. FA-105-2021
Moved by Member Coon-Petersen
Seconded by Member

THAT the Full Authority Meeting **BE ADJOURNED** at 11:08 a.m..

CARRIED

Brenda Johnson, Chair
Niagara Peninsula Conservation Authority

Chandra Sharma, MCIP, RPP
Chief Administrative Officer / Secretary-Treasurer,
Niagara Peninsula Conservation Authority

8 Trees Inc.
www.8trees.ca

June 2, 2021

Chandra Sharma
Chief Administrative Office/Secretary-Treasurer
250 Thorold Road West; 3rd Floor
Welland, ON L3C 3W2

RE: Wainfleet Bog Restoration Project and the Biederman drain proposal

Dear Chandra,

Thank you for considering this important proposal.

As you know, the Wainfleet Bog is a provincially significant wetland ecosystem in the Niagara region, housing a variety of unique vegetation communities, rare wildlife, and species-at-risk. The bog is also located upon the Six Nations lands as affirmed by the 1701 Fort Albany Treaty, and is recognized as traditional harvesting territory of the Haudenosaunee people. Because this site represents a community of native flora and fauna, the preservation and recovery of this sensitive ecosystem signifies a cultural duty to the First Nations community, and to this delegation of experts dedicating their time and expertise to ensure its long-term recovery.

It is the goal of our delegation to inform the key stakeholders of the Wainfleet Bog ecosystem, that the current state of the site (i.e., drainage impacts) is causing long term damage and degradation to this significant wetland. It is our recommendation that NPCA request the engineer to move the 1.4 km section of Biederman drain back to its original alignment, during this open drainage improvement project under the Drainage Act, RSO 1990, c D.17.

Please find enclosed, a summary of proposed drainage options, and a copy of our technical report and correspondence in an Appendix. The delegation is in favor of Option 1 described below (Table A, Fig. A). The enclosed document reviews the past research and technical information to support NPCA in reaching a decision regarding this drain realignment proposal.

On Behalf of our delegation, which includes Six Nations, Nature Conservancy of Canada, Wildlife Preservation Canada, Dr. Barry Warner University of Waterloo, Dr. Glenn Tattersall and Dr Liette Vasseur of Brock University, Dr. Mark Browning MNRF Wildlife Research, and others.

We look forward to working with you and your staff on this important endeavour.

Anne Yagi, MSc, EP, CERP

President
8Trees Inc.

Table A. Summary of the options presented by the delegation of experts in terms of project timing, costs, considerations for species at risk and other relevance and due diligence concerns. See Figure A for mapping of proposed options.

Biederman Drain / Wainfleet Bog OPTIONS	TIMING	COSTS	SPECIES AT RISK (SAR)	RELEVANCE, DUE DILIGENCE AND PUBLIC IMAGE
OPTION 1. MORE PERMANENT BOG WETTING: Return to historic origin (realignment of 1.4 km section of Biederman drain to 1930s location) **Delegation's Preferred option**	logical time to re-examine drainage needs as part of 40-year cyclic review/report; leads to immediate and more permanent restoration	most cost-effective option: relocated drain will improve clay agricultural soils rather than peat nonagricultural soils; no costs to landowners	addresses urgent need of habitat restoration for SAR now rather than later; bog habitat recovery begins now	demonstrates policy and practice decisions guided by science and expert advice rather than political interests
		no costs for future beaver dam removal in the abandoned section	strengthens chances for survival and possible population expansion for SAR	underscores NPCA careful leadership and relevance; exemplifies NPCA seriousness and regard for SAR
		cost savings now and no ongoing costs to landowners	easy and straight forward; great potential to serve as demonstration project for other SAR sites in Ontario	model of vision, forward-thinking and success of management for similar sites/projects in future
		minimal costs for monitoring and maintenance; only single control point	bog water table becomes more stable and predictable for SAR	exemplifies collaboration and positive outcome from multi-stakeholder process and goodwill with local landowners
		no costs for future regulatory oversight	higher water tables in bog decrease chances of further degradation and habitat	improves/restores Haudenosaunee traditional

Biederman Drain / Wainfleet Bog OPTIONS	TIMING	COSTS	SPECIES AT RISK (SAR)	RELEVANCE, DUE DILIGENCE AND PUBLIC IMAGE
			disturbances fire, alien plant invasions, carbon emissions	harvesting territory; preserves sacred species
		SAR funding in hand to support capital costs	Once stable hydrology reached- ecological trap mitigation methods will be reduced overtime as the site recovers.	improves year-round reliable drainage for the farmers because there will no longer be SAR restrictions to maintain this section of drain in old alignment
		significant reduction in greenhouse gas emission costs and increase in carbon credits/carbon trading		
		potential for big bang results with comparatively minimal dollars		
OPTION 2. PERMANENT BOG WETTING: Road allowance as new drainage option	this option is similar to Option 1 but route not in original alignment and should be considered if receiving landowner is no longer in favour.	Most expensive option to build today, but otherwise has similar results to Option 1. This option is in case the receiving landowner is no longer in favour.	similar desired affects to water table and restoration of SAR habitat and populations as Option 1, but smaller buffer around bog.	same as Option 1.
	may have delays to accommodate DFO and SAR permits, and new channel construction planning	Likely more funding would be necessary.	Beaver activity may expand to this drain due to smaller buffer size.	
		permissions must be sought from landowner of road alignment – likely NPCA and Municipality.		

Biederman Drain / Wainfleet Bog OPTIONS	TIMING	COSTS	SPECIES AT RISK (SAR)	RELEVANCE, DUE DILIGENCE AND PUBLIC IMAGE
OPTION 3. LIMITED BOG WETTING: Patch outlets of Biederman drain and consider relocation to historic origin at a later date	delayed and complicated approval process for half-measure; approval will require multiple requests	temporary option: ongoing drainage problems in clay agricultural soils and peat soils remain dry; costs to landowners	only partly addresses urgent need of habitat restoration for SAR now rather than later; bog habitat recovery delayed	does not demonstrate policy and practice decisions guided by best science and expert advice
		costs for future beaver dam removal	chances for survival and possible population expansion for SAR remains unpredictable; ineffective or incomplete restoration of habitat	possibly puts NPCA in position to defend half measures and explain poor action if SAR disappear
		no cost savings now and ongoing costs to landowners	unpredictable; no real value of demonstration project for other SAR sites in Ontario	poor or incomplete vision, forward-thinking and success of management for similar sites/projects in future
		ongoing costs for monitoring and maintenance; multiple control point	bog water table recovery is incomplete and unpredictable for SAR	creates disagreements among collaborators and stakeholders; possible angry local landowners
		costs for future regulatory oversight	partial water table increases in bog maintains chances of further degradation and habitat disturbances by fire, alien plant invasions, carbon emissions	does not or delays improvements/restoration of Haudenosaunee traditional harvesting territory; does not preserve sacred species
		SAR funding to support capital costs	Need to apply full SAR mitigation methods to prevent ecological trap effect on Reptiles (snakes and turtles) due to uncertainty	does not improve drainage for farmers, because farmers will have to wait for SAR timing windows for any dams to be removed.

Biederman Drain / Wainfleet Bog OPTIONS	TIMING	COSTS	SPECIES AT RISK (SAR)	RELEVANCE, DUE DILIGENCE AND PUBLIC IMAGE
			around achieving hydrology stability.	
		no real reduction in greenhouse gas emission costs and opportunity for carbon credits/carbon trading		
		poor or limited results with more dollars; results unpredictable		
OPTION 4. DRY BOG/NO RESTORATION: No action/leave as is	easy and least complicated option but does not restore bog and habitats	existing ditches will continue to drain bog rather than clay agricultural soils; ongoing and increasing costs to landowners	does not address urgent need of habitat restoration for SAR; further loss of bog habitat and possible extirpation of resident SAR	demonstrates negligence; does not demonstrate policy and practice decisions guided by science and expert advice
		ongoing costs in future for beaver dam removal	jeopardized SAR recovery and survival; no population expansion of SAR	does not help NPCA reputation and relevance; exemplifies NPCA poor or incomplete regard for SAR
		no cost savings now and ongoing costs to landowners	good demonstration project for what results when no action is taken for other SAR sites in Ontario	example of what happens when action is not taken to ensure proper and complete management for similar sites/projects in future
		ongoing and possibly increased costs for monitoring and maintenance; multiple sites	bog water table is unpredictable, erratic, and likely lower; further jeopardizing SAR	disintegration of partnerships and no goodwill with local landowners

Biederman Drain / Wainfleet Bog OPTIONS	TIMING	COSTS	SPECIES AT RISK (SAR)	RELEVANCE, DUE DILIGENCE AND PUBLIC IMAGE
		ongoing costs for future regulatory oversight	current water tables in bog maintains high chance for further degradation and habitat disturbances by fire, alien plant invasions, excessive carbon emissions	no improvement to Haudenosaunee traditional harvesting territory; loss of sacred species
		no further or reduced SAR funding to support capital costs	Need to apply full SAR mitigation methods forever) to prevent ecological trap effect on Reptiles (snakes and turtles)- Rescue massasaugas from habitat- place in zoo similar to Ojibway Snake Survival Plan.	
		ongoing and increasing greenhouse gas emission costs and decrease in carbon credits/carbon trading opportunities		
		ongoing and increasing costs; more expensive than if action is taken immediately		

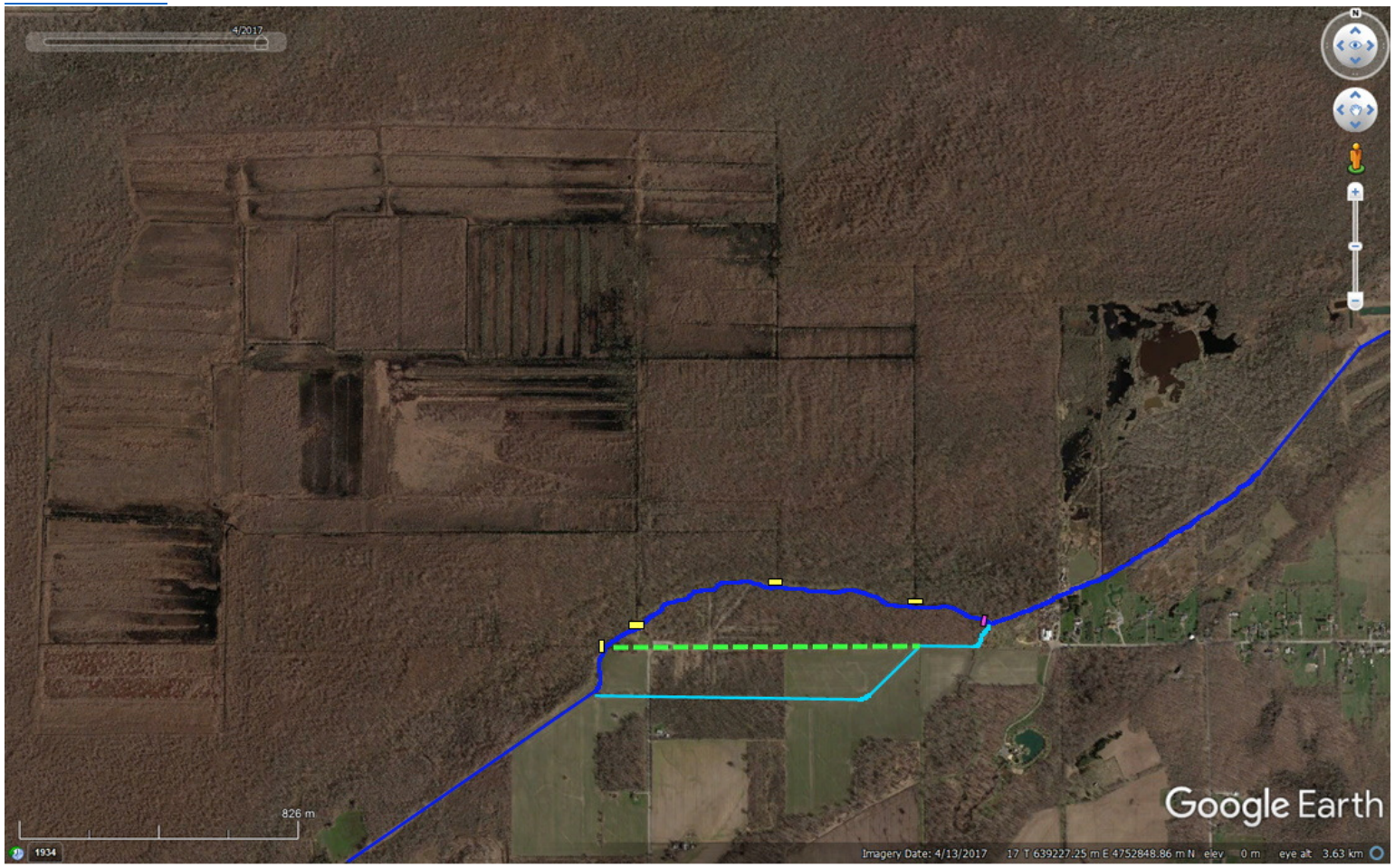

Figure A. Summary of proposal options 1 to 4; Option 1 (teal + pink) shows the original alignment for Biederman drain. This preferred option proposes to abandon the current 1.4km section of Biederman drain that cuts into the Wainfleet bog, and re-establish the original route through the agricultural fields creating a buffer from the edge of the PSW. The proposed location for a single dam structure to control water within Wainfleet bog is shown in pink. Option 2 (green) shows a new alignment for Biederman drain through an existing road allowance, Option 3 (yellow) shows the minimum number of places along Biederman drain (blue) that would require a dam structure to attempt to achieve water retention within the Wainfleet Bog, and Option 4 (blue) represents "do nothing" action, where the current alignment of Biederman drain (blue) will remain as is, with no dam structures.

Technical Report to NPCA RE: Wainfleet Bog Restoration Project and the proposal to move 1.4 km section of Biederman Drain back its 1930s route.

Background Information

The Wainfleet bog ecosystem is located in the Great Lakes lowlands region of Canada near Port Colborne, ON (42°54' 29.16'' N, 79° 17' 44.88'' W). The bog formed from a post glacial lake, and over thousands of years infilled with organic matter primary sphagnum and coarse woody material (i.e., cedar, spruce, tamarack conifer forests; Donaldson, 1987; Pengelly, 1990; Nagy, 1992; Tinkler, 1994). The Wainfleet bog is also located upon the Six Nations lands as affirmed by the 1701 Fort Albany Treaty, and is recognized as traditional harvesting territory of the Haudenosaunee people. Because this site houses a community of native flora and fauna, and a variety of species at risk, the preservation and recovery of this sensitive ecosystem represents a cultural duty to the First Nations community.

The Wainfleet bog was once a domed bog ecosystem meaning the centre was higher in elevation than the surrounding lands forming a headwater area (Nagy, 1992, MacDonald, 1992). The feature gradually transitioned to a lower elevation within a seasonal open water feature (i.e., a moat) formed from groundwater seepage. The Wainfleet Bog is an ombrotrophic ecosystem, meaning the site is entirely precipitation driven (Browning, 2015). Water enters through the ground surface and is stored within the organic basin, with seasonal excess forming seepage areas through the edge moat.

Drainage began in the 1800s with the construction of the first Welland Shipping Canal which remains today as the nearest lowest elevation point for surface water drainage (Tinkler, 1994; Yagi and Frohlich, 1998). The 1930s represents a dry climatic period within an agricultural dominant region where the wettest, hazardous, or rockiest natural features were the only areas not converted to agriculture.

Figure 1. 1934 aerial imagery of the Wainfleet Bog ecosystem and surrounding land use. Note the presence of the first Welland Shipping Canal to the East. Imagery courtesy of the Brock University Mapping Library and displayed using Google Earth.

The remaining natural features within the 1930's landscape represent the core natural heritage features, meaning they are the oldest and most ecologically intact. The earliest available (1934 black and white) air photo imagery provides clues to what the bog feature looked like before the drainage of the feature (Fig. 1).

In the 1934 air photo image, the interior bog vegetation communities are shown as varying shades of grey and appear smooth and flat. However, the bog feature was not flat. Variations in elevations are detectable using stereoscopic pairs of aerial photographs (i.e., principles of parallax). Variable grey areas in the centre are slightly higher in elevation than the surrounding lands and smooth in appearance indicating moss and shrubs, not trees. The lightest grey areas long the edges that are formed in natural channels, and meanders with darker curves within indicating grasses with open water in the lowest areas. Most of the bog edge contained these small natural meandering channels. In contrast man made water courses appear as straightened linear channels. The pock marked surface of the ground in agricultural fields represent wet depressions or remnant sloughs that form from tree fall or windthrow in a forested landscape. The depressions appear darker than the surrounding clay that are light in a dry state. The depressions are often interconnected with a surface ditch to improve agricultural field drainage opportunities toward a larger drainage feature. Therefore, the bog feature originally contained natural channel features that transitioned into a deciduous swamp or slough forest community.

Drainage of the surrounding heavy clay soils was improved overtime by building larger and deeper interconnected channels and by adding subsurface tile drainage. Following 1934, (circa WW2) a portion of the Biederman drain was moved 300m north from the farm fields into the bog moat (a natural meandering section; Fig. 2 A). The 1965 aerial photo clearly shows the Biederman drain was dug into the moat and interior ditches were added to connect to the deeper Biederman Drain allowing the interior bog to drain. Drier site conditions are evident throughout the interior showing linear inundations of cut peat soil as well as fields of bare ground from suction dredging of peat (Fig. 2 B). Therefore, the action of moving the drain into the bog moat facilitated the drainage of the Wainfleet Bog.

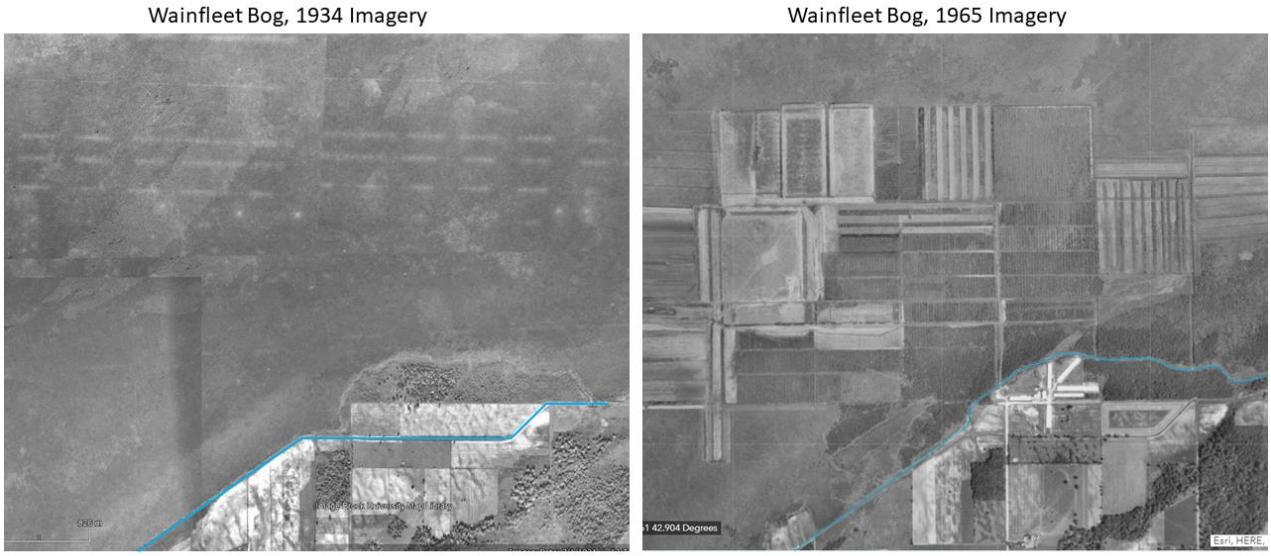

Figure 2. A comparison between 1934 and 1965 aerial imagery of the southern edge of Wainfleet bog. Biederman drain was moved 300 m north after 1934 into the bog moat to facilitate site drainage for peat harvest.

Today the Wainfleet Bog is a highly impacted system containing a partially-mined peatland within an actively maintained municipal drainage system. The wetland complex is approximately 1870 ha containing cultural barren and naturalized peatlands, swamps, marshes and some remnant bog vegetation communities (MacDonald, 1992; MNRF, 2009; Browning, 2015). The main physical structure of this ecosystem remains the same, which is a depression-filled with organic soil within a clay lined aquitard. The system today remains as an ombrotrophic ecosystem (NPCA, 1997; Browning, 2015; MNRF 2017). However, the central dome feature is lower in elevation from drainage and past peat mining and most of the natural channel moat features that transitioned to the agricultural areas have been replaced by a deep, straightened channel which is the municipal drainage system.

Organic soils have a high affinity to moisture. However, the transmissivity of the peat soils, which is the ability of moisture to move through peat, is impacted by the past land use and the proximity and depth of the drainage features (Crowe, 2000; Browning, 2015). The greater distance a drainage feature is from the peat soil, the less impact there is to soil transmissivity. The greater porosity of the peat means the greater likelihood there is for drainage impacts because water would be more mobile through the peat (Hayward and Clymo, 1982; Quinton et al., 2009; Rezanezhad et al., 2010; Rezanezhad et al., 2016). Small pores would have less water mobility. However, drained, drought impacted and compacted peat soils from a degraded peatland may not hold water easily especially when inundated by intense storm events- resulting in a peaky discharge hydrograph (Hoag and Price, 1997). Peat transmissivity, proximity to drainage features and climate change forecasts of intensifying storm events are important considerations for ecosystem restoration.

Although peat mining has ceased in the Wainfleet Bog, the perimeter drains are managed by the municipalities (Wainfleet Township and City of Port Colborne) as municipal drains for agricultural and rural land use on the surrounding clay fields. Management requires the removal of obstructions to drain flow including the removal of beaver dams and trapping of beaver that are using the municipal drainage feature as habitat. Beavers are present within the bog feature and connected waterways and are

especially attracted to the deeper municipal drain that connects to the Welland Canal because it is an open water feature and a dispersal corridor. The presence of beavers in bog ecosystems in Canada are natural and they are recognized as an important keystone species for creating wetlands and maintaining water levels in wetlands (Environment Canada, 2019).

Today, municipal drains largely run nearby, alongside and within the remaining bog feature forming a sudden unnaturally deep area close to the wetland edge. In addition, there are intersections where interior ditches, trails or wildlife pathways originating from within the interior peatland connect to the perimeter municipal drains creating new connections that drain Wainfleet Bog year-round. The perimeter drains are as much as 1-2m below grade, and through this system of ditches and drains, the bog can quickly surface drain down. The effects of this drainage system shorten the hydroperiod of this wetland and reduce the seasonal water storage capacity.

Global Action

Promoting ongoing drainage of peatlands is inconsistent with recent climate change predictions which forecast an increased frequency of drought contributing to conditions that promote peat fires (IPCC, Climate Change, 2013; Nugent et al., 2019; Tanneberger et al., 2021). The main influence on predicting peat fires is the soil moisture content with respect to the dry organic content. Peat fires spread when the water content decreases below 150% MC (Guitart et al., 2016). MC is a unitless percentage derived from the gravimetric moisture content of the sample per mass of dry peat (Guitart et al., 2016).

Healthy peatlands are the largest natural carbon sinks and sequester 0.37 gigatons of CO_2 per year- the largest vegetation type that stores carbon in the world, However, degraded peatlands contribute green house gas emissions about 6-10% of the anthropogenic contributions worldwide (IUCN, 2017; Peters, 2020). For every 10cm of drained peat a bog emits 5t of CO_2 per hectare per year (Peters, 2020; Tanneberger et al., 2021). The current managed drainage regime affects the bog ecosystem (1800 ha), and the water table drops 30 to 50 cm which contributes an extra 200,000 t CO_2 emitted per year. This is equivalent to 43,000 car emissions per yr (EPA, 2018).

In addition to the global benefits for re-storing peatlands and sequestering carbon, healthy peatlands also support rare and endangered species habitat. However, unhealthy peatlands can contribute to species declines. The Wainfleet bog is home to several species-at-risk including; the Massasauga rattlesnake *(Sistrurus catenatus;* 1 of 2 endangered Carolinian populations), Eastern Ribbon snake (*Thamnophis s. sauritus; special concern*), Spotted turtle (*Clemmys guttata;* endangered- 1 of 2 Niagara populations), Snapping turtle (*Chelydra serpentina; s*pecial concern), Midland Painted turtle (*Chrysemys picta marginate;* special concern), and Blanding's turtle (*Emydoidea blandingii*; endangered). The drainage effects on this wetland's water level cycles, impacts reptile habitat to the point where it becomes detrimental to species-at-risk survivorship (Yagi et al., 2020). Overwinter kill, and summer wildfires related to the bog's hydrology have been identified as key factors impacting these populations and this proposal seeks to remove the drainage impacts on these species-at-risk and their critical habitat.

Peatland Restoration Example Burns Bog BC

Maintaining water-saturation of the peat is the primary restoration goal for Burns Bog (Howie et al., 2018). Ditch blocking focused on the peripheral and interior ditches to maximize water storage from annual precipitation events (Howie et al., 2018). Restoration goals involve maintaining a high-water

table throughout the ecosystem and monitoring water level responses to the ditch blocking particularly along the perimeter to retain as much water as possible and to restore sphagnum from the edges inward to restart the peat-forming process. The peripheral drains represent the deepest drained areas containing drier than normal vegetation species and the project was successful in accumulating sphagnum regrowth in the dry edge communities by ditch blocking.

Bog Ecosystem Hydrology Water Budget

Bogs are isolated wetland systems that have a stable water level with respect to inflow and outflow. Water moves vertically from the surface downward contributing to water storage within the peat. Depending on the transmissivity of the peat and surface elevations or doming, water may flow from the upper layers downward into storage or it may flow laterally through seepage toward an open water feature or moat. Most bogs are entirely dependant upon precipitation as the only water source with evapotranspiration as the main water loss.

A simple water balance equation for a healthy bog ecosystem would be, [**Input = Storage – Output]**; where Input = precipitation as snow and rain. Storage depends on the peat volume and transmissivity of the peat, and the rate of groundwater recharge to the underlying bedrock groundwater system. Output = evapotranspiration + seepage (if present). Drainage reduces the water storage and increases water output of the wetland (Wilcox et al., 2006)

When Beavers first colonized the bog from 2006 to 2010 water storage function increased overall (Fig. 3). From 2018 to present, the Wainfleet Bog water storage function is reduced seasonally by ongoing drain maintenance that begins in April each year (Fig. 4). Drain maintenance initiates a reduction in ground water levels across the site and coincides with reduced precipitation events, resulting in reduced water storage function from spring to fall. There is also a lag in response to drainage effects with areas that are further from the drain having a slower response (NPCA 5: Fig. 3). Ultimately the entire site responds to increased drainage and reduced water storage over the summer months. ANSI WW20 minimum water level almost matched the Biederman drain water level in August 2020 following widespread drain cleanout and beaver trapping. Spring drainage is followed by beavers rebuilding dams in the fall which increases levels during winter. **Declining water levels in the spring and increasing water levels in the winter are not natural cycles for wildlife.**

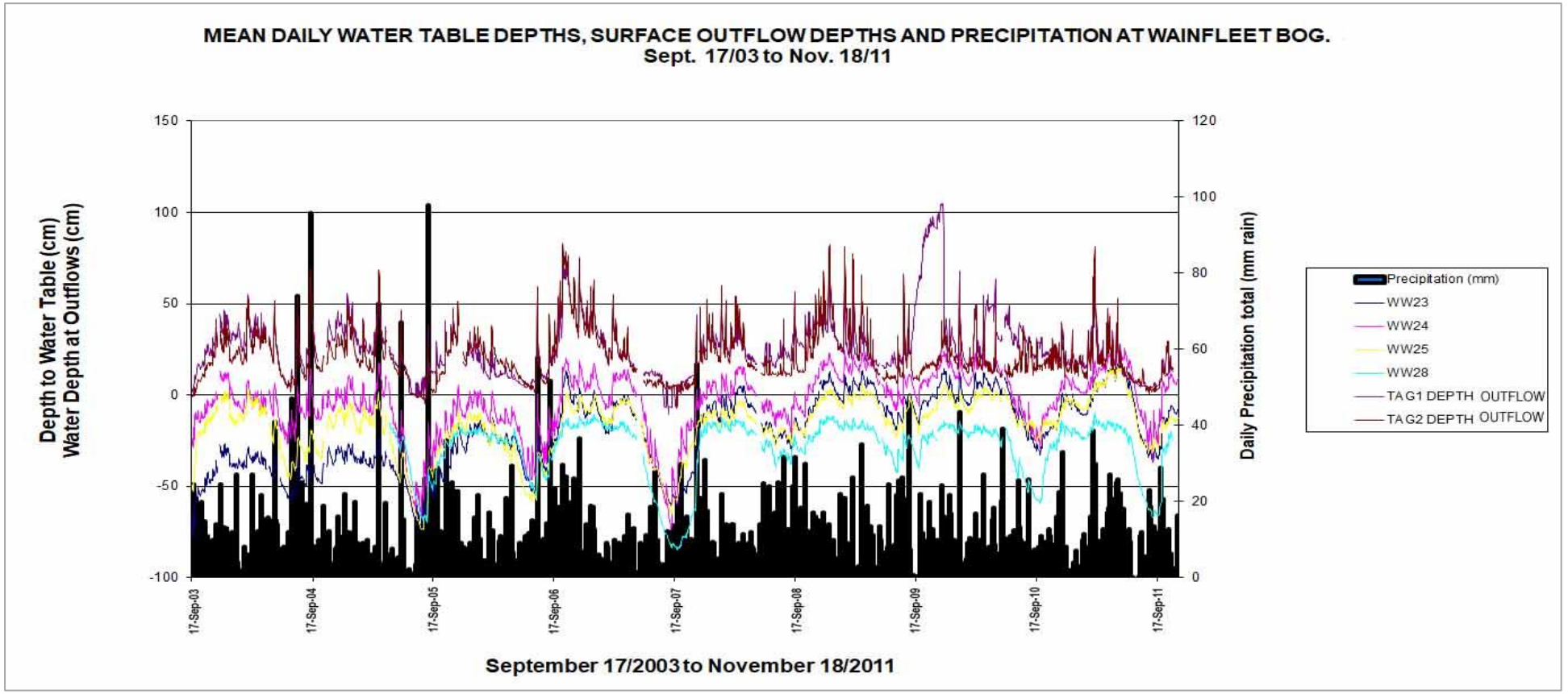

Figure 3. Relative Groundwater levels (WW 23, 24, 25) within the mined peatland and WW28 (control ANSI) during experimental water level increases using peat dams (2003 to 2005) followed by re-colonization of beaver (fall 2005 to 2011). Once beavers re-established the increase in water levels during the winter were more stable (Winter 2008 and 2009), except for Sep 2007 which was a large increase following a prolonged summer drought.

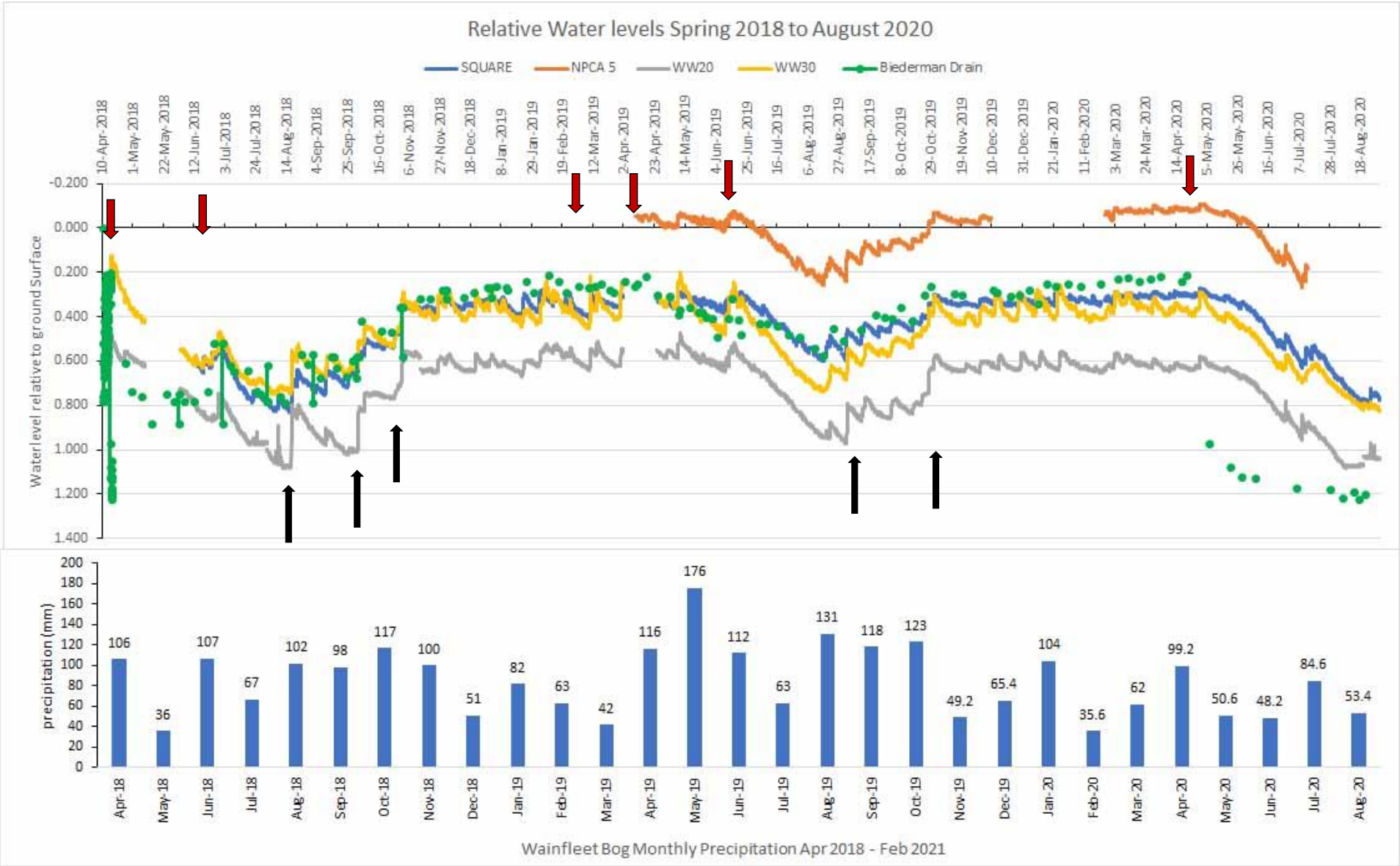

Figure 4. Relative Groundwater levels (m) from water level loggers located in the mined peatland (Square and NPCA 5, ANSI WW20 and ANSI WW30) as well as the Biederman Drain measured at the NPCA culvert from April 2018 to August 2020. Ground surface is represented as 0 m. Beaver dams were removed along the drain within and downstream of NPCA lands in April 2018, 2019, and 2020. In some years beavers immediately replaced dams except in 2020 when the dam removal was accompanied by intensive beaver trapping in the drain. Red arrows indicate when beaver dams were removed, and black arrow indicate when beaver dams were re-built. The ecological trap is evident at NPCA 5 site where water levels are below ground in the fall during hibernation site selection, but they increase over winter and flood the surface during hibernation.

From 2018 to present, 8Trees staff were able to monitor water well data across the bog feature (NPCA, MECP and private lands) and simultaneously keep track of the location of beaver dams and the timing of beaver dam removal by the municipalities (Fig. 5). The map below shows the locations of the monitored wells across the site.

Figure 5. Location of water wells monitored across Wainfleet bog feature. Water levels and temperatures were measured across the interior using transducers (green circles), and manual measurements were taken along the municipal drains (red dots).

Site Management Plan

Management Plan Recommendations (NPCA, 1997)

The current Management Plan for the Wainfleet Bog was written in 1997 and outlines several restoration goals. The goals relevant to this proposal are outlined below:

1. Restore the watershed hydrological regime to near natural conditions as to sustain the bog.
2. Initiate a study to determine the present status of the hydrologic regime on a watershed basis. Aspects of water draw down from peripheral drains should also be assessed, including extent.
3. Relate hydrological studies to vegetative composition to understand the linkages between hydrological changes and the effectiveness of restoration efforts.
4. Further to the findings of the above study, a means of increasing an evaluating the effect of a higher water table on the bog should be evaluated.
5. Monitor water quality of waterways adjacent to the bog for affects of pollution, including nutrient levels.

6. Strongly encourage scientific research which is non-destructive to its species to increase the understanding and further the science and implementation of restoration techniques on bog ecosystems.
7. Research to fulfill the following identified data gaps are to be given priority (summarized):
    a. Further flora baseline data for monitoring purposes
    b. Further fauna information, particularly amphibians, reptiles, birds and insects are required for baseline data
    c. Develop and establish an on-going long-term ecological monitoring program to determine the occurring changes of the site ecosystem and effectively monitor public use and its impact on this ecosystem.
    d. Encourage research of alternative agricultural practices (i.e. drainage) which adversely affect the bog and its ecosystem
8. Provide a diverse habitat suitable to a bog ecosystem, emphasizing the provision of long-term healthy ecosystem addressing the management of all species as opposed to one or two species.
9. Determine species habitat requirements and develop a correlation between population dynamics and the physical ecological of the site.
10. Control natural fires where it is deemed to be a hazard to an adjacent residence. The restoration of hydrological conditions should also assist in reducing the fire risk of the area.
11. Review the overall management plan requirements on a 5-year basis.

Unfortunately, the Management Plan has yet to be updated with any recommendations, data, or information collected since 1997.

Past Research & Recommendations

Several important studies have occurred on site since 1997, particularly the hydrology and vegetation study initiated in 1998 (Browning, 2015), the species-at-risk population monitoring work (Yagi and Tervo, 2005), and the research on species-at-risk population dynamics and their critical habitat function (Yagi, K., 2010; Yagi, A., 2020).

Mark Browning Thesis, PhD (1998 – 2008)

Mark Browning's experimental work was crucial in determining the effectiveness of an elevated water table in promoting bog vegetation growth, including Sphagnum moss, and for identifying the different catchments within the feature (Fig 2.21 from Browning, 2015). Peat dams were installed across many interior ditches in control and experimental areas, to investigate their effectiveness in raising the water table. While the peat dams proved to marginally increase water levels, it was not until 2006 when beavers re-established into the watershed and created dams throughout the site, that a significant increase in water levels were observed. Years of beaver activity since then has shown very clearly how effective these animals are at creating dams, and ultimately, at creating wetlands. Unfortunately, the experimental peat dams have almost all been destroyed by the beaver activity, leaving only beaver dams placed within the site and within the Biederman Drain to retain water in the peatland. Mark's research also delineated the catchment for the ecological trap area (Central peat mined area) and the control point at the eastern most outflow (Fig 2.1 ; Browning, 2015).

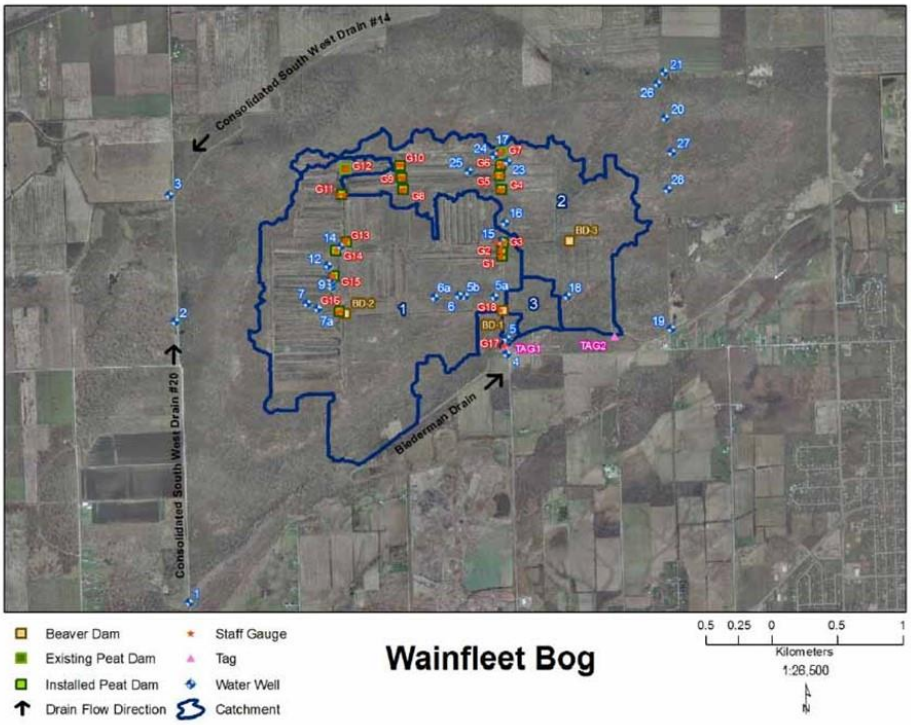

Figure 2.1: Map of Wainfleet Bog and surroundings, with locations of water wells, peat dams, staff gauges, Tag lines at outflows and selected internal catchments.

Recommendations from this research include:

1. The main interior beaver dams should be maintained artificially if the animals are trapped out, disappear or move on to new locations. These have been effective at raising the ground and surface water levels and elevating the volumetric water content of the surface peat. Most of the original peat dams have been channelled through by beaver and can no longer be relied upon to sustain the current hydrological conditions.

2. New peat dams now need to be constructed in the south-western, north-western and eastern portions of the bog, unaffected by the previous experimental drain blockings, to speed the establishment of the secondary successional community of wetland generalists and bog obligates that has developed in the experimental areas. We know from the experimental areas that a simple 2-meter-long peat dam is not sufficient in the long term. Dams need to extend further back up the drain channels and be designed with smaller “wing dams” or bunds extending outward from the main structure to prevent overflow and hold back more water, much the way that beavers construct their dams.

3. To prevent further drying out of the wider bog feature and slow the encroachment of the non-native European Birch (*Betula pendula*) more water needs to be held back around the margins of the bog instead of being carried away in the surround drains. Initially, this thesis recommended “half dams” be constructed in appropriate locations on the main surround drains

to achieve this without unduly flooding neighbouring farmland. However, the option of moving a portion of Biederman drain away from the bog margin entirely would be even more effective at achieving both of these goals.

4. A lag time of approximately 1.5 yrs can be expected between initial peat dam construction and noticeable increases in surface peat volumetric water content. A further 2 + years will be required before the development of the secondary successional bog plant community. Extensive seeding or transplanting is therefore not recommended immediately after the blockage of drains and the moving of the surround drain. Digging of shallow channels leading back from drains into the interior of the drier peat fields which have wide ditch spacings, and the creation of a hummock/hollow microtopography as was done in the experimental areas will enhance the diversity and rate of development of this community.

5. Restricted plant dispersal, rather than harsh environmental conditions or competition, appears to be the main factor limiting further colonization of this secondary successional community by new bog species. After the restoration of an ideal hydrological regime and the development of the secondary wetland community, sowings, plantings or spreading of stem fragments (in the case of *Sphagnum* mosses) may be necessary from local sources within the ANSI and other undisturbed perimeter areas. Consideration should be given to introducing key bog species that were known historically from Wainfleet but are no longer present in the local species pool. These would include black spruce (*Picea mariana*), tamarack (*Larix laricina*) and pitcher-plant (*Sarracenia purpurea*). The nearest source of seed for these species is likely the "Summit Bog" near Copetown approximately 80 km away.

This acknowledges the importance of the beavers and the effectiveness of beaver dams and elevating water levels within this ecosystem. This research addresses several goals of the Site Management Plan, especially #2, #3, #4, and #7a (see above list). An updated Management should bring forward the recommendations from this thesis and outline next steps in determining best practices to maintain a stable, elevated water table within the site.

Population Monitoring Studies (1998 to 2016 by MNRF, and 2017 to present by 8Trees Inc.)

MNRF Management Biologist, Anne Yagi, conducted years of monitoring of the resident Spotted Turtle and Massasauga populations of Wainfleet Bog (Fig. 6). The Spotted turtle monitoring incorporated mark-recapture data collected in the 1990s by Don Pogue and Mark Lachaine and continued with radio telemetry monitoring from 2000 – 2005, and mark-recapture thereafter. The Massasaugas were monitored using radio-telemetry from 2000 – 2005, and mark-recapture using PIT tags and photograph IDs thereafter. Results from the telemetry work showed very clearly that Spotted turtles were attracted to areas with the most water (i.e. drains), and that Massasaugas moved between the ANSI and Mined areas during the summers, used hibernation sites in both the ANSI and Mined area (NPCA lands), and they returned to their previously chosen hibernation site every year. It was confirmed that individual Massasaugas exhibited site fidelity to previously used gestation and hibernation sites.

Additionally, Spotted turtle telemetry work in winter 2009-10 revealed the negative effects of beaver dam removal during winter months. Observations during this time showed a turtle moving from a

hibernation site within a flooded zone, to a new hibernation site in a nearby ditch, in response to a drop in water levels between December 2009 and February 2010 caused by beaver dam removals in the connected drains. This drop exposed the turtle to winter air temperatures and could have been fatal if air temperatures fell below 0°C at that time (Yagi et al., 2010).

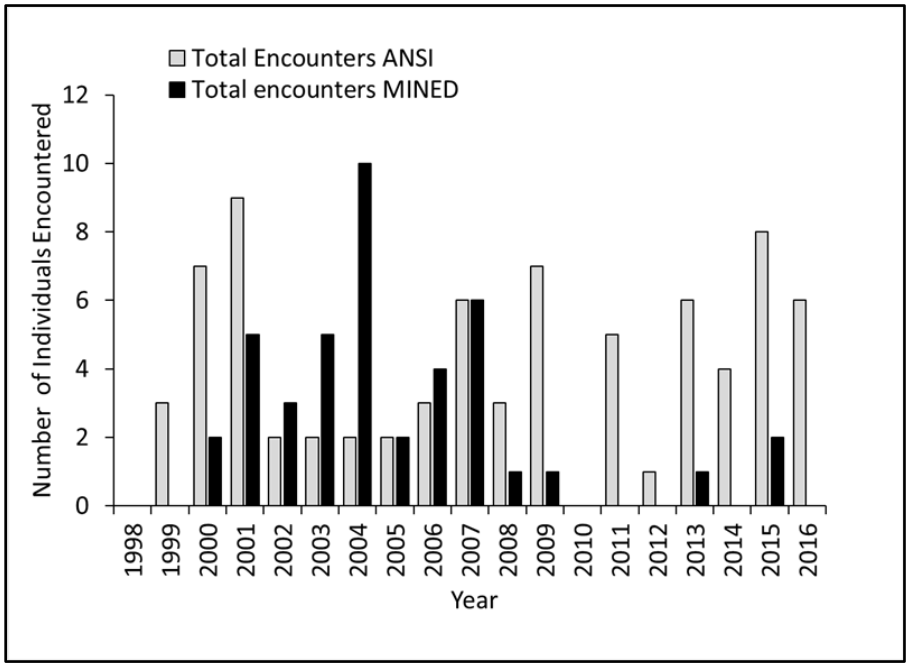

Figure 6. Massasauga Annual Encounters within the two sample areas Not-Mined refugia Area od Natural and Scientific Interest (ANSI) and the Central Mined Peatland (MINED) area which is also the ecological trap area. Note: over 800 hours were spent in 2010 searching for snakes and none were found. Most effort was in the MINED area (MNRF data unpublished).

This research addresses goals #6, #7b, and #7c of the Site Management Plan, as listed above.

Katharine Yagi Thesis, MSc (2008 – 2010)

Katharine Yagi's Master's research was conducted alongside MNRF population monitoring, and focused on investigating the effects of flooding on the resident Spotted turtle population. It was determined that the flooding created a variety of good-quality habitat for the turtles, including new sphagnum moss growth in areas which provided ideal refuge and nesting habitat. It was found that the turtles were actively using the newly flooded areas throughout all seasons, including nesting and hibernation (Fig 3 from Yagi and Litzgus, 2012).

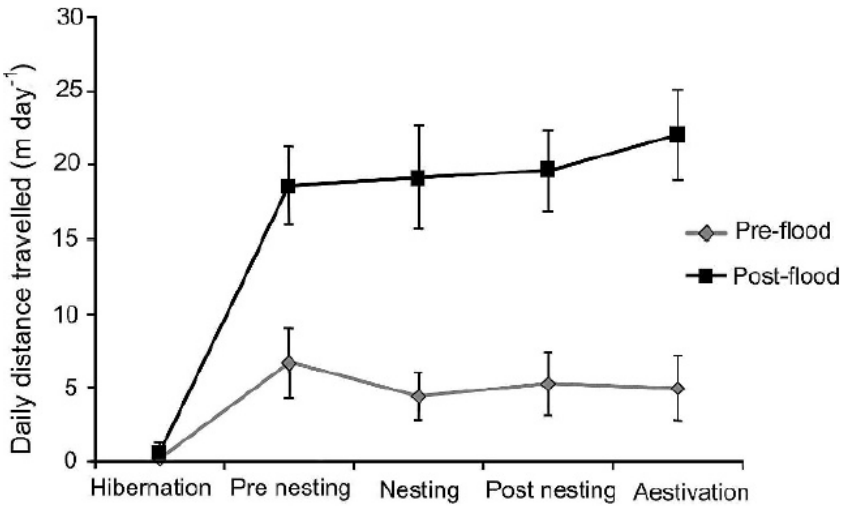

Fig. 3. Mean daily distances traveled by Spotted Turtles (*Clemmys guttata*) in a historically mined peat land in Southern Ontario from 1998 to 2000 (pre-flood; gray diamonds) and 2008 to 2009 (post-flood; black squares). Comparisons were made within each of five seasons, between pre-flooding and post-flooding conditions. Error bars denote standard error.

Site Management recommendations from this research was to allow beaver activity to remain as is, or to control water levels to stabilize at or near the current levels to help sustain Sphagnum growth and optimal Spotted turtle, and other species-at-risk, habitat functions. Building an elevated boardwalk through flooded zones was suggested to help allow for recreational use of the site (Yagi et al., 2010 - attached).

This research addresses goals #6, #7b, #9 of the Site Management Plan, as listed above.

Anne Yagi Thesis, MSc (2012 – 2017)

Anne Yagi's Masters research focused on investigating how snakes deal with flooding during hibernation underground. Comparing three species; Eastern gartersnakes, Northern Red-bellied snakes, and neonatal (baby) Massasaugas, it was found that all species cannot remain submerged underwater during hibernation, because they suffer an oxygen debt over very short time frames (2 hours) while in a forced dive at 5°C. In summary, this research shows that these species cannot survive overwinter underwater without access to a frost-free air space (i.e. life zone), and that a population decline is likely to occur when the habitat floods very quickly during the winter months when snakes cannot move to alternate locations.

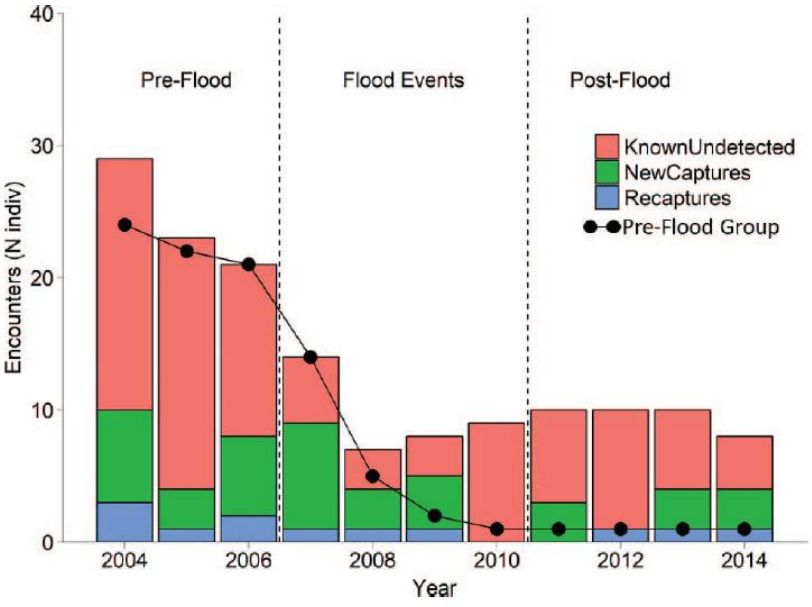

FIG. 7. Massasauga encounters (N_{indiv}) from 2004–2014 are calculated from the long-term (1998–2016) encounter data set for an isolated population located in southern Ontario, Canada. N_{indiv} includes all encountered adult and juvenile Massasaugas plus those presumed present due to their age estimates from future encounters. The preflood group encounter trend is indicated to discern postflood recruitment.

Further, a population decline was estimated to have occurred in this Massasauga population due to the initial flooding events in fall of 2006 (Fig. 7 from Yagi et al., 2020).

Site Management recommendations from this research were to resolve the causes for drastic water fluctuations over the fall and winter seasons by maintaining beaver dams to keep flood-prone areas flooded. By doing this, the low-lying areas would not be chosen for hibernation by young, naïve snakes in the fall, and will lead to increased survival, supporting overall population recovery.

This research addresses goals #6, #7b, #7c, and #9 of the Site Management Plan, as listed above.

Overall Site Conditions

In the last 20 years the bog has experienced extreme ranges in site condition from dry/fire prone conditions to wet/flooded conditions, or cycles from dry to wet (Table 1). The fluctuations in water levels were most stabilized in 2008 and 2009 when beavers established several key dams within the interior and Biederman drain to the south. Unfortunately, beaver dams were removed in December 2010 and the site regressed to a drier state culminating in the first wild-fire event in 2012 since restoration and beaver re-colonization in the peatland feature. The wildfire event in 2012 coincided with a prolonged regional drought period. Interestingly, the previous drought period in 2007, when beaver dams were present did not result in wildfire. The current drain maintenance and removal of beaver dams makes the site vulnerable to wildfire events during drought periods (2012 and 2016; see Table 1).

Table 1. Summarized climate- and drainage-driven site conditions for Wainfleet Bog from 1998 to 2020, including widespread habitat effects and timing of peat dam experiment, beaver activity, and drain maintenance.

Year	Site Conditions (May to October)	Recorded effects on Habitat	Notable Observations
1998	***dry***	***wildfire***	
1999	***dry***	***wildfire***	***Peat Dam experiment***
2000	***dry***	***wildfire***	***Peat Dam experiment***
2001	dry		Peat Dam experiment
2002	dry		Peat Dam experiment
2003	dry		Peat Dam experiment
2004	dry		Peat Dam experiment
2005	dry/wet		Peat Dam experiment & beavers
2006	dry/wet	First flood event – fall- hibernation	Peat Dam experiment & beaver dams
2007	wet		Peat Dam & beaver dams and ***drought***
2008	wet	flooded	Peat Dams degrade & beavers
2009	wet	flooded	Peat Dams degrade & beavers
2010	wet/dry	flooded	1st Biederman Drain clean out of beaver dams
2011	dry		Biederman Drain maintenance
2012	***dry***	***wildfire***	***drought***
2013	dry/wet		Biederman Drain maintenance
2014	dry/wet		Biederman Drain maintenance
2015	dry/wet		Biederman Drain maintenance
2016	***dry***	***wildfire***	***drought***
2017	wet	flooded	Biederman Drain maintenance
2018	wet	flooded	Biederman Drain maintenance
2019	wet/dry		Biederman Drain maintenance
2020	dry		Biederman Drain maintenance

Natural wetland vs. Managed wetland hydrological cycle

Wetlands and other aquatic or semi-aquatic environments exhibit repeatable seasonal hydrology patterns. In the temperate regions, water levels typically exhibit a bimodal hydrograph showing a larger increase in the spring during snow melt, a steady decline during the summer and a slight rise again in the fall with a steady or slight decline during winter (National Research Council, 1995). Terrestrial ecosystems usually have water levels well below the surface however may have a perched water table

or vernal pooling in the spring depending on soil and microtopgraphy conditions. Vernal pooling typically remains for a few weeks depending on precipitation and refills over winter (Fig. 6).

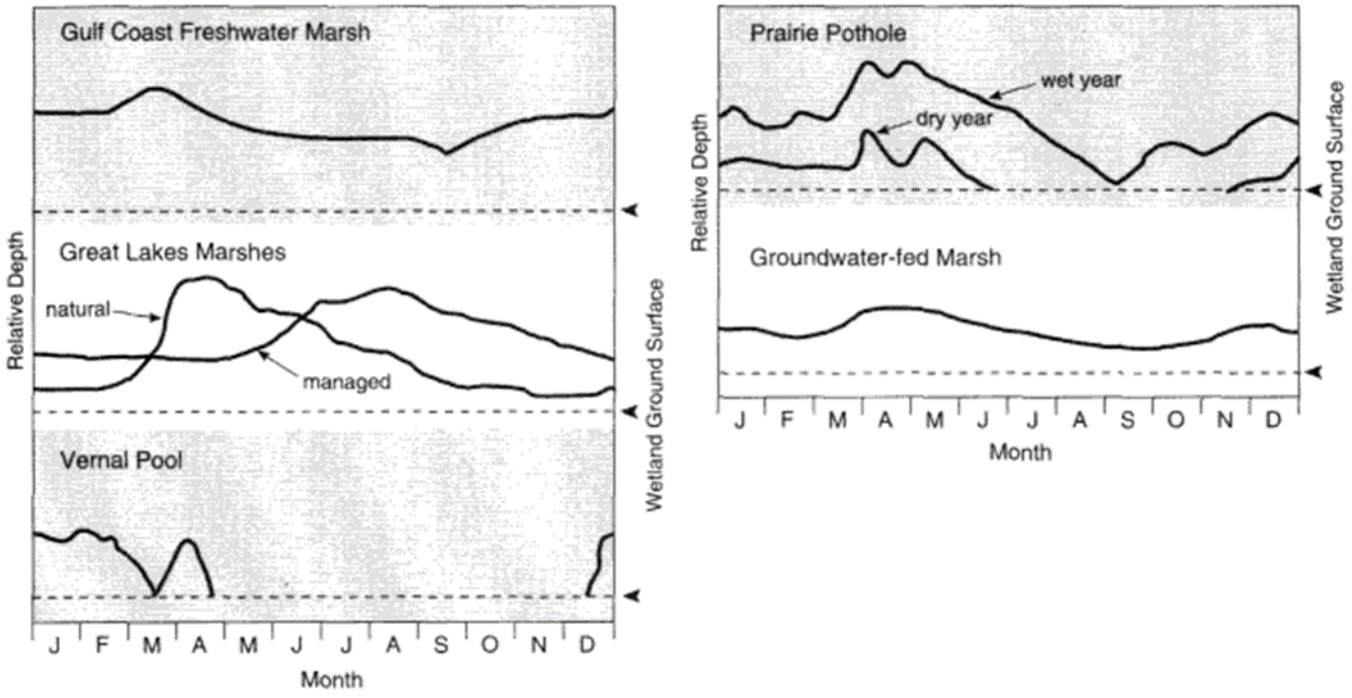

Figure 6. Examples of natural and managed ecosystems and their seasonal hydrology patterns (National Research Council, 1995).

Managed systems, have different hydrographs which do not necessarily follow a natural seasonal pattern. For example, marshes that are managed for waterfowl production maintain a prolonged hydroperiod to sustain waterfowl activity, and every few years the dams are lowered or raised to change water levels to promote vegetation diversity (Fig. 6). Drained wetlands tend to have a shorter than natural hydroperiod overall. Actively drained wetlands with a beaver population tend to develop cycles in water levels that may not represent any natural system. While beaver colonization is beneficial to wetland development, the continuous removal of dams sets up cycles for flood and drought that are too frequent and therefore not natural. While reptiles are adapted to changing water levels during their active season, they rely on water level stability during their inactive season (i.e., hibernation).

Reptiles are ectotherms that move about their habitat in response to environmental cues such as temperature and moisture gradients (Huey, 1982; Baldwin et al., 2006). Reptiles cannot survive winter in a frozen state and must rely upon locating thermally buffered hibernacula to survive winter (Gregory, 1982; Ultsch, 1989; Costanzo and Lee, 2013). Turtles are predominantly aquatic hibernators whereas snakes hibernate terrestrially or semi-terrestrially provided a life zone (i.e., a subterranean space that is frost- and flood-free) is maintained throughout winter (Yagi, 2020; Yagi et al., 2020). Reptiles often use site fidelity behaviour to re-locate previously used hibernation areas which is why they occupy a home range that includes these hibernation site features (Yagi and Tervo, 2005; Harvey and Weatherhead,

2006; Smith, 2009). Reptiles enter their hibernacula in the fall season (i.e., October to November in southern Ontario).

In Wainfleet Bog, Massasaugas have been documented within their hibernacula as early as September and have been seen above the ground during winter thaw events (Yagi and Tervo, 2005). Massasaugas emerge from hibernation in May, depending on temperatures, and have been observed above ground as early as the first week of April at this site (Yagi, 2020).

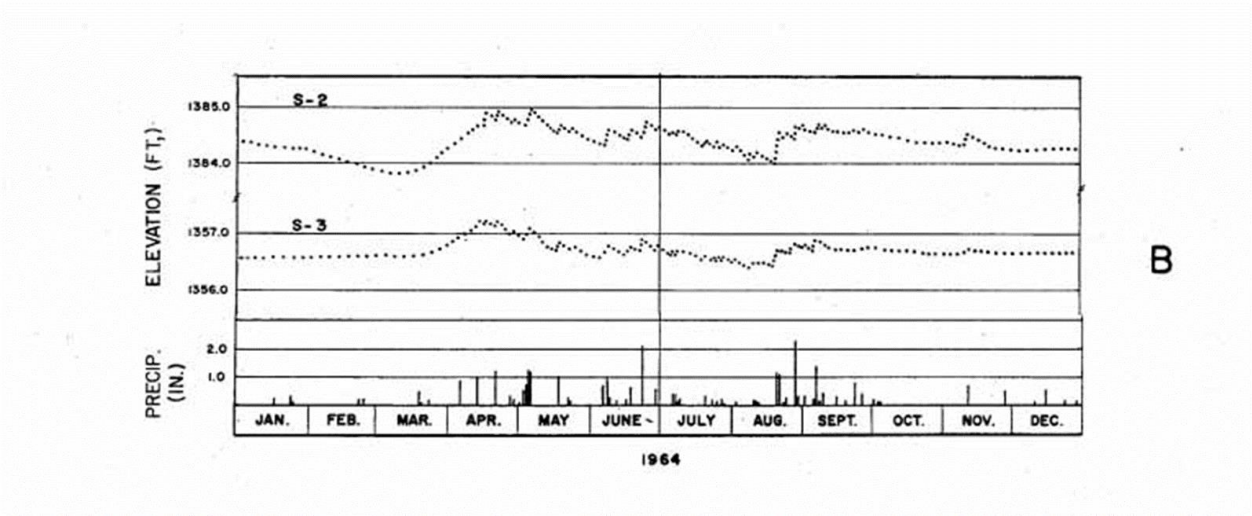

Figure 7. An example of natural bog seasonal hydrology patterns (2 sites) showing a raising water table in April during reptile emergence and a steady level in October during hibernation site selection and throughout winter during hibernation. There is little seasonal variation in water levels overall (Bay, 1968).

Spotted Turtles have also been found near their hibernation site from September to November (Yagi and Yagi, 2018). This species is known to use Sphagnum hummocks, rock caverns, and existing burrows (e.g., made by muskrats) as hibernacula (Litzgus et al., 1999). In the Wainfleet bog, Spotted turtles have been observed using burrows in the banks of drains at a shallow depth (approx. 30 - 50 cm from surface), and therefore become vulnerable to declines in water levels during hibernation (Yagi, 2010). Although Spotted turtles can tolerate low oxygen levels during winter for a few months, they eventually require access to oxygen (Litzgus et al., 1999). Ideal hibernation habitat includes non- freezing semi aquatic spaces with an aerobic air space for ventilation or continuous oxygenated non-freezing aquatic environments to sustain cutaneous respiration via cloacal oxygen exchange (Yagi and Yagi, 2018).

The natural history of these species are important considerations for understanding ecological trap theory and how the ecological trap (central mined peatland) operates on these populations within the Wainfleet Bog ecosystem. Comparing the natural bog hydrograph to the Wainfleet bog hydrology from 2018 to 2020 shows a reverse hydrology pattern of declining spring water levels when beaver dams are removed and increasing water levels during winter hibernation period.

The Ecological Trap

The Wainfleet Bog harbours the majority of the individuals in the Carolinian designatable unit (DU) for the endangered Massasauga (COSEWIC, 2012), and houses the third largest subpopulation of endangered Spotted turtles in the southwestern region of Ontario (COSEWIC, 2014). Due to the unstable

water table, the low-lying areas, such as the mined portions owned by NPCA, are proving to act as an ecological trap to both endangered species, and likely the greater reptile community.

The theory behind ecological traps expands on source-sink theory in metapopulation biology, whereby the trap is a "low-quality" habitat that is attractive and preferred by individuals over other available "high-quality" habitat. The trap effect is that this "low-quality" habitat does not support reproduction or overall survival of individuals even though it is preferred, and therefore cannot sustain the population – it is an "attractive sink" to these populations (Battin, 2004).

For Massasaugas, the trap habitat is the low-lying, hot open peat that exists in the peat-mined areas during dry-cycle years, as gravid female snakes seek out hot, open areas for gestation sites. Gravid females usually do not move far from a chosen gestation site during the summer, putting themselves in a vulnerable state as they remain exposed/basking to achieve their ideal thermoregulatory requirements. When the females give birth in these low-lying areas, the neonates are left in a "low-quality" habitat to choose hibernation sites in the fall. Since neonates are naïve to the behaviour of their habitat, they will choose any nearby hole (i.e., small mammal burrow) for hibernation. Since these snake's exhibit site fidelity to hibernacula, survivors will return to their initial hibernation site (or general area) in subsequent years. When the habitat moves back into a wet-cycle, the low-lying areas will flood over fall or winter, and effectively kill off any snakes hibernating there. This is the sink, or the ecological trap. ***The ecological trap is evident at NPCA 5 site where water levels are below ground in the fall during hibernation site selection, but they increase over winter and flood the surface during hibernation removing the life zone (Fig. 4).***

For Spotted turtles, the trap habitat appears during dry-cycles. It is the dry, terrestrial habitat that is attractive to Spotted turtles during the hottest and driest months of the year. Spotted turtles are the first species to become active in the spring, with a comparatively cooler preferred temperature range to other species (Yagi and Litzgus, 2013). This results in Spotted turtles exhibiting aestivation behaviour during the hot summer months, often between late July and September. Aestivation is a state of dormancy that some ectotherms use to cope with environmental conditions that become unfavorable to remain active within (Ernst, 1982; Yagi and Litzgus, 2012). Spotted turtles aestivate more often when their habitat cannot provide cool enough temperatures and have been found to do so more frequently during dry-cycles in Wainfleet Bog (Yagi and Litzgus, 2012). Ideal aestivation habitat are terrestrial areas with enough shade cover and leaf litter to protect against sun and heat exposure – in the Wainfleet bog, that includes areas with sphagnum hummocks, leaf litter under blueberry bushes, cotton grass hummocks, and leaf litter under forested areas (Yagi and Litzgus, 2012). Unfortunately, the trap effect transpires when wildfires occur during these hot summer months, which naturally target the dry, terrestrial habitats that Spotted turtles use for aestivation. To date 2 adult Spotted turtle carcasses have been found in burn areas within the bog (M. Browning pers. Obsv.).

Additionally, since wintering sites are drier during dry cycles, this causes turtles to begin hibernation at a deeper burrow depth risking anoxic conditions if the water levels rise overwinter. Midwinter hibernation surveys indicate the highest oxygen content is near the ice surface about 20-30 cm depth and the least oxygen (< 2mg/l dissolved oxygen) is in deeper areas > 30cm (Yagi and Yagi, 2018). We have found evidence of overwinter mortality in three species of turtles following dry winter cycles. We found 3 dead adult spotted turtles and several more remains of Snapping turtles and Painted turtles in drains following winters of 2002, 2004, 2012, 2014, 2015. All years showed lower total precipitation records

and low ground water levels. All these turtle species are adapted to aquatic hibernation under the ice with low oxygen conditions, but they do not survive prolonged anoxia (no oxygen) (Ultsch and Jackson, 1982; Ultsch, 1985 and 1989), which are the conditions found in the internal drains at depth (Yagi and Yagi, 2018).

Population Ecology for Rare species

Population dynamics of cryptic or rare species are difficult to assess using classic mark-recapture calculations, because several assumptions of the model are violated. There is no guarantee that survival rates are the same between years, especially when the habitat does not always support their survival, and there is no guarantee that catchability is equal among individuals. The nature of surveying for rare and cryptic species often results in a low recapture rates, that classically over-estimates population size. A better way to determine the trajectory of a population is by using predictive models that require knowledge for mortality factors, sensitivity testing, estimates of fecundity and survivorship by age class. We have begun a population viability analysis for the Wainfleet Massasauga Population comparing managed (neonate dispersal control using assisted/forced hibernation) and unmanaged scenarios.

For turtles, understanding that adults are being eliminated from the population at an unnatural rate is cause for alarm without need for any calculations. Adults are of highest reproductive value in turtle populations (Crouse et al., 1987; Crowder et al, 1994), as the adults sustain the population by producing recruitment every year. It is known that survival of turtles increases exponentially as they age, and that survival of hatchlings is always extremely low, but never zero. For snakes, especially Massasaugas, having a lack of recruitment over many years impacts the population greatly, as these snakes begin reproducing at age 3 or 4 (Yagi et al., 2018). A 3-to-4-year cycle in habitat quality may effectively wipe out an entire cohort of newly mature snakes and can cause a population crash in less than 10 years.

To ensure the protection and recovery of these species-at-risk, and the greater reptile community, the hydrological regime and frequent dry-to-wet cycles occurring within the Wainfleet Bog must be addressed. By removing the reverse seasonal fluctuations brought on by municipal drain maintenance (i.e., Biederman Drain), we can remove the impact to the habitat, give the landowners better control of the sites water-levels, and begin to move the entire wetland ecosystem on the right trajectory towards recovery.

Current Species at Risk Mitigation

The ecological trap can be addressed by stopping the trap from operating in the first place. There are several options that we have proposed to NPCA but have not been fully accepted to date. The proposed mitigation methods reflect Provincial and National recovery strategy objectives for the Wainfleet Population (OMNR, 2015; Parks Canada, 2015).

Our proposed mitigation actions are as follows:

1. Stopping Massasaugas from gestating in the central mined peatland and initiating site fidelity behaviour, by bringing gravid females into the lab to give birth. Releasing post-partum females at point of capture following 1 week of imprinting and retaining neonates for assisted/forced hibernation across all identified life zone areas.

2. Enhancing refugia areas (higher elevation habitats within the bog feature) which are also areas that maintain a life zone, for gestation habitat function by keeping areas open using artificial gestation site cover objects and vegetation maintenance.

3. Preventing Massasauga neonates from dispersing into the Central Mined peatland and selecting burrows for hibernation by using “assisted/ forced” hibernation techniques. Place neonates into artificial burrows within known life zone areas to overwinter until spring.

4. Keeping flood prone areas flooded by maintaining beavers and their dams. Monitor water levels across ecosystem. We currently have 3 water level transducers sites.

5. Monitor life zone areas using winter monitoring methods, locate suitable areas for Life zone monitoring, and testing habitat suitability using force hibernated gartersnakes prior to using sites for Massasauga neonates.

6. Use Massasauga neonates in forced hibernation in life zone areas identified from across the site to ensure genetic diversity is captured overtime.

7. Create new hibernation life zones for snakes in potentially suitable areas, by adding microtopography and woody material and creating conditions for sphagnum growth.

8. Add more dams into low lying areas or create more microtopography in the interior to create aquatic refugia for turtles.

9. Mitigate winter anoxia problem for turtles by adding ventilation pipes to drain banks where dead turtles have been found. Monitor aquatic habitats during mid-winter ice cover period.

10. Remove individuals from the population a maximum of 2 neonates per litter to the Toronto Zoo as part of the Species Saving Plan (SSP) for Massasaugas.

We currently have partial permission for #1 but can only hold females for 24hours which is an unrealistic permit condition, and we cannot use neonates captured on NPCA lands in the assisted/forced hibernation project where we have over 74% annual survival (3 to 4 times natural survival). Nor can we fix, identify or test for hibernation habitat suitability within NPCA lands. We do have permission to monitor one well field that is in the trap area and we can maintain 3 automatic water level loggers within NPCA lands. ***Without receiving NPCA permissions to implement our full mitigation methods (which are the approved provincial methods), we need to find a long-term solution to the drainage threat, or the SAR populations will continue to decline.***

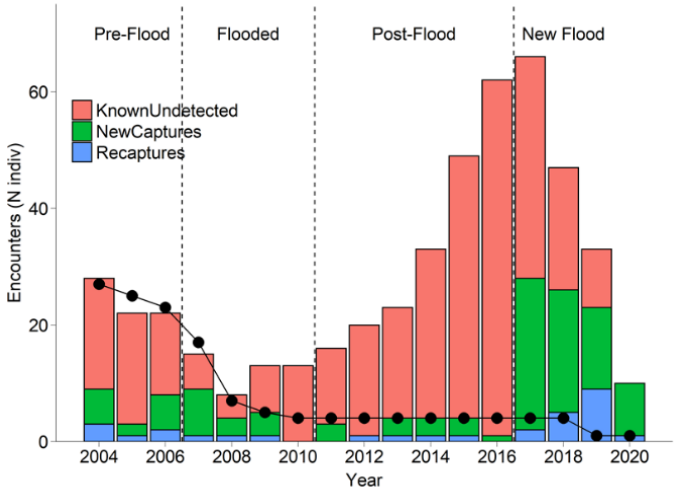

Figure 8. Massasauga encounter Index from 2017 to 2020 were back casted based upon their age onto the long-term data set. Encounters were ~90% from refugia areas where snakes had established site fidelity since the first flood event in 2006-2010. However, there are now increasing encounters within the Central Mined peatland (i.e., ecological trap area) accounting for 10% of overall encounters. Trend is more accurate in the past than the most recent 4 years. Method from Yagi et al., 2020

Current Recovery State of the Site

Engaging stakeholders is key to moving forward with any restoration work. To help facilitate communication between the scientists, practitioners and stakeholders, the Society for Ecological Restoration (SER) uses various tools, such as a Recovery Wheel (see below) to communicate scientific results to a general audience. Each part of the wheel represents a different aspect of the restoration project in question. Recovery level is assessed on a scale of 1 (minimal) to 5 (advanced), and is used to help determine the current state of the site in question. A more filled-in wheel represents a more complete or on-track restoration project.

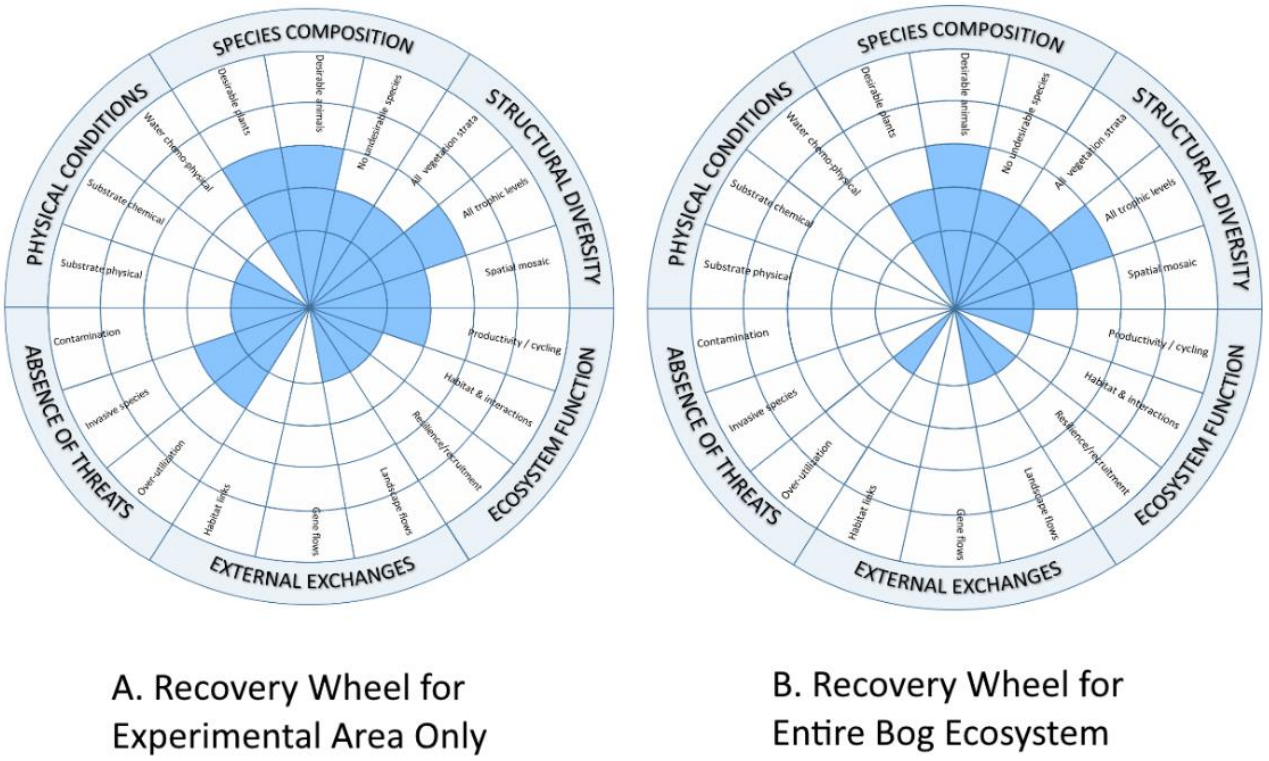

Figure 9. A comparison of two recovery wheels made to communicate the recovery state of the Wainfleet Bog to NPCA and other stakeholders. A. reflects the time period during the experimental ditch blocking from 2000 to 2008. B. represents the entire ecosystem today. An ecosystem that is on a recovery trajectory would be filled in with "blue".

The two recovery wheels above were filled out by Mark Browning and Katharine Yagi, and reviewed by the delegation, in order to show the recovery state of the Wainfleet bog for (A) the experimental area where M. Browning set up the vegetation plots, and (B) the entire bog ecosystem, which incorporates all of NPCA, MECP and private lands. For wheel (A), because the immediate threat of drainage was experimentally addressed using peat dams in interior drain, we ranked the "absence of threats" section as a 1 out of 5 star. The ranking was not higher than this because most of the original peat dams are no longer present, largely due to beaver activity. However, since the impact of drainage has not yet been addressed for the entire ecosystem, the "absence of threats" was ranked with 0 out of 5 stars for wheel (B), with a 1 out of 5 star subsection acknowledging that the peat mining activity has fully stopped within the site. Further details on the recovery wheel ranking criteria can be found in the Appendix.

Primary Proposal

Biederman drain Re-alignment to 1930s Route

We are proposing that the 1.4 section of Biederman drain that cut into the moat of Wainfleet Bog along the southern edge, be moved back to its 1930s route through the clay agricultural fields. This action will result in the abandonment of the existing section that cuts through the bog, giving space for beaver activity, and giving NPCA better control over the water levels within this site (see Figure of catchments from M. Browning). It is recommended that one control structure be installed at the east junction point, and structure height can be decided on that will suit all stakeholder goals, and ultimately determine the trajectory for the bog's recovery.

This change will result in; 1) better control by NPCA of water levels within their lands, 2) Better protection and recovery of species-at-risk and their habitat, 3) better drainage of the adjacent agricultural fields, 4) removal of drainage feature from a nationally significant wetland and 5) improvement of Haudenosaunee traditional harvesting territory, and preservation of sacred species.

Post-monitoring of wells, vegetation plots, SAR population monitoring and overall reptile community monitoring will be required to determine the site response to this action. All research and data to date support this action.

Figure 10. Aerial view of southern edge of Wainfleet Bog, with the current route of Biederman drain in dark blue, and the historical, proposed route in light blue. Yellow rectangle indicates the proposed location of the dam structure to be installed (a one-control-point solution).

This proposal addresses goal #1 of the Site Management Plan.

Alternate Proposal

The alternate proposal, which was originally discussed with NPCA in a meeting in January 2021, shows the need for several dam structures along the Biederman drain to help block off the major drainage outlets but keeps the municipal channel open for ongoing farm drainage. However, beavers and turtles dig their own tunnels in the banks of watercourses, and beavers use the Biederman drain as a dispersal corridor to retreat to deeper water areas when the bog drains down following maintenance. Beavers will likely attempt to bypass the dams creating additional drain outlets and new dams in the main channel which is deeper and preferred habitat. The dam outlet structures would require constant monitoring and maintenance by NPCA. Therefore, while this plan was proposed first, there are caveats that would likely lead to increased maintenance costs to the NPCA, and is not a long-term, sustainable solution to maintain water levels within the bog.

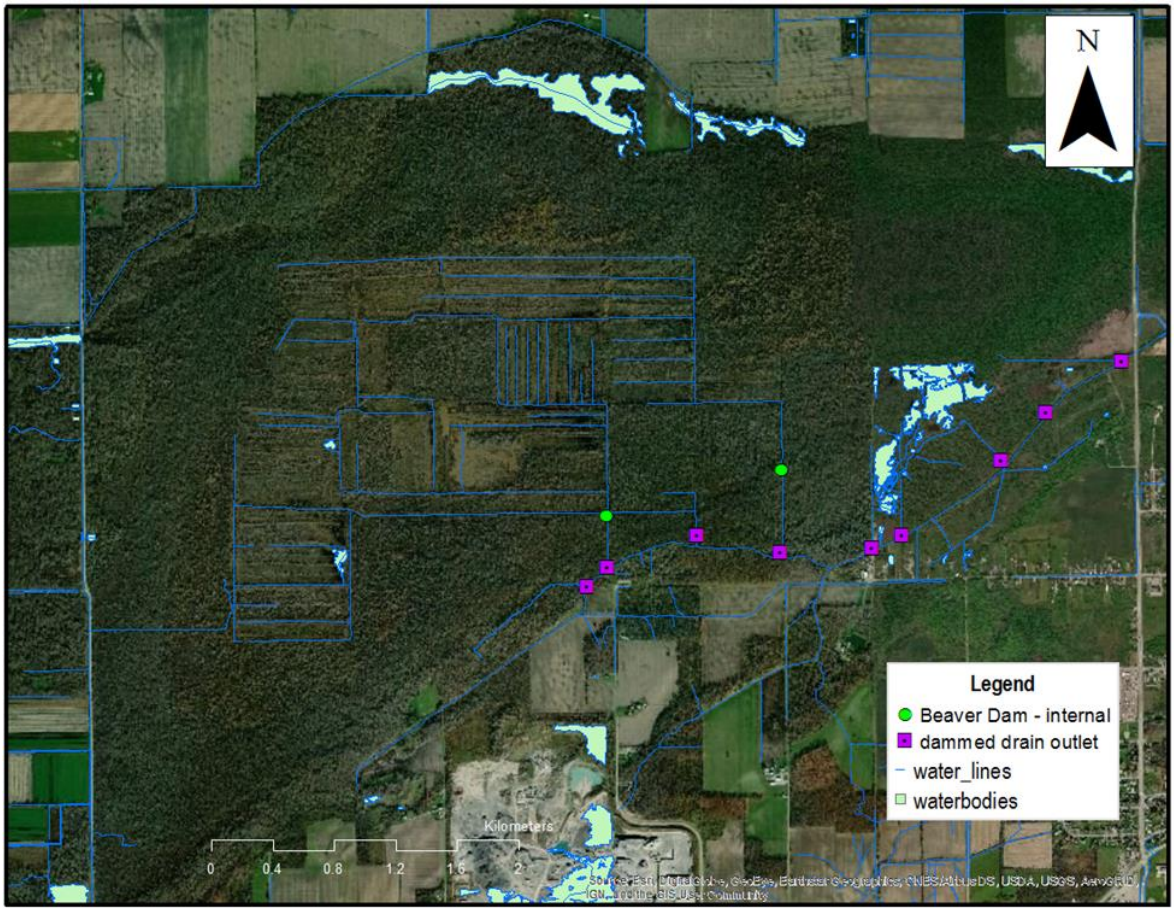

Figure 11. Aerial view of the Wainfleet bog showing locations where dams will be required (purple squares) along Biederman drain in order to address the municipal drainage impacts on the ecosystem.

Table of Recommendations

The highest ranked option using an objective scoring system is option 1.

		Biological & Ecological Variables						Social		Regulatory					Capital Project	
	Description	Spotted Turtle (poaching, survival, habitat)	Massasauga (poaching, survival, habitat)	Sphagnum and other bog vegetation	Fish (presence, abundance, habitat)	Biodiversity (increase in native wetland species)	Ecosystem Function (carbon sequestration, storm attenuation)	Recreational Activity (safety, accessibility, low cost)	NPCA Reputation	ESA	SARA	Fisheries Act	CA Act (protect wetlands from drainage)	Drainage Act (landowners have the right to drain farmlands)	Timing (longer time frame is better)	Costs (lower costs is better)
Option 1 (recommended): realign 1.4 section of Biederman drain back to its 1930s alignment	request to move 1.4km section of Biederman drain back to its 1930s route - for Drainage Engineer's report (closes June 2021). Will remove municipal maintenance activities within the wetland feature, add a 300m buffer to the wetland, and allow NPCA to have better control over water levels within the site. This is a long term solution that will stabilize the fluctuating water table and promote recovery of the bog vegetation, SAR populations, their habitat and the overall ecosystem. Low-lying areas will remain flooded, and boardwalks can be built to facilitate public access to the site. Also, less (or NO) regulatory permits will be required for drain maintenance activities in the 1930s route as it is outside of the wetland boundaries and through clay agricultural fields.	+++	+++	+++	+++	+++	+++	++	++	+++	+++	+++	+++	+++	---	+++
Option 1 Total	97	7	7	7	7	7	7	6	6	7	7	7	7	7	1	7
Option 2: block off all outlets to Biederman drain	NPCA to build several dam structures at the outlets along the current Biederman drain path. This may temporarily stabilize water levels, but requires frequent maintenance by NPCA, and does not remove the dam removal activity in the Biederman drain (regulatory permits still required).Since turtles and beaver dig tunnels, it is possible that new outlets will be formed to the Biederman drain in this case. This is only a short-term solution, and will require permission for 8Trees full mitigation methods across NPCA lands to help ensure some Massasauga recruitment. Also, opening another report in <10 yrs may be difficult if the landowners do not want it, and will negatively effect adjacent landowners current work/costs for tile drainage...	+	+	+	+	+	+	++	0	--	--	--	--	---	+++	---
Option 3 Total	53	5	5	5	5	5	5	6	0	2	2	2	2	1	7	1
Option 3: Do nothing	allow for continued maintenance of Biederman drain, which knowingly causes negative impacts to SAR habitat and limits the progress of bog restoration. In dry years, the bog will continue to have wildfires, which reverses any restoration progress in terms of peat carbon sequestration, and kills animals (i.e. turtles) using the terrestrial habitat during the hottes/driest months. The water levels will continue to fluctuate and cannot be controlled overwinter, thus impacting hibernating snakes in low-lying areas.	---	---	---	---	---	---	+	-	---	---	--	--	--	+++	+++
Option 3 Total	36	1	1	1	1	1	1	5	3	1	1	2	2	2	7	7

scale							
symbol	---	--	-	0	+	++	+++
Points	1	2	3	4	5	6	7
Criteria	3 neg	2 neg	1 neg	neutral	1 pos	2 pos	3 pos

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Yagi A.R., K.T. Yagi, B. Breton, C. Blott and T. Bukovics.2019. Managing an ecological trap in a partially mined peatland on the resident reptile community which includes five species at risk; massasauga; Eastern Ribbon; Spotted turtle; Snapping turtle and Blanding's turtle final report FY 2018-19 to the Ontario Species at Risk stewardship fund.

Yagi, A.R., Abney, C., Bukovics, T., Breton, B.A., Blott, C., Garcia, B. and Yagi, K.T., 2018. The Young and the Restless: Postpartum Breeding and Early Onset Sexual Maturity in an Isolated Northern Population of Massasauga Rattlesnakes. Journal of Zoology, 89(1), pp.60-68.

Yagi, A., 2020. Flood Survival Strategies of Overwintering Snakes (Master's thesis, Brock University).

Yagi A.R., K.T. Yagi, B. Breton, C. Blott and T. Bukovics.2020. Managing an ecological trap in a partially mined peatland on the resident reptile community which includes five species at risk; Massasauga; Eastern Ribbon; Spotted turtle; Snapping turtle and Blanding's turtle final report fy 2019-20 to the Ontario Species at Risk stewardship fund.

Yagi, A.R., Planck, R.J., K.T. Yagi, and G.J. Tattersall. 2020. A long-term study on Massasaugas (*Sistrurus catenatus*) inhabiting a partially mined peatland: A standardized method to characterize snake overwintering habitat. Journal of Herpetology, 54(2), pp.235-244.

Yagi K.T. and J. Litzgus. 2012. The effects of flooding on the spatial ecology of spotted turtle (*Clemmys guttata*) in a partially mined peatland. Copeia (2) 179-190

Yagi K.T. And J. Litzgus.2013. Thermoregulation of Spotted turtles (*Clemmys guttata*) in a beaver-flooded bog in southern Ontario, Canada. J of Therm biol. (38) 205-213

Correspondence from Drainage Engineer

8 Trees Inc.
11 Berkwood Place
Fonthill, Ontario, L0S 1E2 Website: www.8trees.ca

June 1, 2021

Chandra Sharma
Chief Administrative Office/Secretary-Treasurer
250 Thorold Road West; 3rd Floor
Welland, ON L3C 3W2

RE: Funding for the Biederman Drain Re-Alignment Proposal

Please see the attached preliminary estimate for the costs to re-align the Biederman Drain to its original alignment completed by Brandon Widner P. Eng. Spriet Associates, Architects and Consulting Engineers.

8Trees has applied for funding from the Ontario Species at Risk Program to cover the capital costs of this project. I have also been in contact with the funding coordinator to provide this cost estimate to update our February 2021 3-year-application. This project aligns with the province's top priority species funding criteria, and we expect their full support.

8Trees has also agreed to continue to provide support to this project and to cover these capital costs to ensure a smooth process.

Regards,

Anne Yagi MSc., EP, CERP
President 8Trees Inc.

Anne Yagi

From: Jaxa-Debicki, Kim (MECP) <Kim.Jaxa-Debicki@ontario.ca>
Sent: May 5, 2021 2:22 PM
To: Anne Yagi
Subject: RE: Drain Relocation Costs

This is good! 😊

From: Anne Yagi <anne.yagi@8trees.ca>
Sent: May-05-21 2:20 PM
To: Jaxa-Debicki, Kim (MECP) <Kim.Jaxa-Debicki@ontario.ca>
Subject: FW: Drain Relocation Costs

Hi Kim
I just got this from the engineer- we should be able to spend our funding in the proper year.
See below.

Regards,
Anne Yagi, M.Sc., EP, CERP
President
8 Trees Inc.
We are here to help!
www.8trees.ca
Ph: 905-892-1760
All Citizen Scientists, try our newest mobile app "My field App"
From your mobile phone go to https://qrco.de/bbRJJ5
OR Scan the QR Code
SCAN ME

From: Brandon Widner
Sent: May 5, 2021 2:10 PM
To: Anne Yagi <anne.yagi@8trees.ca>
Cc: Alana VanderVeen <Alana.VanderVeen@portcolborne.ca>; Mark Jemison <MJemison@wainfleet.ca>
Subject: RE: Drain Relocation Costs

Anne

The cost would billed the year following the construction.

Currently the project is schedule for report later this year, construction next year. Probably billed the year following.

Probably Early 2023

Thanks

Brandon Widner
P.Eng
Spriet Associates **Architects and Consulting Engineers**
155 York St. - London, ON - N6A 1A8
phone: 672.4100
brandon@spriet.ca
www.spriet.on.ca

From: Anne Yagi <anne.yagi@8trees.ca>
Sent: May 3, 2021 4:22 PM
To: Brandon Widner <brandon@spriet.on.ca>
Subject: RE: Drain Relocation Costs

Hi Brandon
The province just got back to me. What year would this be spent?
This year?

Regards,
Anne Yagi, M.Sc., EP, CERP
President
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From your mobile phone go to https://qrco.de/bbRJJ5
OR Scan the QR Code
SCAN ME

From: Brandon Widner
Sent: May 3, 2021 2:04 PM
To: C Blott <cblott6@gmail.com>; Katharine Yagi <katharine.yagi@8trees.ca>
Cc: Anne Yagi <anne.yagi@8trees.ca>
Subject: Drain Relocation Costs

Cathy

As discussed, attached is an estimated cost for the works to relocate the Biederman Drain

Let me know if you have any questions

Thanks

Brandon Widner
P.Eng
Spriet Associates **Architects and Consulting Engineers**
155 York St. - London, ON - N6A 1A8
phone: 672.4100
brandon@spriet.ca
www.spriet.on.ca

From: C Blott <cblott6@gmail.com>
Sent: April 29, 2021 10:09 AM
To: Katharine Yagi <katharine.yagi@8trees.ca>
Cc: Barry Warner <barry.warner@uwaterloo.ca>; Diemer, Kristen (MECP) <Kristen.Diemer@ontario.ca>; Brandon Widner <brandon@spriet.on.ca>; Browning, Mark (MNRF) <mark.browning@ontario.ca>; Anne Yagi <anne.yagi@8trees.ca>
Subject: Re: Meeting with NPCA

Brandon Widner, the engineer, will be there, May 6, 10am. I just spoke with him on the phone and he will be providing us & bringing capital cost calculations to meeting.

Cathy Blott
Habitat Design & Stewardship
519-496-6421

On Thu, Apr 29, 2021 at 10:00 AM Katharine Yagi <katharine.yagi@8trees.ca> wrote:

> Hello Everyone,
>
> I wanted to check that everyone received a meeting invite (zoom link) from Gina Shaule at NPCA for May 6th, 10:00 AM – 10:45 AM?

SCHEDULE 'B' - COST ESTIMATE

BIEDERMAN DRAIN

City of Port Colborne

We have made an estimate of the cost of the proposed work which is outlined in detail as follows:

DRAIN RELOCATION

Clearing & grubbing of ditch bank with mechanical brushing (Approx. 1400m)	$	18,900.00
1400 meters of open ditch reconstruction & cleanout	$	7,000.00
Levelling of excavated material	$	4,900.00
Seeding of ditch banks and buffer strips (Approx 10000m²)	$	3,500.00
Erie Peat Road		
18 meters of 1500mm dia. 3.5mm thickness Aluminized C.S.P. with 125mm x 25mm corrugations		
Supply	$	10,800.00
Installation of pipe including supply and installation of bedding and backfill material and disposal of any unacceptable material	$	6,800.00
Supply and installation of quarry stone riprap (Approx. 16m³ Q.S. required)	$	2,400.00
(Roll No 1-250-00)		
16 meters of 1500mm dia. 2.8mm thickness Aluminized C.S.P. with 125mm x 25mm corrugations		
Supply	$	8,000.00
Installation of pipe including supply and installation of bedding and backfill material and disposal of any unacceptable material	$	5,600.00
Supply and installation of quarry stone riprap (Approx. 12m³ Q.S. required)	$	1,800.00
Barrick Road		
16 meters of 1500mm dia. 2.8mm thickness Aluminized C.S.P. with 125mm x 25mm corrugations		
Supply	$	8,000.00
Installation of pipe including supply and installation of bedding and backfill material and disposal of any unacceptable material	$	5,600.00
Supply and installation of quarry stone riprap (Approx. 12m³ Q.S. required)	$	1,800.00
Exposing and locating existing tile drains and utilities Construction	$	2,000.00
Contingencies	$	5,100.00
Allowances under Sections 29 & 30 of the Drainage Act	$	19,530.00

PRELIMINARY

BIEDERMAN DRAIN
City of Port Colborne

ADMINISTRATION

Interest and Net Harmonized Sales Tax	$	2,870.00
Survey, Plan and Final Report	$	16,700.00
Expenses	$	1,000.00
Supervision and Final Inspection	$	4,700.00
TOTAL ESTIMATED COST	**$**	**137,000.00**

Anne Yagi

From: Brandon Widner <brandon@spriet.on.ca>
Sent: May 5, 2021 2:10 PM
To: Anne Yagi
Cc: Alana VanderVeen; Mark Jemison
Subject: RE: Drain Relocation Costs

Anne

The cost would billed the year following the construction.

Currently the project is schedule for report later this year, construction next year. Probably billed the year following.

Probably Early 2023

Thanks

Brandon Widner
P.Eng
Spriet Associates Architects and Consulting Engineers
155 York St. - London, ON - N6A 1A8
phone: 672.4100
brandon@spriet.ca
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As discussed, attached is an estimated cost for the works to relocate the Biederman Drain

Let me know if you have any questions

Thanks

Brandon Widner
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Cc: Barry Warner <barry.warner@uwaterloo.ca>; Diemer, Kristen (MECP) <Kristen.Diemer@ontario.ca>; Brandon Widner <brandon@spriet.on.ca>; Browning, Mark (MNRF) <mark.browning@ontario.ca>; Anne Yagi <anne.yagi@8trees.ca>
Subject: Re: Meeting with NPCA

Brandon Widner, the engineer, will be there, May 6, 10am. I just spoke with him on the phone and he will be providing us & bringing capital cost calculations to meeting.

Cathy Blott
Habitat Design & Stewardship

519-496-6421

On Thu, Apr 29, 2021 at 10:00 AM Katharine Yagi <katharine.yagi@8trees.ca> wrote:

> Hello Everyone,
>
> I wanted to check that everyone received a meeting invite (zoom link) from Gina Shaule at NPCA for May 6th, 10:00 AM – 10:45 AM?
>
> Thanks,
>
> Katharine Yagi, PhD, CERPIT
>
> Research Associate | 8Trees Inc.| www.8trees.ca
>
> Department of Biological Sciences | Brock University
>
> Amphibian and Reptile Specialist Subcommittee | COSEWIC
>
> E1: katharine.yagi@8trees.ca | E2: kyagi2@brocku.ca | T: (905) 328-2450

Anne Yagi

From: Brandon Widner <brandon@spriet.on.ca>
Sent: May 7, 2021 8:07 AM
To: Katharine Yagi
Cc: C Blott; tbukovics@gmail.com; Anne Yagi
Subject: RE: Meeting follow up - letter request
Attachments: 19-HCAA-01802 - Biederman Drain Maintenance - DFO Class Authorization

Katharine

Couple issues with you letter.

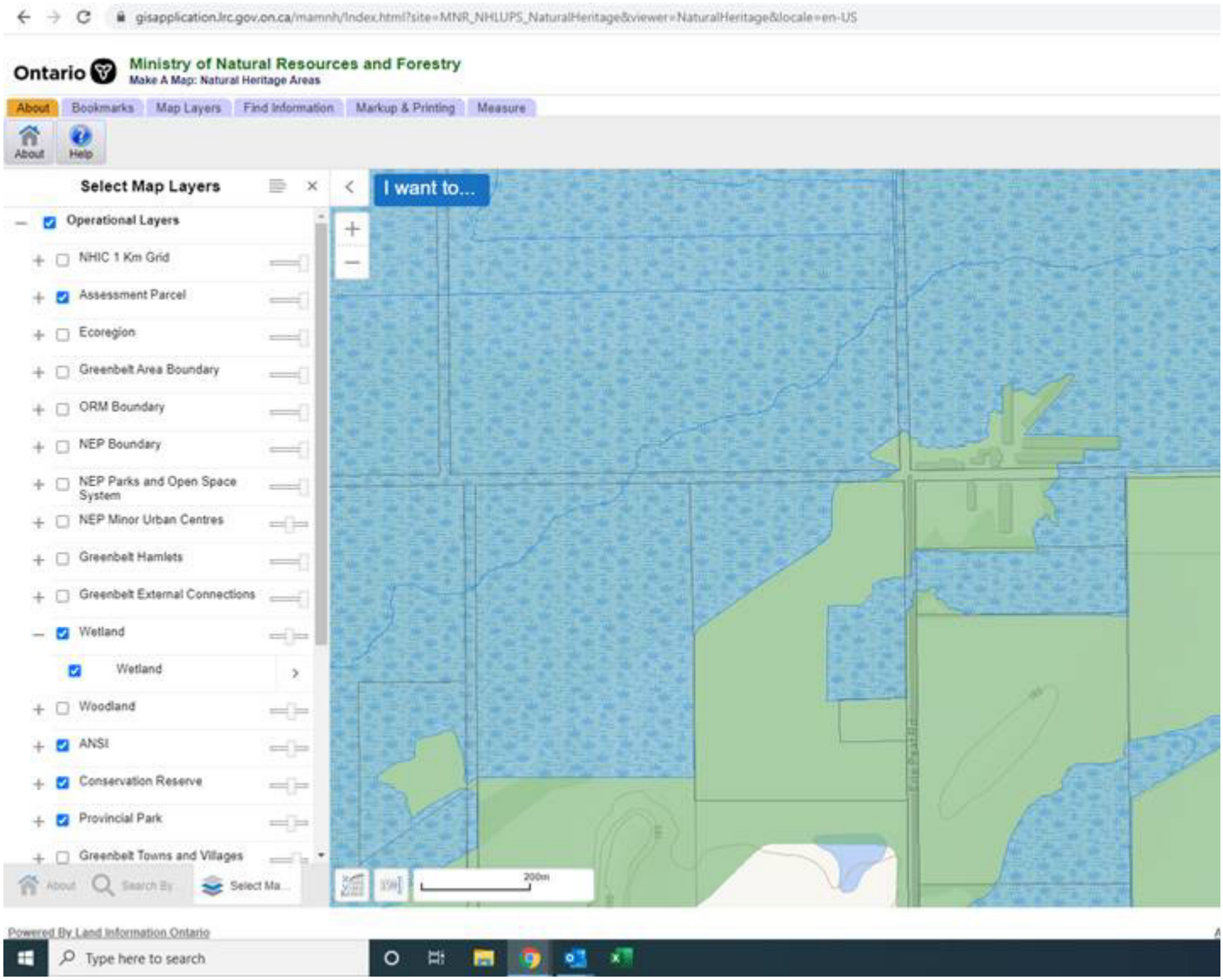
All the permits have not been received, only the DFO. And yes, it could just an amendment, but this is a class E drain. And the DFO could just turn the proposal down flat out. I have not even ran this idea past them

As for the cost it would not be anticipated for an increase to anyone, but remember that is an estimate and the drain still has to be surveyed.

I must be clear in that you need to get the NPCA on board and OK for me to propose putting the new route through their wetland as all correspondence I have ever received is they will not allow any new drains through wetlands, and I don't see them making an exception for themselves.

Thanks

Brandon Widner
P.Eng
Spriet Associates Architects and Consulting Engineers
155 York St. - London, ON - N6A 1A8
phone: 672.4100
brandon@spriet.ca
www.spriet.on.ca



From: Katharine Yagi <katharine.yagi@8trees.ca>
Sent: May 6, 2021 3:50 PM
To: Brandon Widner <brandon@spriet.on.ca>
Cc: C Blott <cblott6@gmail.com>; tbukovics@gmail.com; Anne Yagi <anne.yagi@8trees.ca>
Subject: Meeting follow up - letter request

Hi Brandon,

Thanks for meeting with us this afternoon. As discussed, can you please write us a cover letter to accompany the cost estimate?

The following point(s) should be addressed in the letter:

- When capital costs are covered ($137 K estimate) by the SAR fund, there will be no other costs expected (or no expected change in costs) to landowners for moving this 1.4km section of Biederman drain back to its original route.
- All regulatory permits have already been received for this project, and any changes that result from this work (moving the drain back to original alignment) will only require amendments.

You can reword these points if you wish.

Thank you!
-Katharine

Katharine Yagi, PhD, CERPIT
Research Associate | 8Trees Inc.| www.8trees.ca
Department of Biological Sciences | Brock University
Amphibian and Reptile Specialist Subcommittee | COSEWIC
E1: katharine.yagi@8trees.ca | E2: kyagi2@brocku.ca | T: (905) 328-2450

APPENDIX

Letters and Correspondence from Delegation

May 5, 2021

Adam Christie
Director of Operations and Strategic Initiatives
250 Thorold Road West; 3rd Floor
Welland, ON L3C 3W2

Via Email

RE: Biederman Drain Realignment

Wainfleet Bog is located upon the Six Nations lands as affirmed by the 1701 Fort Albany Treaty and recognized internationally as the Six Nations Territory in the Treaty of Utrecht of 1713. These Treaties are protected under Section 35 of Canada's Constitution. Six Nations of the Grand Rivers' Aboriginal and Treaty Rights throughout Southern Ontario are well documented through archaeological findings, historical facts and written Treaty Agreements.

The Haldimand Treaty and the 1701 Fort Albany/Nanfan Treaty have been recognized in past court proceedings and are presented as factual evidence in the ongoing litigation between Six Nations of the Grand River and Crowns Canada and Ontario.

As you are aware, Wainfleet Bog is home to Spotted Turtles, Blanding's Turtles, and Massasauga Rattlesnakes, of which all are designated at risk.

Six Nations was not consulted before the original draining and mining of the Wainfleet Bog, which has caused significant environmental degradation.

We urge you to do what is necessary to request the engineer to move the 1.4 km section of Biederman drain back to its original alignment, during this open drainage improvement project under the *Drainage Act*, RSO 1990, c D.17.

Haudenosaunee people have a cultural duty to protect all species. We respectfully request that you meet with us in order for us to have meaningful consultation before making a final decision regarding this matter.

Sincerely,

Bethany Wakefield
Wildlife Manager,
Wildlife Office, Lands and Resources Department
Six Nations of the Grand River Elected Council

WILDLIFE PRESERVATION CANADA
5420 Highway 6 North, Guelph, ON N1H 6J2
admin@wildlifepreservation.ca
wildlifepreservation.ca
1-800-956-6608

12 May 2021

Re: Abandonment of the Biederman Drain (1.2 km section)

To: Mr. Adam Christie
Director, Land Operations
NIAGARA PENINSULA CONSERVATION AUTHORITY
250 Thorold Road West; 3rd Floor
Welland, ON L3C 3W2
Phone: 905-788-3135, x 323
Fax: 905-788-1121
Email: achristie@npca.ca

Dear Mr. Christie,

Wildlife Preservation Canada coordinates the Ojibway Prairie Reptile Recovery Program (OPRREC) in Windsor, ON. The major goal of OPRREC is to recover the Ojibway Prairie population of Eastern Massasauga rattlesnakes, a species with only two populations left in the Carolinian region of Canada. The Ojibway Prairie population is nearly extirpated, leaving the population of Massasaugas at Wainfleet Bog as the only remaining population in Canada's Carolinian region.

Given our involvement in Massasauga recovery, and the ongoing decline in Massasauga range, we have a strong interest in the wise management of Wainfleet Bog and the Species at Risk populations that inhabit this ecosystem. In this regard, we strongly support the proposal by 8 Trees Inc. to abandon the 1.2 km section of the Biederman Drain and its realignment back to the original 1930s alignment.

Sincerely,

Jonathan D. Choquette, BSc, MLA
Lead Biologist - Ojibway Prairie Reptile Recovery
Wildlife Preservation Canada
(226) 961-5193
jchoquette@wildlifepreservation.ca

Lance Woolaver, PhD
Executive Director
Wildlife Preservation Canada
(519) 836-9314
lance.woolaver@wildlifepreservation.ca

web: www.wildlifepreservation.ca/ojibway-prairie-reptile-recovery/

Anne Yagi

From: Kristen Bernard <Kristen.Bernard@natureconservancy.ca>
Sent: May 6, 2021 11:44 AM
To: Anne Yagi
Subject: Follow Up

Hello Anne,
I wanted to send a quick follow up note to the meeting. I thought the overall tone was encouraging, with the right people from NPCA present and engaged. It did seem to slide a bit at the end with the discussion heading towards short term stop gap measures. What next steps need to be in place to ensure NPCA has the right information to include in the board report? Would letters of support, in addition to landowner support, be helpful? I will await your follow up and continue to stay engaged. You and your team have done a tremendous amount of work on this project. Many thanks.
Kristen

Kristen Bernard
Program Director – Southwestern Ontario
Nature Conservancy of Canada | Port Rowan Office
P.O Box 520 | Port Rowan, ON N0E 1M0
T: 519.410.8605
kristen.bernard@natureconservancy.ca | www.natureconservancy.ca

Anne Yagi

From: Barry Warner <barry.warner@uwaterloo.ca>
Sent: April 8, 2021 1:25 PM
To: Anne Yagi; Katharine Yagi; C Blott; achristie@npca.ca; csharma@npca.ca
Cc: Browning, Mark (MNRF); Rick Vos
Subject: RE: Wainfleet Bog Drain Relocation Request

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning Anne:

Many thanks for sharing your latest string of communication with Mr. Christie at the NPCA. I understand your frustration to find the willing ears to hear and understand the urgency to act sooner rather than later, and who have the ability to execute tangible conservation success at the Wainfleet Bog. What makes it even more frustrating in this case is that you have the science and huge body of appropriate knowledge to target specific implementation measures. The wetland community is so fortunate to have such a dedicated and skilled team as you working on behalf of wetlands.

Good morning Mr. Christie:

Thank you for all you and others do at the NPCA for wetlands. The wetlands in the Niagara Region are exemplary and unusual which adds pressure on agencies such as yours to ensure they remain as intact as possible for future generations. I genuinely understand the demands for your time in your day to day work environment. It's hard these days when conservation authorities are so understaffed and seemingly under-appreciated by our current provincial government. We all know nothing is farther from the truth.

By way of introduction, I have been studying Wainfleet Bog since the 1980s because it is unusually Canada's most southern bog. I supervised a M.Sc. thesis on the site and have gathered additional scientific data on the site over the years. I am one of Canada's leading wetland scientists. I have long advocated that Wainfleet Bog should be added to Canada's list of wetlands of international significance but I could not find local political will to pursue it. I am a past President of the Society of Wetland Scientists (largest wetland society in the world) and a past National Focal Point for Canada on the international Ramsar Convention for Wetlands. Most of my research has focused on peat-accumulating wetlands such as the Wainfleet Bog.

I message you to emphasize the urgency in adopting and implementing the restoration measures outlined by Anne Yagi and her team. Every lost growing season is one more season that degradation continues and successful restoration is lost. I am happy to hear you report that "the site is moving in the right direction to achieve a more natural bog ecosystem including more consistent and higher water levels, rare snake and turtle populations, and accumulating sphagnum moss and peat development". Let me correct you. Even though you might observe possible natural bog ecosystem succession on the surface, in bogs such cursory observations can be misleading because most of the ecosystem components required to support successful and long-term restoration occur below the surface. That is the water table must be precisely at the correct elevation to support Sphagnum moss growth and its conversion to peat and its storage below the surface. Our studies have shown peat is not accumulating….and any potential gains are set back years and

millennia when there are fires, for example. Restoration and ecosystem preservation cannot occur until all mechanisms responsible for water removal such as drainage ditches are removed or rendered inoperable.

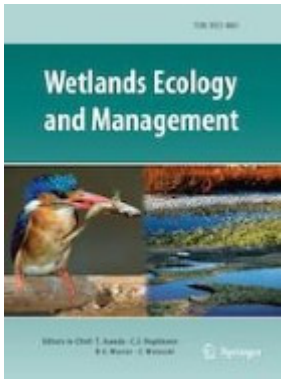
Can you and your team take a second look and set up a meeting with Anne Yagi to discuss plans to proceed as soon as possible…meetings in the fall just make this an after thought when we know exactly what needs to happen now. I, for one, and the whole wetland community will be forever indebted to you. I would truly like to see another Conservation Authority in Ontario show this government that Conservation Authorities are not as irrelevant as they would like some to believe.

I shall be happy to discuss this further with you if you so desire.

Sincerely

Barry

Barry G. Warner, Ph.D., PWS (License #1140)
Professor Emeritus,
Department of Earth and Environmental Sciences,
University of Waterloo,
Waterloo, Ontario,
Canada N2L 3G1
Email: bwarner@uwaterloo.ca
https://www.linkedin.com/in/barry-g-warner-3397b959/
and
Editor in Chief,
Wetlands Ecology and Management
https://www.springer.com/journal/11273



From: Anne Yagi <anne.yagi@8trees.ca>
Sent: April 8, 2021 8:57 AM
To: Katharine Yagi <katharine.yagi@8trees.ca>; C Blott <cblott6@gmail.com>
Cc: Browning, Mark (MNRF) <mark.browning@ontario.ca>; Barry Warner <barry.warner@uwaterloo.ca>; Rick Vos <rvos@torontozoo.ca>
Subject: FW: Wainfleet Bog Drain Relocation Request

We have a decision with NPCA- no meeting until the Fall now.

Regards,

Anne Yagi, M.Sc., EP, CERP
President
8Trees Inc.
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OR Scan the QR Code

SCAN ME

From: Anne Yagi
Sent: April 8, 2021 8:51 AM
To: Adam Christie <achristie@npca.ca>
Cc: Chandra Sharma <csharma@npca.ca>
Subject: RE: Wainfleet Bog Drain Relocation Request

Hi Adam

While I will continue to support all efforts to restore the bog community and promote SAR recovery. I am incredibly disappointed in this decision- but not surprised. I ask that you do not dismiss the long-term option to abandon the drain entirely. NPCA alone has the right to make a difference here. Your assumptions regarding the SAR populations are wrong. I ask to see your evidence. The ecosystem is not restoring itself- It is not on its way to recovery. I ask to see your evidence. You are completely mistaken. Since 2010 the ecosystem is cycling back to a degraded state with wildfires in 2012 and 2016- how can anyone even possibly think the ecosystem is on its way to recovery.

I asked to meet privately with you and Chandra and the Drainage Engineer from the City of Port Colborne. At least give me the courtesy of an open discussion regarding facts before you dismiss the long-term solution and establishment of a proper buffer distance from hydrological impacts to this important ecosystem.

Meanwhile, I am meeting with the NCC and the Ministers's office this month to discuss the conflict between NPCA's mandate and ethical responsibilities toward this nationally significant wetland as this property was given to the NPCA in trust. A provincial decision I was part of and now I unfortunately, regret.

I am available as always to discuss further, at your convenience.

Regards,
Anne Yagi, M.Sc., EP, CERP
President
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OR Scan the QR Code

From: Adam Christie
Sent: April 8, 2021 7:13 AM
To: Anne Yagi <anne.yagi@8trees.ca>
Subject: Wainfleet Bog Drain Relocation Request

Good morning Anne,

Thank you for your request letter and proposal to relocate the Biederman Drain located in the Wainfleet Bog. The NPCA acknowledges the many years of valuable work that 8 Trees Inc. has done for species-at-risk in the Wainfleet Bog Conservation Area. NPCA staff have reviewed the proposal and consulted with Town of Wainfleet staff. As per Town of Wainfleet Council motion, NPCA will support the involved parties in pursuing alternative projects to achieve similar outcomes in the most collaborative, least environmentally disruptive, and cost effective manner.

The NPCA shares the same goal as 8 Trees Inc., to achieve consistent higher water levels in the Wainfleet Bog. This is outlined in the site management plan for the conservation area. Over the past two decades the NPCA (along with partners and volunteers) have invested significant resources to restore the site. Results of this long term approach is evident today, as the site is moving in the right direction to achieve a more natural bog ecosystem including more consistent and higher water levels, rare snake and turtle populations, and accumulating sphagnum moss and peat development. Our ongoing approach and restoration objective (per Board approved Management Plan) is to raise the water level slowly so wildlife and plants can adapt, have reduced fluctuations, and to not adversely impact surrounding properties. The NPCA plans to continue to achieve these restoration objectives by blocking the internal peat canals to prevent water from leaving the site, as well as continued removal of European Birch Trees due to their high evapotranspiration rate.

The NPCA recognizes that the Wainfleet Bog Conservation Area is an important property to many stakeholders. As such, in collaboration with external stakeholders and adjacent land owners, the NPCA will continue to deploy additional measures (including any operational improvements as alternatives to relocation) to ensure that the objectives of the Wainfleet Bog management plan are being met. We are also committed to develop a Wainfleet Bog working group to discuss the current state and future of the Bog. The desired timing to initiate this working group at this time is Fall 2021. The NPCA looks forward to continuing to work with 8 Trees Inc. in the future.

Sincerely,

Adam

Adam Christie
Director, Land Operations

Anne Yagi

From: Gould, Ron (MECP) <ron.gould@ontario.ca>
Sent: February 12, 2021 2:37 PM
To: Theresa Bukovics
Cc: C Blott; Anne Yagi
Subject: RE: Wainfleet Bog-and Species at risk Science Advisers

Thanks Theresa,

We are supportive of the proposal to realign the drain back to its historical location to help improve/restore hydrology of Wainfleet Bog, and will use the link to observe the meeting.

Ron Gould | Protected Areas Specialist – Southwest Zone
Ontario Parks
659 Exeter Rd W, London, Ontario, N6E 1L3
P: 226-559-0897 **W:** OntarioParks.com

Please Note: As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Theresa Bukovics <tbukovics@gmail.com>
Sent: February-12-21 2:00 PM
To: Tomasz Eles <eles_t@hotmail.com>; Gould, Ron (MECP) <ron.gould@ontario.ca>
Subject: Fwd: Wainfleet Bog-and Species at risk Science Advisers

FYI, Please see the link!

Cheers,
T.

Theresa Bukovics, MSc.
(pronouns: she/her ; pronoms: elle/la)
Habitat Stewardship Biologist
(905) 341-1330
tbukovics@gmail.com
www.8trees.ca

---------- Forwarded message ---------
From: **Anne Yagi** <anne.yagi@8trees.ca>
Date: Fri, Feb 12, 2021 at 1:42 PM

Anne Yagi

From: Davy, Christina (MNRF) <Christina.Davy@ontario.ca>
Sent: February 16, 2021 8:33 AM
To: Rick Vos; Anne Yagi; Browning, Mark (MNRF)
Cc: Jackie Litzgus; Glenn Tattersall; jchoquette1@laurentian.ca; Liette Vasseur; Andrew Lentini; Denyes, David (MNRF); Karam, Michelle (MECP); Barry Porter; Katharine Yagi; Theresa Bukovics; C Blott; Diemer, Kristen (MECP)
Subject: Re: Wainfleet Bog-and Species at risk Science Advisers

Hi Anne and all,

I will do my best to follow on YouTube - and I'm really glad to hear you may be able to get that part of the drain moved. I wish circumstances were different and I could help more with this.

best wishes,
Christina

Dr. Christina Davy (she/her)
Research Scientist, Wildlife Research and Monitoring Section | Ministry of Natural Resources and Forestry
Adjunct Professor, Trent University
/|\^..^/|\ /|\^..^/|\

From: Rick Vos <rvos@torontozoo.ca>
Sent: Saturday, February 13, 2021 3:00 PM
To: Anne Yagi <anne.yagi@8trees.ca>; Browning, Mark (MNRF) <mark.browning@ontario.ca>
Cc: Davy, Christina (MNRF) <Christina.Davy@ontario.ca>; Jackie Litzgus <jlitzgus@laurentian.ca>; Glenn Tattersall <gtattersall@brocku.ca>; jchoquette1@laurentian.ca <jchoquette1@laurentian.ca>; Liette Vasseur <lvasseur@brocku.ca>; Andrew Lentini <alentini@torontozoo.ca>; Denyes, David (MNRF) <David.Denyes@ontario.ca>; Karam, Michelle (MECP) <Michelle.Karam@ontario.ca>; Barry Porter <barry.porter@landcareniagara.com>; Katharine Yagi <katharine.yagi@8trees.ca>; Theresa Bukovics <tbukovics@gmail.com>; C Blott <cblott6@gmail.com>; Diemer, Kristen (MECP) <Kristen.Diemer@ontario.ca>
Subject: RE: Wainfleet Bog-and Species at risk Science Advisers

Hi Anne,
I can't attend in person but I will be following on You Tube.
Cheers,
Rick

Rick Vos B.Sc.
Lead Keeper- Reptiles and Amphibians
Toronto Zoo
361A Old Finch Ave
Toronto, Ontario,
M1B 5K7, Canada

Phone: 416-392-5968
Fax: 416-393-6364
Adopt-A-Pond Wetland Conservation Programme: www.torontozoo.com/adoptapond
Blog: http://adoptapond.wordpress.com
Massasauga Recovery Team: www.massasauga.ca
Ways of Knowing Partnership Turtle Island Conservation: www.turtleislandconservation.com

---

From: Anne Yagi [mailto:anne.yagi@8trees.ca]
Sent: February 12, 2021 1:43 PM
To: Browning, Mark (MNRF) <mark.browning@ontario.ca>
Cc: Davy, Christina (MNRF) <Christina.Davy@ontario.ca>; Jackie Litzgus <jlitzgus@laurentian.ca>; Glenn Tattersall <gtattersall@brocku.ca>; jchoquette1@laurentian.ca; Liette Vasseur <lvasseur@brocku.ca>; Andrew Lentini <alentini@torontozoo.ca>; Rick Vos <rvos@torontozoo.ca>; Denyes, David (MNRF) <David.Denyes@ontario.ca>; Karam, Michelle (MECP) <Michelle.Karam@ontario.ca>; Barry Porter <barry.porter@landcareniagara.com>; Katharine Yagi <katharine.yagi@8trees.ca>; Theresa Bukovics <tbukovics@gmail.com>; C Blott <cblott6@gmail.com>; Diemer, Kristen (MECP) <Kristen.Diemer@ontario.ca>
Subject: RE: Wainfleet Bog-and Species at risk Science Advisers

Hi, Mark so nice to hear from you.

Yes, there is a Youtube link. Thank you for your support I remember when we sat down and talked about that section of drain before.– this has taken a while and we are so close.

I was provided the following from the Town Clerk. Tues Feb 16th 7:00 pm.

Please direct anyone who wishes to observe the meeting to our YouTube Channel, where the meeting will be streamed live for the public.

Regards,
Anne Yagi, M.Sc., EP, CERP
President
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OR Scan the QR Code
SCAN ME

Anne Yagi

From: Liette Vasseur <lvasseur@brocku.ca>
Sent: February 15, 2021 5:23 PM
To: Anne Yagi
Subject: RE: Wainfleet Bog-and Species at risk Science Advisers

Hello
This is great. Glad that things are moving. I would like to be there but can you tell me why everyone is doing meetings on Tuesdays or Wednesdays at 7 pm?
Or is it that I am too much connected??
I am confident that you'll doing great. focus on basic and good news 😉
Congrats,
Liette

From: Anne Yagi <anne.yagi@8trees.ca>
Sent: February 11, 2021 9:42 PM
To: Davy, Christina (MNRF) <Christina.Davy@ontario.ca>; Jackie Litzgus <jlitzgus@laurentian.ca>; Glenn Tattersall <gtattersall@brocku.ca>; jchoquette1@laurentian.ca; Liette Vasseur <lvasseur@brocku.ca>; Andrew Lentini <alentini@torontozoo.ca>; Rick Vos <rvos@torontozoo.ca>; Browning, Mark (MNRF) <mark.browning@ontario.ca>
Cc: Denyes, David (MNRF) <David.Denyes@ontario.ca>; Karam, Michelle (MECP <Michelle.Karam@ontario.ca>; Barry Porter <barry.porter@landcareniagara.com>
Subject: Wainfleet Bog-and Species at risk Science Advisers

Hello Everyone, thank you for your ongoing support of the Massasauga, Spotted Turtle, and Wainfleet Bog ecosystem recovery project.

In addition to continuing our long-term population mark-recapture, hibernation habitat monitoring and forced hibernation work. We have finished 4 years of hydrology monitoring across the Wainfleet Bog ecosystem which follows Mark Browning's previous work. We expanded the groundwater level monitoring network with more real-time data loggers, measured ground surface elevations, and added water level staff gauges to all municipal drain outlets, collected daily precipitation, and tracked beaver dam locations and water levels throughout the ecosystem.

In the last 4 winters, we have also kept in close communication with the municipal drainage staff regarding the timing of beaver dam removals so that drain maintenance did not directly harm snakes or turtles during hibernation. However, in a year we are back to drain maintenance removing beaver dams that directly lower the groundwater table again. We end up with rapid changes in water levels which is not natural bog hydrology.

We want to isolate the bog hydrology from drain maintenance. We have found the best location- control point to isolate the bog from drain maintenance activities. And we have general acceptance by the NPCA and the receiving landowner for moving a 1-km portion of the Biederman drain out of the bog edge and back to its original 1930s location. The drain was moved into the bog to drain the bog to facilitate peat extraction in the 1940s to 90s. Peat extraction is no longer occurring in the ecosystem.

The Town Council Meeting is Feb 16th, 2021 at 7 pm. We have 10 minutes to present our case and request the drain to be abandoned through the bog and re-instated in the 1930s location 300m to the south. We are asking for your support to be there during the presentation. This is a significant long-awaited +20 yr turning point in this project. I hope you can be there.

Attached is a technical presentation we made to the Drainage engineer, Municipal staff, and NPCA a few weeks ago as background. And our intended presentation to the council is much shorter and simpler.

Let me know if you can attend.

Thank you

Regards,
Anne Yagi, M.Sc., EP, CERP
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SCAN ME

From: Browning, Mark (MNRF)
Sent: February 12, 2021 12:21 PM
To: Anne Yagi <anne.yagi@8trees.ca>
Cc: Davy, Christina (MNRF) <Christina.Davy@ontario.ca>; Jackie Litzgus <jlitzgus@laurentian.ca>; Glenn Tattersall <gtattersall@brocku.ca>; jchoquette1@laurentian.ca; Liette Vasseur <lvasseur@brocku.ca>; Andrew Lentini <alentini@torontozoo.ca>; Rick Vos <rvos@torontozoo.ca>; Denyes, David (MNRF) <David.Denyes@ontario.ca>; Karam, Michelle (MECP) <Michelle.Karam@ontario.ca>; Barry Porter <barry.porter@landcareniagara.com>
Subject: Re: Wainfleet Bog-and Species at risk Science Advisers

Hi Anne

Great news that you may be able to get that portion of Biederman drain moved! That is really an important step. I know in the past we talked about trying to permanently dam it upstream from the parking lot but moving it is likely a more acceptable option to the township. I didn't realize that it had been moved north in the 1930's - you did well to figure that out.

Is there an option to attend the council meeting remotely e.g. Teams, Zoom or call in. I would certainly be able to do that.

Thanks!

Mark

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Sent: February 11, 2021 9:42 PM
To: Davy, Christina (MNRF) <Christina.Davy@ontario.ca>; Jackie Litzgus <jlitzgus@laurentian.ca>; Glenn Tattersall <gtattersall@brocku.ca>; jchoquette1@laurentian.ca <jchoquette1@laurentian.ca>; Liette Vasseur <lvasseur@brocku.ca>; Andrew Lentini <alentini@torontozoo.ca>; Rick Vos <rvos@torontozoo.ca>; Browning, Mark (MNRF) <mark.browning@ontario.ca>
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Thanks!

Mark

Anne Yagi

From: Glenn Tattersall <gtattersall@brocku.ca>
Sent: April 21, 2021 2:17 PM
To: Kim Frohlich; Anne Yagi; Jonathan Choquette; jim.wigle@ontario.ca; kcedar@citywindsor.ca; jessica@wildlifepreservation.ca; rvos@torontozoo.ca; dlebedyk@erca.org; Jenni.Kaija@ontario.ca; Kristen.Diemer@ontario.ca; hannah.mccurdy-adams@wildlifepreservation.ca; 'Donnell Gasbarrini'
Cc: achabot@lionsafari.com; alanna.smolarz@magfn.com; alentini@torontozoo.ca; andrew.promaine@canada.ca; Katharine Yagi; Kristen Bernard; anna.sheppard@ontario.ca; barry.porter@landcareniagara.com; barry.warner@uwaterloo.ca; bill.lougheed@gblt.org; biologist@gbbr.ca; bpopelier@brucetrail.org; briarhunts@gmail.com; brooks.greer@gblt.org; Christina.Davy@ontario.ca; cory.kozmik@labrc.com; dave.richards@ontario.ca; edward.morris@ontario.ca; gabriellaz@ontarionature.org; georgianbaycares@gmail.com; gmi@henveyinlet.com; hfotherby@nrsi.on.ca; jamie.joudrey@heritagetrust.on.ca; Esme.Batten@natureconservancy.ca; jeremy.rouse@ontario.ca; jlitzgus@laurentian.ca; Joe.Crowley@ontario.ca; john@blazingstar.ca; julia.riley87@gmail.com; Karine.Beriault@ontario.ca; karolyne.pickett@canada.ca; Katharine Yagi; ken.tuininga@canada.ca; kent.prior@canada.ca; Kenton.otterbein@ontario.ca; Kevin.DeMille@heritagetrust.on.ca; Kim.Jaxa-Debicki@ontario.ca; kkerr@torontozoo.ca; Kristen.Bernard@natureconservancy.ca; lough@queensu.ca; Browning, Mark (MNRF); melody.cairns@ontario.ca; Mhairi.McFarlane@natureconservancy.ca; miptoon@gmail.com; nadine.perron@magfn.com; pmoldowan1@laurentian.ca; rbarnett@escarpment.ca; rlinn@sixnations.ca; rmelblack@gmail.com; ron.gould@ontario.ca; sar@shawanagafirstnation.ca; SARontario@ontario.ca; scalesanimalcare@gmail.com; scalescnpp@gmail.com; scalesnaturepark@gmail.com; scott.sutton@canada.ca; smeras@ontarionature.org; tanya.pulfer@canada.ca; Thomas Eles; Tricia.Robins@canada.ca; wildlife@sixnations.ca; achristie@npca.ca
Subject: Re: Urgent: Attention Needed Massasauga Recovery Group

Dear Everyone,

I think the most important issue Anne Yagi highlighted yesterday relates to catastrophic or rapid changes in water level on top of overall habitat management. With rapid water level changes, or with season to season variation in where standing water is, snakes very likely drown in the winter if they happened to select a degraded habitat. Please recognise that when I say “habitat”, I am referring to very local features for what the snake selects, sometimes referred to as ‘microhabitat’. I would like us not to fall into the classic problem of focussing on the mean/aggregate response while maybe not considering the variation or that extreme conditions vary from place to place (this is the ecological trap concept that Anne has been discussing for the past few years). Anyhow, I think the primary item under discussion here is with respect to how to re-locate the drain and why (from the outside looking in) the NPCA and Town of Wainfleet seem to be resistant to scientific evidence. We really need a 4 season approach to this site, taking the advice and input from the experts in ecology and herpetology who have been included here.

To give some context to the group who do not know me, in my lab, we can measure non-lethally how capable snakes are at breathing through their skin, and please let me reassure everyone here, they can manage only at about 30 to 50% normal capacity provided they are cold. To use COVID analogies, underwater at low temperatures, they are still at the equivalent of someone with 50% blood oxygen saturation who would need to be hospitalised to survive. We do not have the luxury of hospitalising the massasaugas (although we have a bit of a nursery for the babies in my lab for the past few years). Overall habitat restoration might be NPCA’s goals, which I applaud, but the points that Anne raised

relate to how water levels change rapidly and what regions are predictably under water. It seems like a small ask that 8Trees is proposing to move the drain outside of the bog area to its prior historical location.

Anne's MSc thesis work in my lab showed that at least 3 species of snakes living in Wainfleet cannot live aerobically for prolonged periods under-water. Most of these arguments are well described in Anne's thesis, which I'm sure she would share with the team members.

On a related note, I used to see similar issues up on the Bruce Peninsula (my early life was as a farmer) when beaver dams would be removed by local authorities in mid-late summer, leading to catastrophic amphibian die-offs from being left high and dry. If only they had consulted with biologists, this massive and unnecessary killing may have been averted, but the trust was not there. I am pleased to see such a group of people so passionate about Massasaugas and I hope that partnerships can arise from these interactions that lead to better conservation of this species.

Please let me know if you need access to any of the scientific articles on the subject. My graduate work was on hibernation physiology and behaviour in amphibians, and I've spent the past 20 years working on thermal physiology and thermal ecology of reptiles (and a host of different animals), and the intersection between the field and the lab. And I also live in Pelham. I would also like to urge Mr. Christie from the NPCA to take this advice on board in future planning decisions regarding Wainfleet Bog.

Thank you for your time and attention.

Sincerely yours,
Glenn

Glenn Tattersall, PhD
Professor, Biological Sciences
Brock University
1812 Sir Isaac Brock Way
St. Catharines, ON
Canada
L2S 3A1
Web: http://TattersallLab.com | https://www.thermalecologygroup.org/
Social: @TattersallG
Email: gtattersall@brocku.ca
Github: https://github.com/gtatters/Thermimage | https://github.com/gtatters/ThermImageJ

From: Kim Frohlich <kfrohlich@npca.ca>
Date: Wednesday, April 21, 2021 at 12:17 PM
To: Anne Yagi <anne.yagi@8trees.ca>, Jonathan Choquette <jchoquette@wildlifepreservation.ca>, "jim.wigle@ontario.ca" <jim.wigle@ontario.ca>, "kcedar@citywindsor.ca" <kcedar@citywindsor.ca>, "jessica@wildlifepreservation.ca" <jessica@wildlifepreservation.ca>, "rvos@torontozoo.ca" <rvos@torontozoo.ca>, "dlebedyk@erca.org" <dlebedyk@erca.org>, "Jenni.Kaija@ontario.ca" <Jenni.Kaija@ontario.ca>, "Kristen.Diemer@ontario.ca" <Kristen.Diemer@ontario.ca>, "hannah.mccurdy-adams@wildlifepreservation.ca" <hannah.mccurdy-adams@wildlifepreservation.ca>, 'Donnell Gasbarrini' <dgasbarrini@torontozoo.ca>
Cc: "achabot@lionsafari.com" <achabot@lionsafari.com>, "alanna.smolarz@magfn.com" <alanna.smolarz@magfn.com>, Andrew Lentini <alentini@torontozoo.ca>, "andrew.promaine@canada.ca" <andrew.promaine@canada.ca>, Katharine Yagi <katharine.yagi@8trees.ca>, Kristen Bernard <Kristen.Bernard@natureconservancy.ca>, "anna.sheppard@ontario.ca" <anna.sheppard@ontario.ca>,

"barry.porter@landcareniagara.com" <barry.porter@landcareniagara.com>, "barry.warner@uwaterloo.ca" <barry.warner@uwaterloo.ca>, "bill.lougheed@gblt.org" <bill.lougheed@gblt.org>, "biologist@gbbr.ca" <biologist@gbbr.ca>, "bpopelier@brucetrail.org" <bpopelier@brucetrail.org>, "briarhunts@gmail.com" <briarhunts@gmail.com>, "brooks.greer@gblt.org" <brooks.greer@gblt.org>, "Christina.Davy@ontario.ca" <Christina.Davy@ontario.ca>, "cory.kozmik@labrc.com" <cory.kozmik@labrc.com>, "dave.richards@ontario.ca" <dave.richards@ontario.ca>, "edward.morris@ontario.ca" <edward.morris@ontario.ca>, "gabriellaz@ontarionature.org" <gabriellaz@ontarionature.org>, "georgianbaycares@gmail.com" <georgianbaycares@gmail.com>, "gmi@henveyinlet.com" <gmi@henveyinlet.com>, Glenn Tattersall <gtattersall@brocku.ca>, "hfotherby@nrsi.on.ca" <hfotherby@nrsi.on.ca>, "jamie.joudrey@heritagetrust.on.ca" <jamie.joudrey@heritagetrust.on.ca>, "Esme.Batten@natureconservancy.ca" <Esme.Batten@natureconservancy.ca>, "jeremy.rouse@ontario.ca" <jeremy.rouse@ontario.ca>, "jlitzgus@laurentian.ca" <jlitzgus@laurentian.ca>, "Joe.Crowley@ontario.ca" <Joe.Crowley@ontario.ca>, "john@blazingstar.ca" <john@blazingstar.ca>, "julia.riley87@gmail.com" <julia.riley87@gmail.com>, "Karine.Beriault@ontario.ca" <Karine.Beriault@ontario.ca>, "karolyne.pickett@canada.ca" <karolyne.pickett@canada.ca>, Katharine Yagi <katharine.yagi@8trees.ca>, "ken.tuininga@canada.ca" <ken.tuininga@canada.ca>, "kent.prior@canada.ca" <kent.prior@canada.ca>, "Kenton.otterbein@ontario.ca" <Kenton.otterbein@ontario.ca>, "Kevin.DeMille@heritagetrust.on.ca" <Kevin.DeMille@heritagetrust.on.ca>, "Kim.Jaxa-Debicki@ontario.ca" <Kim.Jaxa-Debicki@ontario.ca>, "kkerr@torontozoo.ca" <kkerr@torontozoo.ca>, "Kristen.Bernard@natureconservancy.ca" <Kristen.Bernard@natureconservancy.ca>, "lough@queensu.ca" <lough@queensu.ca>, "Browning, Mark (MNRF)" <mark.browning@ontario.ca>, "melody.cairns@ontario.ca" <melody.cairns@ontario.ca>, "Mhairi.McFarlane@natureconservancy.ca" <Mhairi.McFarlane@natureconservancy.ca>, "miptoon@gmail.com" <miptoon@gmail.com>, "nadine.perron@magfn.com" <nadine.perron@magfn.com>, "pmoldowan1@laurentian.ca" <pmoldowan1@laurentian.ca>, "rbarnett@escarpment.ca" <rbarnett@escarpment.ca>, "rlinn@sixnations.ca" <rlinn@sixnations.ca>, "rmelblack@gmail.com" <rmelblack@gmail.com>, "ron.gould@ontario.ca" <ron.gould@ontario.ca>, "sar@shawanagafirstnation.ca" <sar@shawanagafirstnation.ca>, "SARontario@ontario.ca" <SARontario@ontario.ca>, "scalesanimalcare@gmail.com" <scalesanimalcare@gmail.com>, "scalescnpp@gmail.com" <scalescnpp@gmail.com>, "scalesnaturepark@gmail.com" <scalesnaturepark@gmail.com>, "scott.sutton@canada.ca" <scott.sutton@canada.ca>, "smeras@ontarionature.org" <smeras@ontarionature.org>, "tanya.pulfer@canada.ca" <tanya.pulfer@canada.ca>, Thomas Eles <teles@brocku.ca>, "Tricia.Robins@canada.ca" <Tricia.Robins@canada.ca>, "wildlife@sixnations.ca" <wildlife@sixnations.ca>

Subject: RE: Urgent: Attention Needed Massasauga Recovery Group

Hello Everyone,

As an employee and representative of the NPCA, Niagara Peninsula Conservation Authority, I would like to highlight the following so there is no confusion as per the “Backgrounder” sent out :

- The NPCA has owned and operated the bog since 1995.
- We have restored it and continue to monitor it (minus the snakes and turtles which 8Trees monitors) and make adaptive restoration changes as needed. We have NOT walked away from the site or restoration.
- Habitat is improving- water levels more constant, sphagnum moss and ericaceous shrubs growing, and the bog (on NPCA land) moving towards a more natural bog ecosystem.

Would be please to share habitat information if you like.

Would be please to hear of the ecological trap and how the drain section would improve it.

Sincerely,

Kim

Kim Frohlich
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From: Anne Yagi <anne.yagi@8trees.ca>
Sent: Wednesday, April 21, 2021 9:58 AM
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Cc: achabot@lionsafari.com; alanna.smolarz@magfn.com; alentini@torontozoo.ca; andrew.promaine@canada.ca; Katharine Yagi <katharine.yagi@8trees.ca>; Kristen Bernard <Kristen.Bernard@natureconservancy.ca>; anna.sheppard@ontario.ca; barry.porter@landcareniagara.com; barry.warner@uwaterloo.ca; bill.lougheed@gblt.org; biologist@gbbr.ca; bpopelier@brucetrail.org; briarhunts@gmail.com; brooks.greer@gblt.org; Christina.Davy@ontario.ca; cory.kozmik@labrc.com; dave.richards@ontario.ca; edward.morris@ontario.ca; gabriellaz@ontarionature.org; georgianbaycares@gmail.com; gmi@henveyinlet.com; gtattersall@brocku.ca; hfotherby@nrsi.on.ca; jamie.joudrey@heritagetrust.on.ca; Esme.Batten@natureconservancy.ca; jeremy.rouse@ontario.ca; jlitzgus@laurentian.ca; Joe.Crowley@ontario.ca; john@blazingstar.ca; julia.riley87@gmail.com; Karine.Beriault@ontario.ca; karolyne.pickett@canada.ca; Katharine Yagi <katharine.yagi@8trees.ca>; ken.tuininga@canada.ca; kent.prior@canada.ca; Kenton.otterbein@ontario.ca; Kevin.DeMille@heritagetrust.on.ca; Kim Frohlich <kfrohlich@npca.ca>; Kim.Jaxa-Debicki@ontario.ca; kkerr@torontozoo.ca; Kristen.Bernard@natureconservancy.ca; lough@queensu.ca; Browning, Mark (MNRF) <mark.browning@ontario.ca>; melody.cairns@ontario.ca; Mhairi.McFarlane@natureconservancy.ca; miptoon@gmail.com; nadine.perron@magfn.com; pmoldowan1@laurentian.ca; rbarnett@escarpment.ca; rlinn@sixnations.ca; rmelblack@gmail.com; ron.gould@ontario.ca; sar@shawanagafirstnation.ca; SARontario@ontario.ca; scalesanimalcare@gmail.com; scalescnpp@gmail.com; scalesnaturepark@gmail.com; scott.sutton@canada.ca; smeras@ontarionature.org; tanya.pulfer@canada.ca; teles@brocku.ca; Tricia.Robins@canada.ca; wildlife@sixnations.ca
Subject: Urgent: Attention Needed Massasauga Recovery Group

Hello OPRREC Working group

Thank you for the opportunity to speak yesterday at your meeting and for gathering so many people together. I hope I was effective at conveying how the ecological trap is operating on the Massasauga population in Wainfleet Bog.

However, I do not think I did a good enough job presenting the urgency of the matter at hand regarding the future of the Wainfleet Bog (Please review attached).

The Engineer's report which directs all changes to the Biederman drain is open now for updates and closes June 2021 and will not open again for another 40 years. That is 8 generations of Massaugas affected by a null decision.

We have a **once in a 40-year** opportunity to ensure the ecological trap operating in the Wainfleet Bog (Central Peat Barrens) is mitigated for good. By abandoning this section of the drain we will remove the requirement for drain maintenance here and begin the separation of human-controlled water cycles and reinstate more natural bog hydrology and begin the recovery process.

The species-at-risk Massasauga population (nearly all of the Carolinian designatable unit) owes their entire existence to this ancient wetland and we as a group or as individual organizations within the broad spectrum of conservation and species recovery are the experts that can truly make a difference.

The Niagara Peninsula Conservation Authority is both the responsible wetland regulatory agency and the only landowner that can secure a natural recovery for this nationally significant bog ecosystem.

Thank you to those who have already sent in their email comments to the NPCA. However, more can be done and your voices matter.

In your letter explain who you are and why this Massauga population is important to you and that you support abandoning the drain.

Please direct your support to abandon the Biederman Drain (1.2 km section) via email, to NPCA achristie@npca.ca

Regards,

Anne Yagi, M.Sc., EP, CERP
President
8 Trees Inc.
We are here to help!
www.8trees.ca
Ph: 905-892-1760
All Citizen Scientists, try our newest mobile app "My field App"

From your mobile phone go to https://qrco.de/bbRJJ5
OR Scan the QR Code

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PEATLANDS AND CLIMATE CHANGE

NOVEMBER 2017

- **Peatlands are a type of wetlands which are among the most valuable ecosystems on Earth:** they are critical for preserving global biodiversity, provide safe drinking water, minimise flood risk and help address climate change.
- **Peatlands are the largest natural terrestrial carbon store**; the area covered by near natural peatland worldwide (>3 million km^2) sequesters 0.37 gigatonnes of carbon dioxide (CO_2) a year – storing more carbon than all other vegetation types in the world combined.
- **Damaged peatlands are a major source of greenhouse gas emissions**, annually releasing almost 6% of global anthropogenic CO_2 emissions. Peatland restoration can therefore bring significant emissions reductions.
- **Countries are encouraged to include peatland restoration in their commitments to global international agreements**, including the Paris Agreement on climate change.

What is the issue?

Peatlands are a type of wetlands that occur in almost every country on Earth, currently covering 3% of the global land surface. The term 'peatland' refers to the peat soil and the wetland habitat growing on its surface.

In these areas, year-round waterlogged conditions slow the process of plant decomposition to such an extent that dead plants accumulate to form peat. Over millennia this material builds up and becomes several metres thick.

Peatland landscapes are varied – from blanket bog landscapes with open, treeless vegetation in the Flow Country of Scotland – a tentative World Heritage site – to swamp forests in Southeast Asia. New areas are still being discovered such as the world's largest tropical peatland discovered beneath the forests of the Congo Basin in 2017.

Blanket bog of the Flow Country, Forsinard, Scotland © RSPB

Large amounts of carbon, fixed from the atmosphere into plant tissues through photosynthesis, are locked away in peat soils, representing a valuable global carbon store.

A lack of awareness of the benefits of peatlands means that they have been severely overexploited and damaged as a result of actions including drainage, agricultural conversion, burning and mining for fuel, among others. About 15% of the world's peatlands – covering less than 0.4% of the global land surface – have been drained. This has released huge amounts of greenhouse gases, such as carbon dioxide (CO_2), from the carbon stored within peat soils.

Why is this important?

Peatlands are highly significant to global efforts to combat climate change, as well as wider sustainable development goals. The protection and restoration of peatlands is vital in the transition towards a low-carbon and circular economy.

Damaged peatlands contribute about 10% of greenhouse gas emissions from the land use sector. CO_2 emissions from drained peatlands are estimated at 1.3 gigatonnes of CO_2 annually. This is equivalent to 5.6% of global anthropogenic CO_2 emissions. Fires in Indonesian peat swamp forests in 2015, for example, emitted nearly 16 million tonnes of CO_2 a day. This is more than the daily emissions from the entire US economy.

At the same time, peatlands are the largest natural terrestrial carbon store. Worldwide, the remaining area of near natural peatland (>3 million km^2) contains more than 550 gigatonnes of carbon, representing 42% of all soil carbon and exceeds the carbon stored in all other vegetation types, including the world's forests. This area sequesters 0.37 gigatonnes of CO_2 a year.

In their natural, wet state peatlands provide vital ecosystem services. By regulating water flows, they help minimise the risk of flooding and drought and

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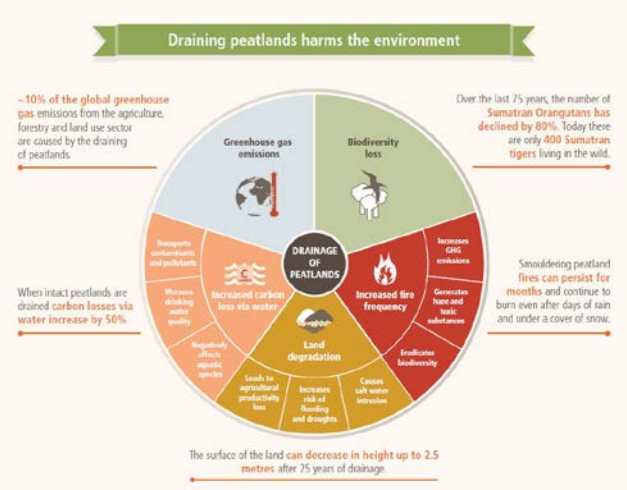
prevent seawater intrusion. In many parts of the world, peatlands supply food, fibre and other local products that sustain local economies. They also preserve important ecological and archaeological information such as pollen records and human artefacts.

Draining peatlands reduces the quality of drinking water due to pollution from dissolved compounds. Damage to peatlands also results in biodiversity loss. For example, the decline of the Bornean Orangutan population by 60% within a sixty-year period is largely attributed to the loss of its peat swamp habitat. The species is now listed as Critically Endangered on The IUCN Red List of Threatened Species™.



Protecting intact peatland habitats is important to secure the carbon stored within the peat, support unique biodiversity and maintain water quality
© UN FAO

What can be done?

Urgent action worldwide is required to protect, sustainably manage and restore peatlands. This involves protecting them from degrading activities such as agricultural conversion and drainage, and restoring the waterlogged conditions required for peat formation to prevent the release of carbon stored in peat soil.

Global efforts can build on the work of those countries which have taken steps to reverse the decline of peatlands. The United Kingdom, for example, is establishing a strategic peatland action plan to support the UK's climate mitigation plans and international biodiversity targets. In Southeast Asia, the ASEAN Peatland Forests Project (APFP) is supporting the implementation of a multi-stakeholder Peatland Management Strategy to restore peatlands and reduce the rate of degradation and the risk of fire and haze. The European Union LIFE funding has assisted over 260 peatland restoration projects, providing practical experience on the feasibility and techniques of peatland restoration.

Peatland restoration projects have proven to be cost-effective compared to other available carbon reducing technologies. They also have the added bonus of re-establishing the multiple benefits arising from peat-forming ecosystems.

The UN Food and Agriculture Organization (FAO) has presented 10 strategic actions that can ensure peatlands contribute their full potential to global agreements such as the Paris Agreement on climate change and Sustainable Development Goals. These include:

- assessing the distribution and state of peatlands
- measuring and reporting emissions from peatlands
- protecting and restoring peatlands with targeted financial support
- stimulating market-based mechanisms to support peatlands
- engaging and supporting local communities
- sharing experience and expertise on peatland conservation, restoration and improved management.

A 2016 IUCN Resolution 'Securing the future for global peatlands' supports the FAO's strategic actions and encourages their adoption within country-focused peatland programmes. The Resolution further recommends:

- peatlands to be included alongside forests in all relevant intergovernmental agreements relating to climate change, geodiversity and biodiversity;
- a moratorium on peat exploitation until legislation is strengthened to ensure peatlands are protected or managed through wise use principles.

Emissions from damaged peatlands and carbon savings from peatland restoration are eligible for national accounting under the UN Framework Convention on Climate Change. There is therefore an opportunity for more countries to look at including peatland restoration and re-wetting in their national climate action plans.

Where can I get more information?

IUCN Commission on Ecosystem Management
Peatland Ecosystems Group: iucn.org/cem_peatlands

IUCN UK National Committee Peatland Programme
iucn-uk-peatlandprogramme.org

Global Peatlands Initiative
globalpeatlands.org

Cris, R., Buckmaster, S., Bain, C. and Reed, M. (eds.) (2014). *Global Peatland Restoration Demonstrating SUCCESS*. Edinburgh: IUCN UK National Committee Peatland Programme.

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8Trees Company CV

Anne R. Yagi

President, 8Trees Inc.
November 2016 - Present
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B.Sc. Honours Zoology, University of Guelph
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8Trees Inc.

is a non-government environmental consulting company that aims to carry out innovative approaches to ecological restoration, data collection, enhance science-communication, and mentor students in the fields of biological conservation, ecology, environmental policy, and environmental impact studies.

Go to Google Play store or Apple store and download 8Trees newly developed free software; “My Field App” and contribute to citizen science biological data collection in your neighborhood. Coming soon, “My Fish App” which measures and organizes your fish catch data.

Current 8Trees Projects:

- “Managing an ecological trap on the reptile community inhabitating a partially mined peatland in Southern Ontario”; OSARF 2017 to 2020; CWS winter 2018 and 2019.
- “Monitoring the human impact on Fowler’s toad at Niagara Beaches”; OSARF 2018 to 2021
- Science Advisor “Haldimand County Gray Ratsnake *(Pantherophis spiloides*) population recovery project”; OSARF 2017 to 2020
- “Building on Success: Using Habitat Modeling and outreach to confirm presence of Gray ratsnake and Foxsnake in Niagara-Hamilton”, OSARP 2020
- Science Advisor “Pelee Island Blue Racer (*Coluber constrictor foxii*) Hibernation habitat restoration project”; OSARF 2018 to 2021
- PhD committee member for J. Choquette 2019-2023 “Managing translocations for Massasauga Recovery in Ojibway Prairie” Laurentian University
- Fowler’s toad Recovery Implementation Team Chair.

8Trees Staff: One full-time biologist, ten seasonal staff and associates.

MSc Thesis 2020: “Flood survival strategies of overwintering snakes”

Memberships: Canadian Herpetological Society, Society for the Study of Amphibians and Reptiles, American Fisheries Society and Society for Ecological Restoration (SER).

Canadian Herpetological Society 2019 award recipient: “Blue Racer Award” in recognition of significant contributions to the conservation of amphibians and reptiles in Canada.

Management Biologist (Retired Sep 30, 2016 after 35 years' service)

Ministry of Natural Resources and Forestry (Vineland Field Office, Guelph District)

My career at MNR began in 1981 as a summer student conducting a creel survey. After eight years of "back to back" contracts I was hired as the Fisheries Enhancement Officer and then as the Fish and Wildlife District Biologist. I continued in this position for 26 years until I retired in 2016. Although retired from government, my interest in fish and wildlife resources and mentoring continues within my graduate studies, pursuit of research and development, proactive projects in natural resource management and applied ecosystem restoration.

Career Highlights:

- Identified, examined and accepted as an expert witness (Federal, Provincial Court and OMB hearings) in the areas of fish biology and habitat, wetlands, deer biology, freshwater turtles, Massasauga rattlesnakes and general wildlife biology.
- Provincial Wetland Evaluations Niagara- Hamilton-Haldimand (est > 200 evaluations)
- Fish Community Monitoring Project Niagara River Watershed (1997 to 2016)
- Winter Habitat Use by Wildlife: via Helicopter Surveys (White-tailed deer, wild turkeys, raptors, swans, ducks, geese)
- Niagara River Remedial Action- Fish population Impairment- Determination of Delisting Criteria
- Field Investigation of Headwater Channel Erosion and related impacts on the Fenwick Regional ANSI, Provincially Significant Wetlands and Species at Risk
- Welland River Fish Passage White Sucker and Walleye Telemetry Project at Old Welland Canal Junction (2000, 2013 to 2015)
- Navy Island Deer Exclosures project and management recommendations
- Restoration of Walleye in the Welland – Niagara River system
- Grand River Fisheries Management Plan and advocate for the removal of the Dunnville Dam
- Species at Risk Habitat Stewardship and Education projects (Fowler's toad, Massasauga, Spotted turtle, Blanding's turtle, Gray Ratsnake, Allegheny Mountain Dusky and Northern Dusky salamander) included managing field technicians and summer students and external funding sources annually since 2000 with an operating budget $50K to $100K. All projects included surveys and monitoring, habitat enhancement, restoration, and design and creation of outreach and educational products. These projects also included mentoring and liaison with partners including universities, agencies, landowners and other interested stakeholders.
- As part of this species at risk team we were the first to identify Allegheny Mountain Dusky Salamander in the Niagara Gorge
- Ecosystem restoration project (1998 to present) - managing two species at risk populations Massasauga and Spotted turtle before, during and after water levels were increased in the central historically peat mined area. This included mark –recapture (> 200) massasaugas and (>400) spotted turtle observations since 1998. Radio telemetry technique for both species was used to confirm habitat use. With increasing conservation concerns raised about massasaugas and the potential that the mined peatland to become an ecological trap on the population. Radio telemetry was abandoned in favour of my innovative and successful coverboard design and survey technique to continue to monitor massasaugas and the resident snake community. During this time, I designed and implemented a hibernation habitat study where I introduced the "life zone" hypothesis. A "life zone" is a subterranean space where snakes successfully overwinter. This space does not freeze or flood completely and is the focus of my graduate studies. "Overwintering behaviour and survival of temperate neonatal snakes" and the development of the "forced hibernation technique". This technique is a biological test of the life zone to confirm snakes can survive within the associated habitat. It is only used in

areas where physical measures have confirmed a physical space is maintained in harsh and mild winters. Once a habitat is biologically tested using neonate gartersnakes (model species), species at risk neonates can be forcibly hibernated in these good habitats. This technique will aid in repopulating good habitat because snakes use homing behaviour to return to previously occupied burrows thus removing the ecological trap associated with the mined peatland.

- Fowler's toad Recovery Team Chair, Ontario Dusky Salamander Recovery Team Co-Chair, Gray Ratsnake and Massasauga rattlesnake and Ontario SAR turtle Recovery Team member
- Peregrine Falcon Recovery and Master Bander (1996 to present)

Other Highlights include:

- Provincial Amethyst Award: Grand River Fisheries Management Plan (1999)
- OMNR Pride Award: Recovery of Peregrine Falcon (2000)
- NPCA: Welland River Restoration Committee Recognition Award (2002)
- NPCA Conservation achievement awards (2002 to 2008)
- Niagara River Bathymetry, Habitat Mapping and habitat creation projects
- Niagara Region Fish Habitat Types with Management Rationale for municipal planning
- Binbrook Reservoir Electrofishing, and live trap netting projects
- Adult Walleye transfer from Bay of Quinte, Lake Ontario to Binbrook Reservoir
- Spring thermal flux studies Niagara River and Upper Niagara River Tributaries
- Long term thermal monitoring of last remaining Brook trout fishery Upper Twelve Mile Creek
- Upper Twelve Mile Creek Brook Trout Population Assessment 1984, 2000, 2008
- Upper Twelve Mile Creek Restoration Projects (1989 to 1995)
- Frenchman's Creek Grass Roots Watershed Restoration Project (1991 to 1995)
- Point Abino Drain Fisheries Study- Pre and Post Drainage Works 2001 – 2002
- Welland River Fish Community Assessment 1997
- Walleye Restoration Project, Grand River, Welland River and Community Involvement
- Lake Ontario Littoral Zone, Lake Gibson, Martindale Pond and Old Welland Canal Fish Community
- Wild turkey reintroduction, trap and transfer International project (1986 to 1996)
- Ontario Conservation Fishing and Hunting Licence, Pleasure Boat Certificate, Class 1 Electrofishing Certificate (all types), Standard First Aid and CPR, ROM Fish ID, Wetland Evaluation Certifications, Active golf enthusiast

Reports and Publications (chronological order)

Yagi A. R. 2020. Flood survival strategies of overwintering snakes. MSc. Thesis Brock University, St Catharines, Canada.

Yagi, A. R., R. J. Jon Planck, K. T. Yagi, and G. J. Tattersall. 2020. A long-term study on Massasaugas (*Sistrurus catenatus*) Inhabiting a partially mined peatland: A standard method to characterize snake overwintering habitat. Journal of Herpetology, 54: 235–244.

Yagi A.R. and G. Tattersall (In Prep) Forced Hibernation- A Technique to ensure overwinter survival of temperate neonatal snakes

Yagi, A.R., et al. 2018. Managing an Ecological trap in a Partially Mined Peatland on the Resident Reptile Community which includes Five Species at Risk; Massasauga; Eastern Ribbon; Spotted turtle; Snapping turtle and Blanding's turtle. Final Report for 2018-19. Species at Risk Stewardship Fund, Ontario Ministry of Natural Resources and Forestry.

Yagi A.R., et al. 2017. Managing an Ecological trap in a Partially Mined Peatland on the Resident Reptile Community which includes Five Species at Risk; Massasauga; Eastern Ribbon; Spotted turtle; Snapping turtle and Blanding's turtle. Final Report for 2017-18. Species at Risk Stewardship Fund, Ontario Ministry of Natural Resources and Forestry.

Yagi, A. R. and Tattersall, G. J. 2018. "Please Don't Step on the Hummocks": Summer Refugia for Massasauga Rattlesnakes." The Canadian Herpetologists/L'Herpetologiste Canadien 8(1): 22-24.

Yagi, A. R., Abney, C., Bukovics, T., Breton, B., Blott, C., Yagi, K. 2018. "The Young and the Restless: Postpartum Breeding and Early Onset Sexual maturity in an Isolated Northern Population of Massasauga Rattlesnakes." The Canadian Herpetologists /L'Herpetologiste Canadien 8(1): 24-26

Hileman ET. … and A.Yagi, 2017. Climatic and geographic predictors of life history variation in Eastern Massasauga (*Sistrurus catenatus*): A range-wide synthesis PLOS ONE | DOI:10.1371 /journal.pone.0172011 February 14, 2017

Yagi, A.R., A. Brant, S. Meyer, D.M. Green, S. Dobbyn, B. Johnson, and R. Tervo†. 2017. The Fowler's toad Stewardship Guide. prepared for Environment Canada Habitat Stewardship Program 61pp.

Yagi A.R, K.T. Yagi and A.Brant. 2017. The Spotted Turtle Stewardship Guide, prepared for Environment Canada Habitat Stewardship Program 25pp.
Yagi A.R. [updated 2016]. Niagara Region Fish Habitat Types with Management Rationale, Ontario Ministry of Natural Resources unpublished manuscript.
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Dr. Katharine T. Yagi

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COSEWIC Amphibians and Reptile Specialist Subcommittee

Background

I am an applied ecologist, conservation biologist, and a passionate teacher/mentor. I believe that good foundations in our students' knowledge and applied skills will lead to better environmental leadership and a brighter future for our environment and species at risk. I am interested in understanding how flora and fauna adapt to environmental change, and how to implement management actions to affect recovery in degraded ecosystems. My investigations are designed within the framework of animal behaviour, population and community ecology, and ecological restoration.

Education

2012-2018:	PhD, Renewable Resources, *Supervised by Dr. David M. Green* Redpath Museum, McGill University, Canada
2008-2010:	M.Sc., Biology, *Supervised by Dr. Jacqueline D. Litzgus* Laurentian University, Canada
2004-2008:	B.Sc., Biological Sciences Guelph University, Canada

Professional Work Experience

Aug 2020 – Dec 2020:	Post Doctoral Fellow, *Supervised by Dr. Glenn Tattersall* Brock University, Canada
May 2020 – Jul 2020:	Course Instructor (Ecology of a Changing Planet #BIOL 3P85) Brock University, Canada
Sep 2019 – Dec 2019:	Course Instructor (Principles of Ecology BIOL 2Q04) Brock University, Canada
May 2019 – present:	Research Associate 8Trees Inc., Canada
Aug 2017 – May 2019: *(maternity leave from Jan 2018-Jan 2019)*	Post Doctoral Fellow, *Supervised by Dr. Glenn Tattersall* Brock University, Canada
Jun 2011 – Dec 2011:	Species at Risk Biologist Ontario Ministry of Natural Resources, Guelph District, Canada
Nov 2010 – Jun 2011:	Habitat Stewardship Technician Land Care Niagara, Canada
May 2005 – Sep 2008 (seasonally):	Field Technician Ontario Ministry of Natural Resources, Guelph District, Canada

Certifications

- Certified Ecological Restoration Practitioner-in-training/CERPIT (authorized by the *Society of Ecological Restoration*)
- Wetlands 101 (authorized by *Ducks Unlimited Canada*)

Awards and Achievements

2010: Runner-up, Best Student Presentation, Turtle Survival Alliance

2003: Niagara Peninsula Conservation Authority Conservation Achievement Award

1998: Women in Science Award

Authorships

Published Articles

1. Yagi, A.R., R.J. Planck, **K.T. Yagi**, and G. Tattersall. 2020. A Long-term Study on Massasaugas (*Sistrurus catenatus*) Inhabiting a Partially-mined Peatland: A Standardized Method to Characterize Snake Overwintering Habitat. Journal of Herpetology.

2. Green, D.M., and **K.T. Yagi.** 2018. Ready for bed: pre-hibernation movements and habitat use by Fowler's Toads, *Anaxyrus fowleri*. Canadian Field-Naturalist 132(1):46-52.

3. **Yagi, K.T.** and D.M. Green. 2018. Post-metamorphic carry-over effects in a complex life history: behaviour and growth at two life stages in an amphibian. Copeia 106(1):77-85.

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5. **Yagi, K.T**., and D.M. Green. 2016. Mechanisms of density-dependent growth and survival in Fowler's toads, (*Bufo*) *Anaxyrus fowleri*: volume vs. abundance. Copeia 104(4):942-951.

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7. **Yagi, K.T.** and J.D. Litzgus. 2012. The Effects of Flooding on the Spatial Ecology of Spotted Turtles *(Clemmys guttata*) in a Partially Mined Peatland. Copeia 2012(2):179-190.

Published Natural History Notes

1. Yagi, A.R., C. Abney, and **K. Yagi**. 2018. The Young and the Restless: Postpartum Breeding and Early Onset Sexual Maturity in an Isolated Northern Population of Massasauga Rattlesnake. The Canadian Herpetologist 8(1):24-26.

2. **Yagi, K.T**. 2014. Toad Tales from Long Point, Ontario Part 1. The Canadian Herpetologist 4(2): 11-12.

Published Dissertations

1. **Yagi, K.T**. 2017. Density-dependence and dispersal mechanisms in a pond breeding amphibian. PhD Thesis. McGill University.

2. **Yagi, K.T**. 2010. The effects of flooding on the spatial ecology and thermoregulation on Spotted turtles (*Clemmys guttata*) in a southern Ontario population. MSc Thesis. Laurentian University.

Technical Reports (not published)

1. 8Trees Inc. 2020. Environmental Impact Study for Black Creek Center, Town of Fort Erie, Ontario. Prepared for the Region of Niagara. 64pp.

2. 8Trees Inc. 2020. Scoped Environmental Impact Study for 368 Aqueduct St. and 155 Gadsby Ave, City of Welland, Ontario. Prepared for the Region of Niagara. 184pp.

3. 8Trees Inc. 2020. Environmental Impact Study for 495 Bernard Ave, Town of Fort Erie, Ontario. Prepared for the Region of Niagara, 75pp.

4. Yagi, A.R., **K.T. Yagi**, et al. 2020. Building on Success: Investigating the presence of Gray Ratsnake and Eastern Foxsnake using Habitat Suitability Modelling, and occurrence information to initiate standardized monitoring in priority Niagara-Hamilton areas. Final report for 2019-20, Ministry of Environment, Conservation and Parks, 29pp.

5. Yagi, A.R., **K.T. Yagi**, C. Blott, T. Bukovics, and B. Breton. 2020. Managing an Ecological trap in a Partially Mined Peatland on the Resident Reptile Community which includes Five Species at Risk; Massasauga; Eastern Ribbon; Spotted turtle; Snapping turtle and Blanding's turtle. Final Report for 2019-20. Species at Risk Stewardship Fund, Ministry of Environment, Conservation and Parks, 79pp.

6. Yagi, A.R., **K.T. Yagi**, C. Blott, and T. Bukovics. 2019. Risk Assessment Report on Human Impacts in the Wainfleet Bog Wetland Complex: Studies of terrestrial and aquatic wintering habitat for SAR Reptiles. Unpublished report for Environment Canada and Climate Change, 29pp.

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8. Yagi, A.R., **K.T. Yagi**, et al. 2018. Summary Report on the Assessment of Species at Risk Herpetofaunal Habitat Use and Mitigation Activities to Address Human Impacts in the Wainfleet Bog Wetland Complex. Final Report for 2017-18, Environmental Canada and Climate Change: Canadian Wildlife Service, 44pp.

9. Yagi, A.R., **K.T. Yagi**, T. Bukovics, C. Abney, and C. Blott. 2018. Managing an Ecological trap in a Partially Mined Peatland on the Resident Reptile Community which includes Five Species at Risk; Massasauga; Eastern Ribbon; Spotted turtle; Snapping turtle and Blanding's turtle. Final Report for 2017-18. Species at Risk Stewardship Fund, Ontario Ministry of Natural Resources and Forestry, 42pp.

10. Yagi A.R., and **K.T. Yagi**. 2018. Habitat Use by Two Populations of Species at Risk, Massasauga and Spotted Turtles in a partially mined peatland ecosystem (1998 to 2016). Environment Canada and Climate Change: Habitat Stewardship Fund, 24pp.

11. Green, D.M. and **K. Yagi**. 2015. Ponds for Toads. Fowler's Toad Recovery and Habitat Mitigation at Long Point, Ontario. Field report for 2015. Canadian Wildlife Service, Environment Canada.

12. Green, D.M. and **K. Yagi**. 2014. Ponds for Toads. Fowler's Toad Recovery and Habitat Mitigation at Long Point, Ontario. Field report for 2014. Canadian Wildlife Service, Environment Canada.

13. Green, D.M. and **K. Yagi**. 2013. Population ecology for Fowler's toad (*Anaxyrus fowleri*) at Long Point, Ontario, Field report for 2013. Canadian Wildlife Service, Environment Canada.

14. Green, D.M. and **K. Yagi**. 2012. Population ecology for Fowler's toad (*Anaxyrus fowleri)* at Long Point, Ontario, Field report for 2012. Canadian Wildlife Service, Environment Canada

Professional Services

I am currently a member on the COSEWIC Amphibians and Reptile Specialist Subcommittee and have served as a peer reviewer on multiple publications across several journals and have served as an academic reviewer on several project proposals for permits, and grant/funding proposals.

Professional Memberships

Jan 2021-Dec 2024: COSEWIC Amphibians and Reptiles Specialist Subcommittee member

Peer Reviewing

I have served as a peer reviewer for the following academic journals:

- Copeia
- Journal of Herpetology
- Journal of Thermal Biology
- Journal of Comparative Physiology B
- Ethology, Ecology & Evolution
- Ecosphere
- Trends in Ecology & Evolution

Curriculum Vitae Biologist

Cathy Blott

BSc Honours Science, University of Waterloo, 1993

blott@intown.net

Cathy Blott is currently an Associate Habitat Restoration Biologist

with 8Trees Inc, specializing in hydrological system monitoring.

Cathy has over 28 years' experience in aquatic systems monitoring, and ecosystem restoration projects.

Some of her responsibilities at 8Trees Inc. include installation and management of hydrology monitoring systems (Wainfleet Bog and Pelee Island), conducting elevation surveys, downloading, and managing data, analysis of data, implementing and monitoring restoration project designs, prepare reports and proposals, and to mentor younger staff, students, and volunteers in the field. Cathy also conducts outreach events and builds partnerships with landowners, municipalities, and agencies to gain support for several ongoing projects. Cathy is our lead fisheries and hydrology expert for Environmental Impact studies as well as conducting soils, ELC, amphibian and bird surveys.

From 2008 to 2016 she worked as Fish Crew Leader, Integrated Resource Management Technician, Biologist and Acting Management Biologist for the MNRF. She worked on the Fish Community Monitoring of the Niagara River Watershed", Wainfleet Bog Winter Life Zone, hydrology monitoring and Niagara River RAP Beneficial Use Impairment projects.

From 2006 to 2008 she worked for the Ministry of Forests in BC (2006 to 2008) conducting environmental assessments for proposed channel diversions of the Fraser River for hydroelectric and Ministry of Transportation projects. She worked as part of a team to measuring stream flows, fish community impacts and to assessed fish passage within newly constructed channels.

Work in BC continues, as needed. In 2020, she sat in as the Professional Biologist on site at 2 river crossing construction projects in BC, monitoring for impacts to downstream water quality, as per provincial protocols. Detection of an impact results in an immediate Stop Work Order.

From 1996 to 2006 and again from 2013 to 2015, she worked for Limnoterra Ltd. (1996 to 2006) as a Biologist and field technician responsible for installing and managing water level loggers in creek and wetland ecosystems to assess ecosystem level impacts, watershed and site level impacts caused by subdivision stormwater discharges, drainage, road construction, channel diversions and aggregate resource mining.

After graduating from University of Waterloo, from 1993 to 1996 she worked at the University of Waterloo as the GIS technician for a multi-disciplined Grand River Watershed Study.

Specialized Training:

- Royal Ontario museum fish identification certifications
- Class 1 crew leader boat & backpack electrofishing license

- Standard First aid & CPR
- Marine Emergency Duties (MED A-4)
- Pleasure craft boating license
- Ontario Stream Assessment Protocol (OSAP) certification, Soils, Wetlands
- Arc GIS, Access, Excel, Sigma Plot

Highlighted Experience at MNRF:

- Coauthored Niagara Fish Community and Niagara River RAP- fish population reports
- Analyzed and managed MNRF's digital fish database
- Managed fish telemetry data collection at Welland River Syphons (2013 to 2015)
- Managed thermal studies of Upper Niagara River and Upper 12 Mile Creek
- Completed bathymetry, substrate, aquatic vegetation surveys, fish migration, and velocity studies within the Upper Niagara River and tributaries.
- Coordinated application of Great Lakes Acoustic (GLATOS) monitors in Niagara River watershed
- Fish Crew Leader Welland River Fish Assessment (Seine, Back-Pack, E-Boat) (2007)
- Managing Environmental restoration projects for Lower Grand River Land Trust.
- Assisting Habitat Haldimand in restoring of brook trout stream on Grand River
- Literature search & preparation of Draft Environmental Resource Study document for impending Class C Environmental Assessment of brown trout stocking in Lake Huron. (2010)
- Sturgeon sampling & commercial catch sampling, Nottawasaga Bay, Owen Sound (2008)
- District (2010) Fish Crew Leader MNR Zone 8, 10 & 11 North Bay, ON. (2009) Sault Ste Marie/Blind River (2008)
- Gill net surveys from (Broad Scale Fisheries Management Program). Field supervision of remote site access, fish sampling, remote camping, call in procedures, & data delivery. Use of small, motorized watercraft. Access by truck, plane and helicopter.

Highlighted Experience in private consulting, BC:

- Assisted with field studies & reports of fish community habitat & flow analysis to assess impacts for 5 mountain streams of Fraser River and North Thompson River valleys being proposed to divert for proposed Independent Power Production hydro-electric projects. Collected velocity transects for flow modelling and diversion channel design.
- Monitored & directed construction crew to ensure no impacts to river water quality during Ministry of Transportation riverbank repair: detection of an impact results in an immediate Stop Work Order to resolve issues.
- Monitored and directed construction crew to insure no impacts to fisheries during bridge construction on the Fraser River and the Inonochlin River in the Monashee Mountains.
- Conducted Fish Passage Culvert Inspections for Ministry of Forests & Prioritized Ministry of Transportation culvert replacement candidates based on fish community & habitat parameters, throughout the interior of BC.

Highlighted Experience with Limnoterra Ltd working under Dr. Jon Planck.

- Measured/assessed and successfully showed impacts to wetlands and fisheries of proposed groundwater pumping for a proposed subdivision development, Dunnville Ontario, on behalf of local citizens, that resulted in proposed development application being denied.
- Provided technical support at Municipal Hearing Board to successfully show impacts of proposed gravel pit pumping to a coldwater creek and provincially significant wetland, on behalf of the local community group that resulted in the development application being denied, Greenoch Creek PSW, Greenoch, Ontario.
- Measured and assessed watershed flow throughout Strasburg Creek watershed, the last remaining coldwater system in Kitchener, to assess impacts and inform design of proposed dense urban development. Kitchener, Ontario
- Measured and assessed flow and biological communities in receiving creek system downstream of gravel pit to ensure features were not impacted as part of annual Provincial Pit & Quarry licensing. Puslinch Township, Ontario
- Monitored ground water level & temperature, wetland water levels, creek stage/flow to assess impacts to natural features from gravel extraction as part of annual Provincial Pit & Quarry licensing for existing pits and for new pit applications. Four sites along the Grand River, Elora, Ontario.
- Measured and analyzed sewer system flow for assessment and designs to divert stormwater flow from sewage treatment plants in the Greater Toronto Area to address impact of raw, untreated sewage flowing into Lake Ontario during precipitation events. Used continuous monitoring technology developed by Dr. Planck, (continuous monitoring instruments were not commercially available at the time).
- Assisted with installation & monitoring of the first On-site Sewage Treatment systems in Ontario: Municipal Pilot Project, Clifford ON, Bronte Creek Tim Horton's Camp, Mountsberg, ON.
- Monitored construction of award-winning surface stormwater collection/treatment system for a 200ac subdivision, Humber Flats, Vaughan, ON. Following construction, monitored stormwater quality and flow, to show difference between surface treatment of stormwater compared to stormwater pond discharge. Data showed stormwater pond results in pulses of turbid, warm, nutrient-rich water discharging to natural watercourse, compared to a more consistent flow of cool, clear water discharging from the surface collection/treatment system. It is intended this data will be used to go before MECP to change provincial policy requiring stormwater ponds for urban development.

Report To: **Board of Directors**

Subject: **New Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health**

Report No: **FA-37-21**

Date: **June 18, 2021**

Recommendation:

THAT Report No. FA-37-21 RE: New Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health **BE RECEIVED**.

Purpose:

The purpose of this report is to inform the Board of Directors about the New Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health and to highlight NPCA activities that support its priorities.

Background:

The Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health (COA) is an agreement between the Government of Canada and Province of Ontario to restore, protect and conserve Great Lakes water quality and ecosystem health. The first COA was signed in 1971 to fulfill Canadian commitments under the Canada–United States Great Lakes Water Quality Agreement. It also supports delivery of provincial commitments under the Made-in-Ontario Environment Plan, Ontario's Great Lakes Strategy and *Great Lakes Protection Act, 2015*. In 2019, the Governments of Canada and Ontario sought input from stakeholders on a Proposed COA Framework. NPCA staff provided comments that were submitted to the Province of Ontario through its online Environmental Registry of Ontario (refer to Report No. FA-155-19).

On May 27, 2021, the Governments of Canada and Ontario announced that they have signed the new COA, which sets out specific actions each government will take to protect and restore the Great Lakes, such as preventing toxic and nuisance algae, improving wastewater and stormwater management, reducing plastic pollution and excess road salt, restoring native species and habitats, and increasing resilience to climate change. The new COA is in effect from June 1, 2021 until May 31, 2026.

Discussion:

The Great Lakes are a treasured resource that is integral to the health and well-being of millions of Canadians, including those within the NPCA watershed. The Niagara Peninsula watershed area is

uniquely surrounded by the waters of the Great Lakes on three sides: Lake Erie is on its southern end, Lake Ontario is the northern portion of NPCA jurisdiction, and the Niagara River to the east. Approximately 5% of the NPCA watershed drains into Lake Erie, 40% of the area drains into Lake Ontario, and 55% into the Niagara River (and ultimately to Lake Ontario).

Protecting and restoring the Great Lakes is a shared responsibility. Through COA 2021, there is a commitment for strong, ongoing collaboration with partners (e.g., conservation authorities) to deliver on collective actions toward improving Great Lakes water quality and ecosystem health. Given the role of the NPCA in watershed-based resource management and the important linkage between the land and lakes, the NPCA is positioned to provide leadership and support to fulfill actions to improve the Great Lakes ecosystem.

The new COA 2021 includes 5 priority areas and 13 Annexes (areas of focus) that outline how Canada and Ontario will respond to existing or emerging priorities over the next five years (Fig. 1).

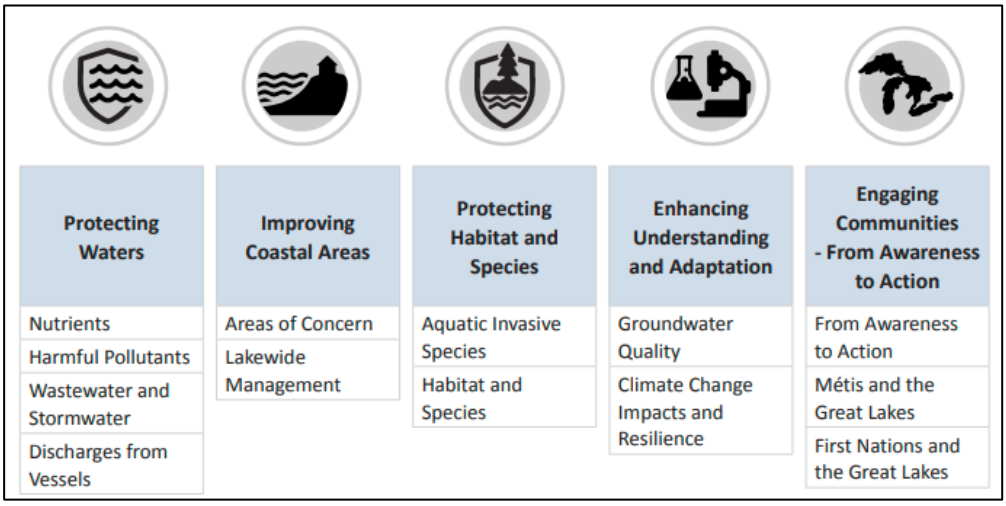

Figure 1. Graphical summary of the COA 2021 Priorities and Annexes to protect and restore the Great Lakes water quality and ecosystem health (Source: COA 2021).

NPCA's activities supporting COA objectives.

Through its existing programs/services such as water quality monitoring, source protection program, habitat restoration, integrated watershed management, and remedial action plan, the NPCA continues to provide local leadership and support to help Canada and Ontario achieve several results noted in the COA Annexes (i.e., Nutrients, Wastewater and Stormwater, Areas of Concern, Habitat and Species, Groundwater Quality, Climate Change Impacts and Resilience, etc.).

a) The NPCA actively supports 'Improving Coastal Areas – Areas of Concern' (COA Annex 5, Result 10) to lead and coordinate the completion of remaining actions to achieve Niagara River Remedial Action Plan (RAP) goals through funding agreements with Canada and Ontario. The NPCA and RAP partners recently completed a Niagara River (ON) Delisting Strategy which directly supports the COA result indicated. Together with its partners, the NPCA is on track to complete all remaining RAP actions by 2026—as noted in the COA 2021.

b) The Regional Watershed Monitoring Network & Watershed Report Cards provide water quality conditions and trends within the NPCA jurisdiction. The NPCA continues to contribute

to local and regional scientific knowledge that enhances the understanding of environmental impacts and implementation of strategies and actions.

c) NPCA's restoration, stewardship, and community engagement initiatives facilitate local actions encouraging habitat improvement, environmentally-sound practices, and pollution prevention measures. The NPCA will continue to proactively seek involvement by a broad cross-section of the population to support the goals and objectives of COA and the Niagara River RAP (beyond delisting of the Area of Concern). An enhanced restoration program is currently being developed.

d) NPCA's watershed planning data updates will continue to focus on establishing and understanding land-to-lake interactions and provide guidance on policy recommendations as well as stakeholder and community actions. The NPCA will work closely with the Provincial and Federal government to ensure our work supports COA 2021 goals.

e) A citizen science initiative to establish a visual assessment data network is being established on the shoreline of Lake Erie through funding support from the Provincial Great Lakes Local Action Fund. A similar initiative will be pursued for the Lake Ontario shoreline through the Federal Eco-Action Community Fund in 2022 with other partners.

f) Through Conservation Ontario, the NPCA will also be contributing to Lake Erie and Lake Ontario Lakewide Action and Management Plan (LaMP) work.

Financial Implications:

There are no direct financial impacts resulting from this report. As evident from the discussion above, the conservation authority continues to be a significant local delivery agent and there will be further opportunities to partner with the Federal and Provincial Governments to help achieve shared outcomes of the COA 2021.

New resources will be needed to support NPCA in delivery of programs and services as a result of recent changes to the Conservation Authority Act. NPCA will continue to leverage grant funding opportunities as appropriate to match municipal funding.

Through our comments on the CA Act Regulation consultations, the NPCA will also be advocating for inclusion of conservation authority programs that support COA 2021.

Links to Policy/Strategic Plan

The Canada-Ontario Agreement currently supports the implementation of the Niagara River Remedial Action Plan (as per Annex 5, Result 10). As the NPCA completes and executes its new Strategic Plan, there may be further funding and partnership opportunities to deliver on mutual outcomes.

Related Reports and Appendices:

Report No. FA-155-19 RE: Comments on "Proposed new Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health"

Delisting Strategy: Niagara River (Ontario) Area of Concern [Download/View]

Authored by:

Original Signed by:

Natalie Green, M.Sc., PMP
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Reviewed by:

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Chandra Sharma, MCIP RPP
Chief Administrative Officer/Secretary-Treasurer

Report To: **Board of Directors**

Subject: **Niagara River 'Beach Closings' Beneficial Use Impairment (BUI) Status Assessment and Re-designation**

Report No: **FA-36-21**

Date: **June 18, 2021**

Recommendation:

1. **THAT** Report No. FA-36-21 RE: Niagara River 'Beach Closings' Beneficial Use Impairment (BUI) Status Assessment and Re-designation **BE RECEIVED**.

2. **THAT** Report No. FA-36-21 **BE CIRCULATED** to the Town of Niagara-on-the-Lake.

3. **AND THAT** a letter **BE WRITTEN** to the Town of Niagara-on-the-Lake thanking them for their leadership and ongoing collaboration with the NPCA to improve the Niagara River's water quality and ecosystem health as part of the Niagara River Remedial Action Plan initiative.

Purpose:

The purpose of this report is to inform the NPCA Board of Directors about the recent Niagara River Beneficial Use Impairment Status Assessment Report which recommends changing the status of the 'Beach Closings' BUI to Not Impaired.

Background:

The Niagara River was identified as one of 43 Great Lakes' Area of Concern (AOC) in the late 1980s due to water quality and habitat problems. Several partners (including the NPCA) have been working together to improve the Niagara River's water quality and ecosystem health as part of a local Remedial Action Plan (RAP). Each AOC must restore fourteen potential impaired beneficial uses that represent the ways in which humans and wildlife benefit from water. The beneficial use impairments (BUIs) are used by the local RAP team to focus restoration needs, track progress, and report on success. There are only 5 BUIs remaining in the Niagara River (Ontario) AOC related to restrictions on fish consumption, degradation of fish and wildlife populations, degradation of benthos (bugs that live in sediments in waterbodies), beach closings, and loss of fish and wildlife habitat. The goal of the RAP is to complete actions that improve individual BUIs to remove the Niagara River from the list of Great Lakes' AOCs.

The 'Beach Closings' BUI is meant to indicate water quality issues due to bacterial pollution from fecal sources (e.g., sewage waste). Historically, the 'Beach Closings' BUI has been designated as impaired due to high levels of *E. coli* bacteria at Queen's Royal Beach (QRB) in the Town of Niagara-on-the-Lake (NOTL). QRB is the only public swimming beach on the Canadian side of the Niagara River. Studies indicated that the contamination was likely from the nearby storm sewer outfall that

discharges near the beach. From 2010-2018, thorough investigations into the bacterial pollution sources that could be linked to water quality issues were identified and remedial and monitoring actions were completed by the Town of NOTL and other relevant partners to address the challenges impacting QRB.

Discussion:

Recent extensive water quality monitoring, microbial source tracking studies, storm sewer investigations, and implementation of remedial actions have resulted in significant water quality improvements at the Niagara River beach. Additional risk management actions will continue to ensure people are aware of potential risks and help them make decisions to protect their health.

The 'Beach Closings' BUI Status Assessment Report indicates all the Niagara River RAP criteria have been met and recommends that the status of the 'Beach Closings' BUI for the Canadian side of the Niagara River be officially changed to Not Impaired. The BUI is not considered impaired on the U.S. side of the Niagara River.

Table 1. Niagara River BUI delisting criteria and assessment result.

For the Niagara River (ON) AOC, the Beach Closings BUI will no longer be considered impaired when:	**Assessment Result**
1) Prominent sources of fecal pollution that could contaminate the beach or recreational waters are known and remedial actions to address known sources are identified and completed;	Achieved
2) At least 80% of the geometric mean results of recreational water samples (when sampled at least once per week) meet the Ontario Ministry of Health Recreational Water Quality Guideline (≤200 CFU/100 mL) each swimming season for a minimum of three years;	Achieved
3) Risk management actions (e.g., postings, signage, education, rain rule) are in place to protect human health.	Achieved

In a joint outreach and engagement effort with the Town of NOTL, RAP partners are proceeding with the re-designation process by seeking input from the public, local First Nations, Métis Nation of Ontario, and U.S. RAP counterparts before submitting an official status change request to the Government of Canada and Ontario for review and approval. If approved, the Niagara River RAP Team will have reached another tremendous milestone on the journey to remove the Niagara River from the list of Great Lakes' Areas of Concern and will have four remaining BUIs. More information is available at www.ourniagarariver.ca/beach.

Financial Implications:

There are no financial implications. The Niagara River Remedial Action Plan project is funded through agreements with Environment and Climate Change Canada and the Ontario Ministry of the Environment, Conservation and Parks.

Links to Policy/Strategic Plan:

The Niagara River (Ontario) Remedial Action Plan is currently hosted and coordinated by the NPCA through agreements with the federal and provincial governments.

Related Reports and Appendices:

None

Authored by:

Original Signed by:

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Project Manager, Niagara River Remedial Action Plan

Reviewed by:

Original Signed by:

Geoff Verkade
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Reviewed by:

Original Signed by:

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Director, Corporate Services

Submitted by:

Original Signed by:

Chandra Sharma, MCIP RPP
Chief Administrative Officer/Secretary-Treasurer

Report To: **Board of Directors**

Subject: **Water Quality Monitoring Program Summary Report for the Year 2020**

Report No: **FA-38-21**

Date: **June 18, 2021**

Recommendations:

1. **THAT** Report No. FA-38-21 RE: Water Quality Monitoring Program Summary Report for the Year 2020 **BE RECEIVED**.

2. **THAT** the actions highlighted in the report to inform municipalities, stakeholders, and the public about the report findings and best practices to improve local water quality **BE IMPLEMENTED**.

3. **AND FURTHER THAT** a copy of this report **BE CIRCULATED** to municipalities, Ministry of Natural Resources and Forestry (MNRF), Ministry of the Environment and Parks (MECP) and the Federal Ministry of Environment and Climate Change Canada (ECCC).

Purpose:

The purpose of this report is to provide a summary of NPCA's 'Water Quality Monitoring Program Summary Report for the Year 2020' and to inform the Board of the strategy to inform our member municipalities, stakeholders, and the public about the report and its associated findings and what actions can be taken to improve local water quality.

Background:

The NPCA Water Quality Monitoring Program was implemented in 2001 and is operated in partnership with the Ministry of Environment, Conservation and Parks (MECP), the Regional Municipality of Niagara, Haldimand County, and the City of Hamilton. The NPCA collects and analyzes hundreds of water samples each year from the streams and groundwater resources within the watershed. From this information, the NPCA can identify sources of pollution, track water quality trends, and help to assess and direct NPCA environmental programs. As well, the long-term data collected serves as a baseline by which to compare the success of various water quality improvement initiatives being undertaken by different organizations throughout the watershed.

Discussion:

The NPCA Water Quality Monitoring Report for the Year 2020 summarizes the results of the NPCA's surface water and groundwater monitoring program.

Surface Water

The NPCA collects monthly surface water quality samples (during the ice-free season) at 80 monitoring stations and analyzes them using several indicator parameters including chloride, nitrate, total phosphorus, total suspended solids, copper, lead, zinc, and *E. coli*. These indicator parameters are used to calculate the Canadian Water Quality Index (WQI) which provides a descriptive water quality rating for each station.

The NPCA also monitors surface water quality using benthic invertebrates (aquatic insects and animals) as indicators of stream health. Due to their restricted mobility and habitat preferences benthic invertebrates usually remain in a localized area. As a result, they are continuously subjected to the effects of all pollutants and environmental stream conditions, and as such can provide a broad overview of water quality related problems. They are abundant in all types of aquatic systems and can be easily collected and identified.

For surface water, the biological and chemical monitoring results indicate that most of Niagara's watersheds have poor or impaired water quality. Total phosphorus, *E. coli*, suspended solids, and chlorides from non-point sources (agricultural and livestock operations, faulty septic systems, winter de-icing operations) and point sources (combined sewer overflows, urban stormwater runoff) continue to be the major causes of impairment in the NPCA watershed.

Watercourses under the direct influence from the Great Lakes and Niagara River such as the Lower Welland River have higher water quality ratings. Watercourses that are strongly influenced by groundwater discharge like the Upper Twelve Mile Creek (Effingham Branch) also have higher water quality ratings as do watercourses located in areas with substantial natural landscapes like the Point Abino Drain and Beaver Creek (both located in Fort Erie). Please refer to Appendix 1 for additional information.

Groundwater

The NPCA collects water quality data from 15 Provincial Groundwater Monitoring Network (PGMN) monitoring wells and 31 Ontario Geological Survey monitoring wells. Please refer to Appendix 2 for the location of the wells within the NPCA groundwater monitoring network. This data is important to assess the ambient conditions of several bedrock and overburden aquifers found in NPCA watershed. For groundwater, monitoring results indicate that water quality was found to be highly variable with some wells exceeding the Ontario Drinking Water Standards. All groundwater quality exceedances were related to naturally occurring bedrock conditions and have been reported to the Ministry of the Environment, Conservation, and Parks and the applicable municipal Public Health Departments.

Recommendations

The NPCA Water Quality Monitoring Program continues to provide valuable information about the health of the watershed. The poor surface water quality in the NPCA watershed has been caused by decades of environmental degradation. However, water quality programs that improve how

nutrients are managed, serve to increase riparian buffers, and improve forest cover can begin to address these impacts. It will likely take many years of implementing these programs before the water quality in the NPCA watershed improves to the point where it is able to meet federal and provincial water quality guidelines. As such, the Water Quality Monitoring Report recommends that the NPCA continue to monitor both our surface water and groundwater to ensure that there is up-to-date water quality information available, be able to quantify trends, and continue to identify sources of contamination within the NPCA watershed.

Communication Strategy

In previous years, the Water Quality Monitoring Program Annual Summary Report was circulated via email to the Clerks at the member municipalities, the local Health Departments, and the MECP. At the October 22, 2020 NPCA Board Meeting, the NPCA Board directed staff (via Resolution FA-134-2020) to present the annual Water Quality Monitoring results and trends to the partner municipalities and to develop water quality education resources to engage stakeholders about the state of water quality and suggested best practices.

As requested, the NPCA will undertake the following actions:

1. The Water Quality Monitoring Summary Report will be distributed to the Clerks at the Region of Niagara, its lower tier municipalities, the City of Hamilton, the County of Haldimand, all associated Public Health Departments, and the local Ontario Ministry of Environment, Conservation and Parks office. With the circulation to the Clerk at the NPCA's member municipalities, an offer will be extended for NPCA staff to present the report and its associated findings to municipal council and/or senior staff.

2. A digital postcard summarizing the report's findings and a list of actions that individuals, communities, and businesses can undertake to improve local water quality will also be published via various mediums. Please see Appendix 3 for a copy of the postcard.

3. NPCA staff will coordinate a Public Information workshop after Thanksgiving 2021 in order to inform the public of the Water Quality Monitoring Summary Report and its associated findings, outline a list of suggested best practices, and to advertise the opportunity for the public to participate in the NPCA's Restoration Grant Program.

4. The Report will be placed on the NPCA website along with educational resources.

Financial Implications:

The Water Quality Monitoring Program is funded through NPCA annual budgets. The program is currently listed under the future Mandatory Programs and Service to be Prescribed in Regulation within one year after the end of the transition period of the proposed CA Act regulations currently being developed.

Related Reports and Appendices:

Appendix 1 – Water Quality Ratings in 2016-2020
Appendix 2 – NPCA Groundwater Monitoring Network
Appendix 3 – Digital Postcard
Appendix 4 – Water Quality Monitoring Program Report Summary Presentation

Authored by:

Original Signed by:

Joshua Diamond, M.Sc., C. Tech
Water Quality Specialist

Prepared by:

Original Signed by:

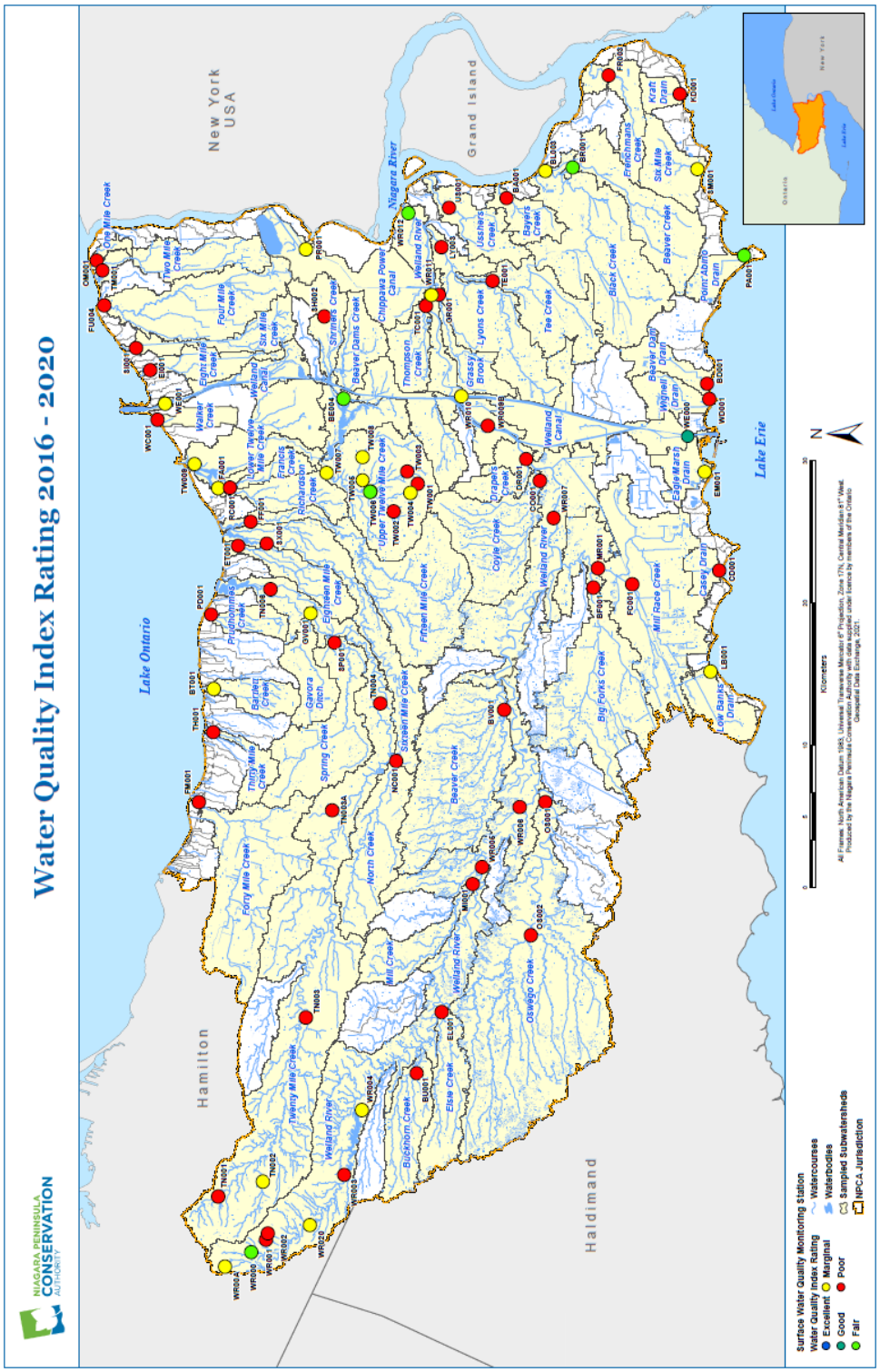
Steve Miller, P.Eng.
Senior Manager, Water Resources

Submitted by:

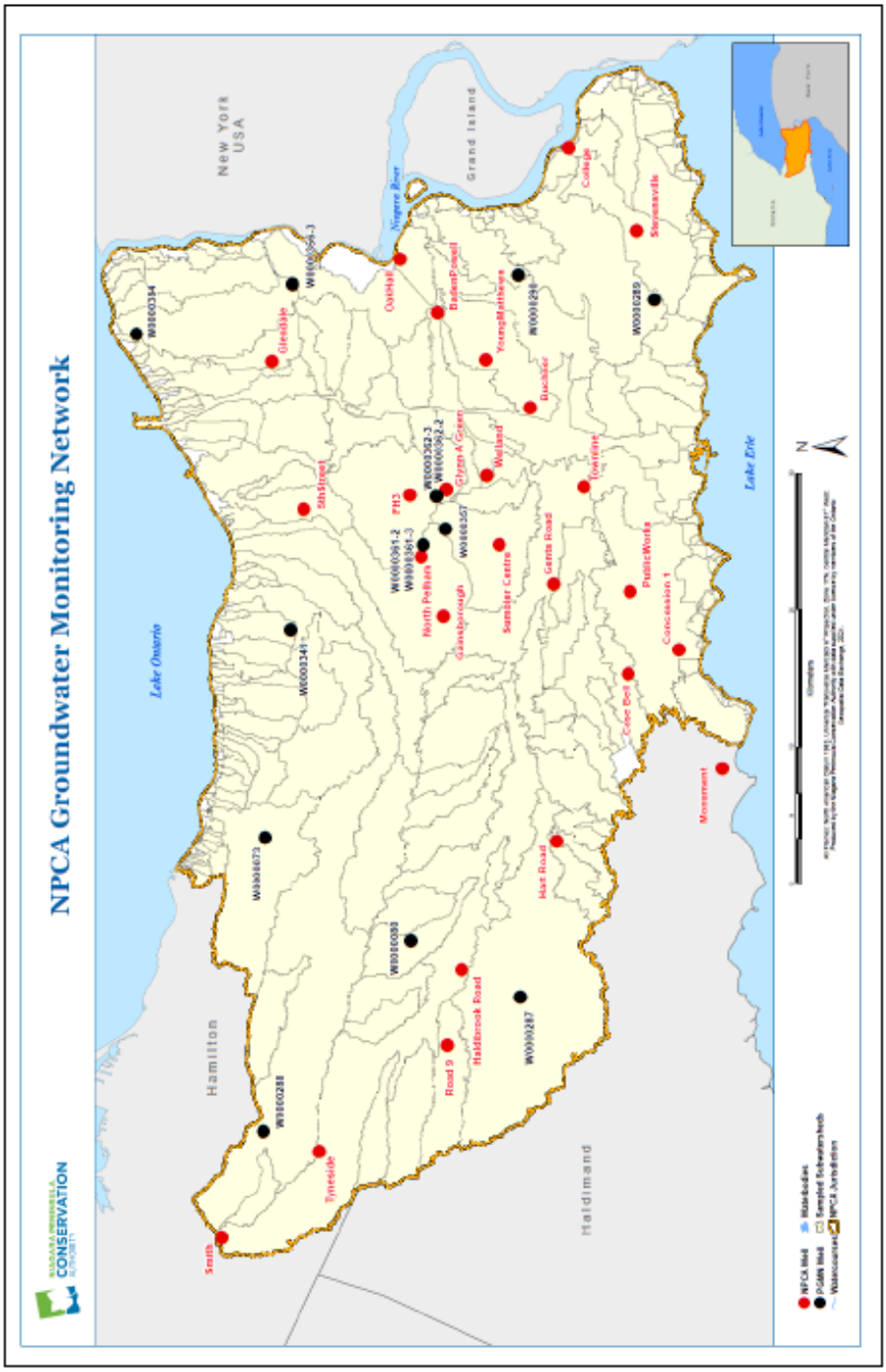
Original Signed by:

Chandra Sharma, MCIP, RPP
Chief Administrative Officer/Secretary-Treasurer

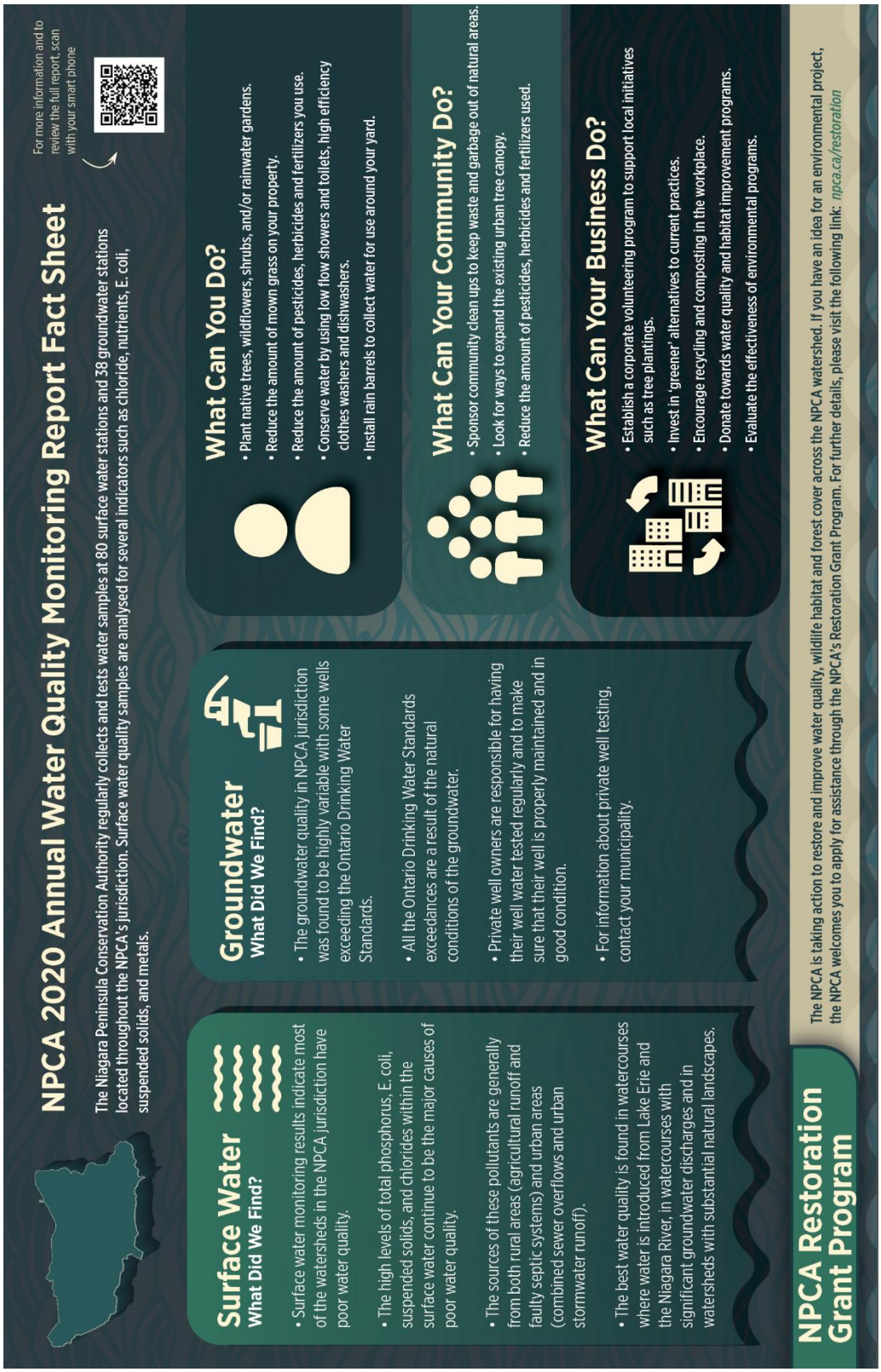
Appendix 1 - Water Quality Ratings 2016-2020



Appendix 2 – NPCA Groundwater Monitoring Network



Appendix 3 – Digital Postcard



Water Quality Monitoring Program Summary Report of the Year 2020

NPCA Board of Directors Meeting
June 18, 2021

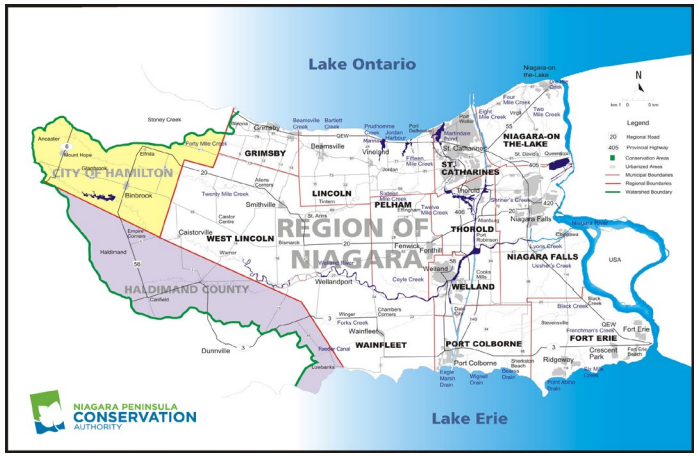
Why is monitoring important?

- Characterizes the quality of our waters and identifies changes over time.
- Identifies emerging water quality issues and sources of contamination.
- The information is used to design specific pollution prevention and remediation programs and to determine how effective they are.
- Allows for a better understanding of the impact of spills or pollution discharges.

NPCA Water Quality Monitoring Program implemented in 2001 with a mandate to:

1) **Assess** water quality in local watersheds

- Surface water quality
- Groundwater quality



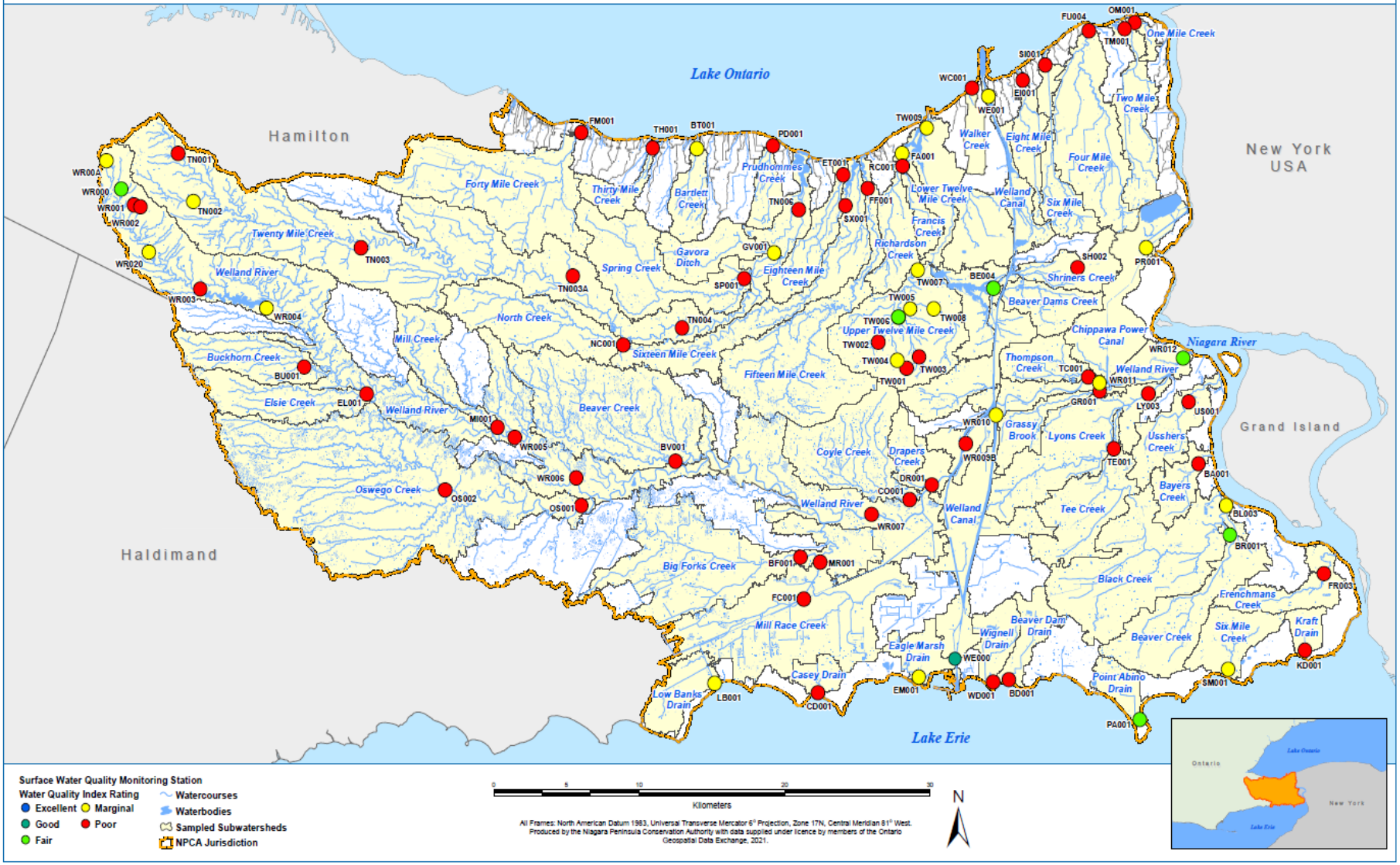
2) **Report** water quality information to stakeholders

- Water quality reports
- Data sharing

What does the NPCA look at in our water?

Indicator	Sources	Impacts
Chloride	Road salt, sewage	Ecological toxicity
Phosphorus	Fertilizers, sewage	Excess algae growth
Nitrate	Septic systems, fertilizers	Human health
Suspended Solids	Erosion, urban and agricultural runoff	Loss of habitat
E. coli	Sewage, manure	Beach closures, boil water advisories
Metals	Industrial effluents, pesticides, storm water runoff	Ecological toxicity
Benthic Animals	Both rural and urban pollutants	Ecological toxicity Loss of habitat

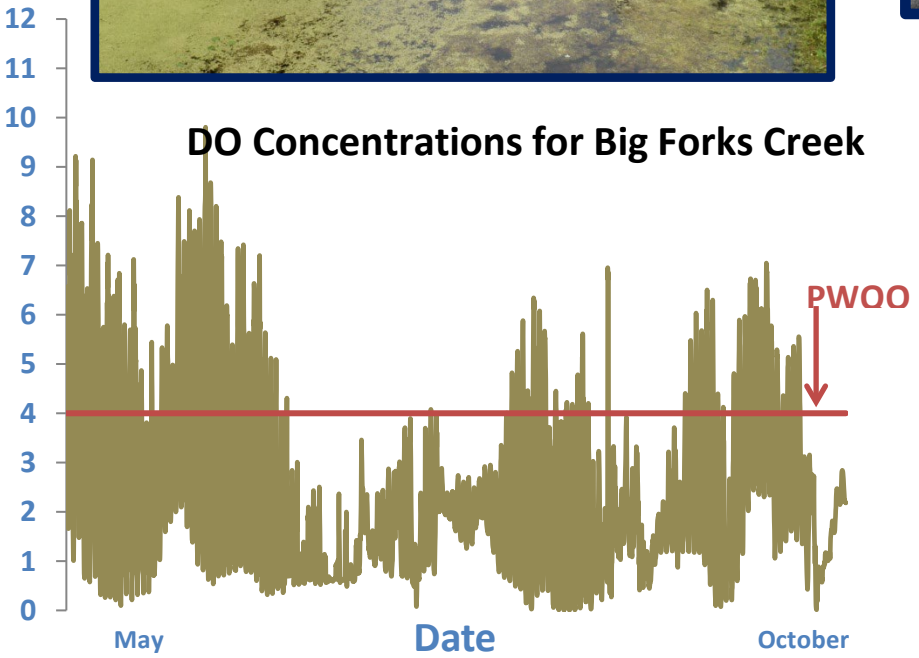
Water Quality Index Rating 2016 - 2020



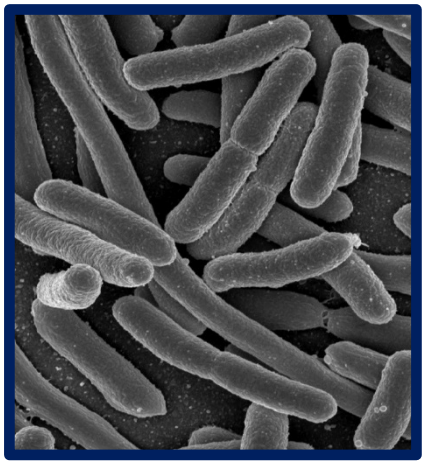
What is the surface water data telling us?

Total Phosphorus

Algae & Duckweed

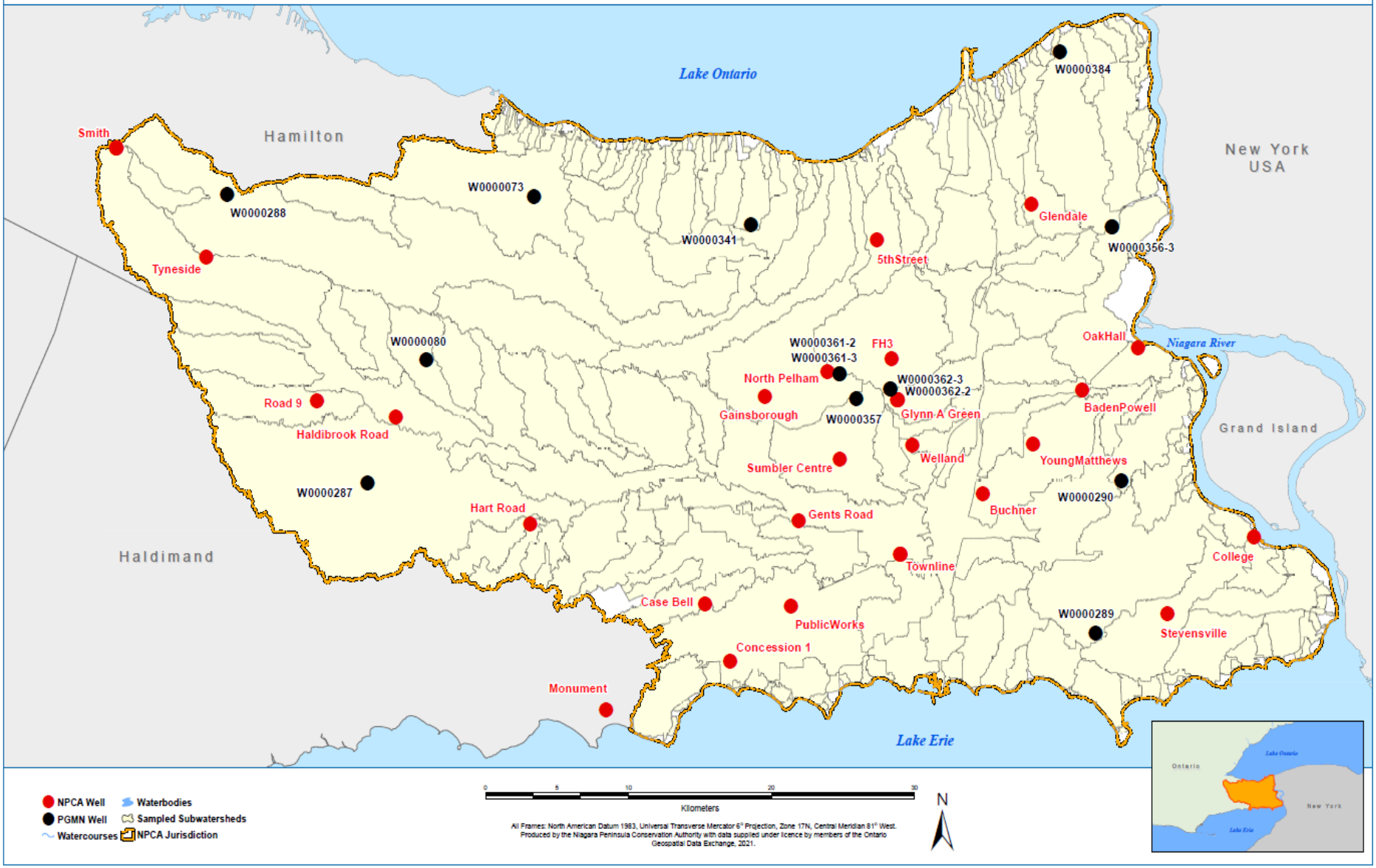


E. coli



Chloride

NPCA Groundwater Monitoring Network



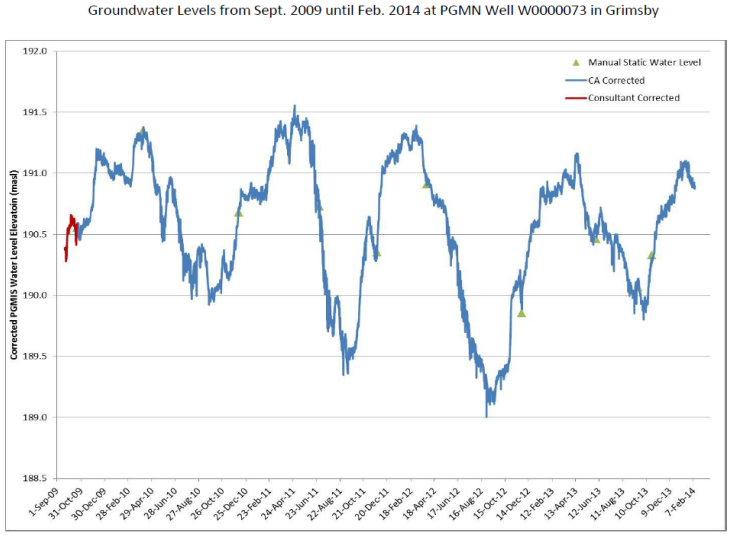
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
Produced by the Niagara Peninsula Conservation Authority with data supplied under licence by members of the Ontario Geospatial Data Exchange, 2021.

What is the groundwater data telling us?

- Water quality at most NPCA wells meets Ontario Drinking Water Guidelines

But…..

- Some exceedances are attributed to natural conditions of the groundwater



Strategies to Improve Water Quality

Best Management Practices

Livestock Restrictions

Wetland &Tree Plantings

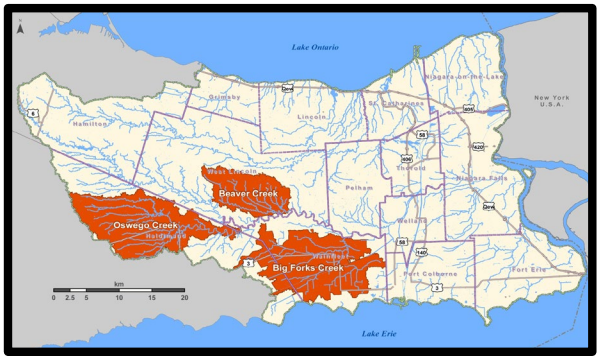
Cover Crops

Nutrient Management

Riparian Buffers

Conservation Farm Practices

Watershed Prioritization

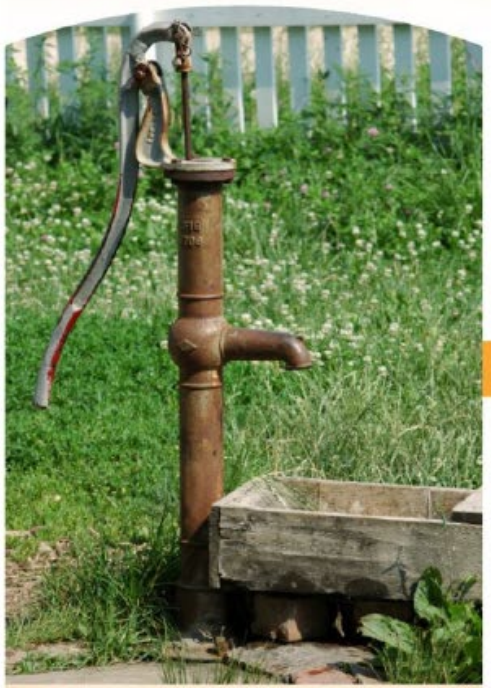


Site Specific Studies

Better Technology

NPCA Water Well Decommissioning Grant Program

WATER WELL DECOMMISSIONING GRANT PROGRAM



NIAGARA PENINSULA CONSERVATION AUTHORITY

For more information phone 905.788.3135
or visit www.npca.ca

PROJECT ELIGIBILITY

- Grants are available for projects on qualifying lands located within the NPCA jurisdiction for the decommissioning of unused water wells.
- Limit of two (2) wells per property (landowner).
- Oil wells, gas wells and cisterns are not eligible under this program.
- All work must be completed by a water well contractor licensed by the Ministry of the Environment (MOE) as set out in Ontario Regulation 903.
- All work must comply with MOE procedures for plugging or abandoning water wells according to Ontario Regulation 903.
- Applicants must apply and be approved prior to initiating their project. Projects already underway or completed without NPCA approval will not be eligible.

5 STEPS FOR INTERESTED PROPERTY OWNERS

1. Contact NPCA for an application and program information.
2. Fill out the application and submit to NPCA with two (2) quotes from licensed water well contractors for proposed work.
3. Obtain pre-approval from NPCA to proceed with proposed work.
4. Complete proposed work and submit all receipts, invoices, and water well decommissioning record(s) to NPCA for review.
5. Receive final approval and grant funding from NPCA.

NIAGARA PENINSULA CONSERVATION AUTHORITY

250 Thorold Road West 3rd Floor, Welland, ON L3C 3W2
phone 905.788.3135 • fax 905.788.1121

Project Funding Provided By: WaterSmart Niagara | Niagara Region

Recent Projects

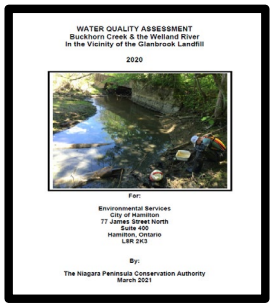
Before

After

Additional Water Quality Monitoring Services Provided in 2020

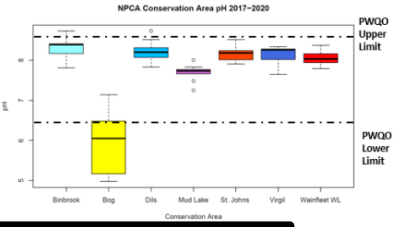
1. **Hamilton Airport Biological Monitoring Study**
   - Assists with monitoring airport operations

2. **Glanbrook Landfill Biological Monitoring Study**
   - Assists with monitoring landfill operations

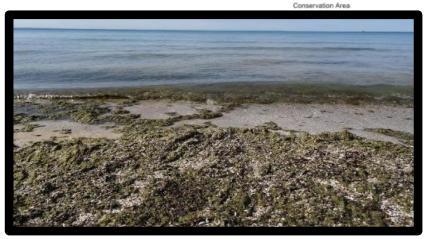


3. **Upper Twelve Mile Creek Water Temperature Monitoring**
   - Monitor summer stream water temperature

4. **Conservation Area Water Quality Monitoring**
   -Ambient water quality monitoring of significant water features

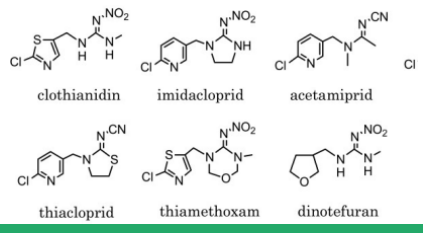


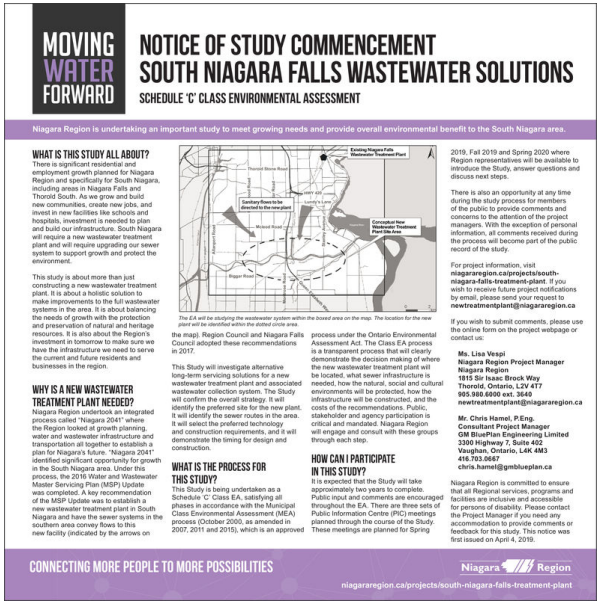
5. **Niagara Coastal Collaborative Committee**
   - Lorraine Bay nutrient trackdown field program



Spill Investigations

Neonicotinoid Insecticides





Consultants

Assessing the level of correlation amongst biological indices and water chemistry parameters from 2005-2013 in the Effingham Tributary of Twelve Mile Creek, Pelham, Ontario

ERS 411 Senior Honours Thesis

Thank You!

Eric Augustino
Water Quality Technician

Report To: **Board of Directors**

Subject: **Wainfleet Bog Biederman Drain Re-Alignment Proposal**

Report No: **FA-39-21**

Date: **June 18, 2021**

Recommendation:

1. **THAT** Report No. FA-19-21 RE: Wainfleet Bog Biederman Drain Re-Alignment Proposal **BE RECEIVED**.

2. **THAT** the Board **ENDORSE** staff recommended approach to the future management of drainage in Wainfleet Bog.

3. **AND FURTHER THAT** this report **BE CIRCULATED** to the City of Port Colborne and the Township of Wainfleet.

Purpose:

The purpose of this report is to update the Board on a request by 8Trees Inc. to relocate the Biederman Drain and seek a decision on the staff recommended approach in response to the request by 8Trees Inc..

Background:

The Wainfleet Bog is located approximately eight km northwest of the urban area of Port Colborne, within the Township of Wainfleet and the City of Port Colborne. The Wainfleet Bog historically was mined for peat which resulted in significant adverse impacts to this rare and unique ecosystem. The two largest landowners of the Wainfleet Bog are the NPCA and the Ministry of Natural Resources and Forestry, with NPCA having the largest land holdings. The Wainfleet Bog Conservation Area was acquired in 1995 by NPCA and is the largest of NPCA's Conservation Areas, at approximately 2,000 acres (800 hectares) in size. The Wainfleet Bog is a provincially, significant wetland and is the largest least disturbed bog remaining within the Carolinian region of Ontario. This rare ecosystem provides habitat to a variety of unique plants and animals as well as a suite of recreational uses.

Protected Area Designation 2021

In 2021, the Wainfleet Bog met the pan-Canadian standards for "protected areas" and was designated as a site under the 'Pathway to Canada Target 1" Initiative. This recognition acknowledges the ways in which the Wainfleet Bog is already being managed by the NPCA to

conserve biodiversity. Details of this Designation were presented to the Board (Report No. FA-19-21).

Wainfleet Bog Management Plan and Site Restoration Activities

A Management Plan and site Restoration Plan were developed by staff in 1997 with input from stakeholders and the community, with an objective to restore a healthier state of the Wainfleet Bog, provide passive recreation and educational opportunities, as well as include self-sustaining management strategies with little to no human intervention, multi-use site opportunities, and at minimal cost. NPCA staff continues to implement management actions aligned with the Management Plan. Monitoring of water levels, vegetation progress and site wildlife continues monthly and annually to assess the progress of the management plan. The plan continues to be relevant with ongoing reviews and updates to the management plan scheduled. A management plan update (as needed) will be scheduled in future years along with other NPCA lands as part of the recent CA Act updated regulation requirement.

Several drainage canals were created during the period that peat was mined in portions of the Wainfleet Bog. Although, these canals have been decommissioned since the peat mining halted. The canals still exist but are maintained open for wildlife use (turtles and fish) and some drainage on the east half. Dams made of peat (i.e., peat dams) were originally created (in 1998) with the purpose of blocking water flows leaving the bog via the canals on the western portion of the bog, with the intention of rehabilitating the NPCA Wainfleet Bog. The peat dams have effectiveness, although may not be as effective as desired due to damage inflicted by wildlife (e.g., burrows). Maintaining the appropriate level of water in the bog has been one of the objectives of the NPCA. Currently, water levels of the bog are primarily affected by evapotranspiration, drainage and beaver activity (i.e. beaver dams).

Site restoration activities on NPCA land have included: blocking peat canals with peat dams, creating surface indentations to mimic bog topography (hummocks and pools), planting native bog plants, cutting invasive European Birch trees, and installing boardwalks for passive recreation and educational purposes. This habitat mimics that required by the snakes and turtle Species at Risk populations. To date, the bog continues to be monitored and shows progress towards a more natural bog ecosystem. The bog is progressively retaining more water with more constant water levels (allowing for better recharge and discharge functions as well as more stable water levels), increased growth of *sphagnum* moss and associated peat accumulation, increased areas of bog shrubs and grasses, as well as continues to support species-at-risk populations of snakes and turtles as well as other bog species. The NPCA continues to monitor site features to ensure management plan goals are being met.

Research

Over the past several years, the NPCA has worked in partnership with the Ministry of Natural Resources and Forestry, Environment Canada National Water Research Institute, academic institutions, and other researchers on a variety of research initiatives including groundwater patterns, water budget and effective techniques for water retention, bog vegetation progression, turtle and rattlesnake habitat use and populations, wildfire effects, satellite imagery and hydrology analyses.

Water levels are monitored by the NPCA through a network of water wells across and surrounding the bog, while vegetation progress and snake and turtle population levels are monitored by the Ontario Ministry of Natural Resources and Forestry and the proponent to reduce overlap and

effectively use human and financial resources. The NPCA has provided the proponent (8 Trees Inc.) NPCA research permits to facilitate knowledge sharing of the Massasauga Rattlesnake and turtle populations (e.g. Spotted Turtle, *Endangered* status through the Provincial Endangered Species at Risk Act) for survival rates, habitat areas use and population levels (increasing, decreasing or maintained).

Biederman Drain Re-location Request from the Proponent (8Trees Inc.)

The Biederman Drain exists along approximately two thirds of the southernmost edge of the Wainfleet Bog. The proponent is proposing to relocate a segment of the Biederman Drain to a historic yet non-active drain location. This historic location falls on NPCA and private land within a Provincially Significant Wetland.

The City of Port Colborne is currently updating the engineering report for the Biederman Drain. 8Trees Inc. is requesting the NPCA, as a landowner, submit a petition to the City to relocate this section of the Biederman Drain as part of the engineer's report.

Research conducted by proponent indicates fluctuating water levels of the Wainfleet Bog in areas where the snakes hibernate/overwinter, which can adversely impact this *Endangered* Species by drowning or dehydrating the species while it hibernates. The NPCA notes the fluctuating water levels at the site are caused by site drainage, as well as high evapotranspiration from European Birch trees and beaver activity (dams), and management of beaver activity (i.e., removal of beavers and dams) in the Biederman Drain. The management of beaver activity and the impact of how this management affects the bog has not been quantified. These components have been addressed in the current NPCA restoration plan considering all site objectives. NPCA staff continues to monitor site restoration work, and work with 8Trees Inc. to gain clarity and evidence for these conclusions.

Discussion:

Under the *Drainage Act*, the following conditions must be met for this type of re-location activity:

a) A petition must be made by the landowner in question to the Municipality (NPCA to the City of Port Colborne) to include the re-location in their Engineers Report.
b) The landowner(s) is required to pay for the entire activity (approx. $137 000 as per the preliminary estimate by the Port Colborne Drainage Engineer) this includes an allowance to the receiving landowners for the potential loss of land.
c) An agreement must be made with the receiving landowners to receive the Drain (Currently two landowners are implicated). To date there is no known requests or intentions from the landowners in question to have the drain moved on their property.
d) There is an important timing component where the City appointed the Engineer in late 2019. According to staff the Engineers report must be presented to the council within the next few months as the process has been delayed.
e) There is a public process component where the Town Council-approved Engineer's report will flow through a public comment process. This report can be appealed. Appeals, if any, and associated delays are added to the cost of the project.

Note: NPCA Staff have spent a significant amount of time working with the proponent. to find a mutually aggregable solution that is least disruptive to the environment, financially viable and consistent with the objectives of the Management Plan.

Options

Three key options have emerged from discussions with NPCA staff and some key stakeholders in determining an approach that will contribute to the overall benefit of the Wainfleet Bog. A variety of factors, including ecology, social and recreation values, achievable results, financial costs, and balancing priorities are outlined below. The following section summarizes options and outlines key considerations for each option. Option Three is recommended by NPCA Staff.

Option 1: Status quo with current NPCA site management

Summary: Maintain the existing management regime. This aligns with the NPCA Site Management Plan and Restoration Plan (1997). Current focus is on monitoring existing restoration activities and adaptive management of the site, including community engagement through school programs to build awareness of the natural wonders of the Wainfleet Bog. Existing site restoration focuses on the western 3/4 of the bog, within the upper watershed areas, areas where peat canals are close together and water retention activities are the most effective. It also ensures a status quo area to the east to allow species to adapt to changing site conditions.

- Additional costs on future water management structures noted by the proponent notes, but not detailed or estimated in costs.
- Restoration has included blocking internal canals, creating surface indentation/bog topography of hummocks and pools, planting (of wet and dry bog species) and cutting invasive European Birch trees (known to have high evapotranspiration rates).
- The primary component of the site restoration plan was implemented in 1997-2004 and continues with site monitoring of the management plan objectives. Additional “active” restorative management may be taken, however there are wildfire constraints that need to be managed with the piling of felled trees. This is linked to local wildfire prevention and management with local municipal partners.
- NPCA’s site monitoring program of groundwater levels (across and around the bog), plant progression and species at risk population health levels are annually assessed to determine if management activities need to be modified for the overall benefit of the bog. The nature and complexity of the bog requires continuous monitoring to determine how the hydrology, vegetation and wildlife are progressing.
- NPCA continues to work with its’ partners on the monitoring program components data for determining if any adaptive management needs.

Option 2: Move section of Biederman Drain.

Summary: The proponent identifies moving a section of the Biederman drain. This will result in decreasing fluctuating water levels in the center of the NPCA bog property. This will in turn theoretically improve the habitat of the *Endangered* Massasauga Rattlesnake. Anticipated impacts of activities proposed may include:

- Abandonment of a 1.2km section of Biederman Drain, the reinstatement of the abandoned non-active 1930s drain alignment, and the construction of an engineered dam at a single control point for the entire NPCA property in the future.
- A formal *Drainage Act* process is required where relevant landowners request the movement of the drain in question. Unless the relevant landowners request it, no action occurs.
- The Township of Wainfleet Council did not support the proponent’s request to move the drain. Council would consider other options to achieve the goals of bog and support goals of the NPCA, with recommendations to pursue alternative options to facilitate achievement of goals

other than the Biederman Drain engineer's update. For example, blocking of canals in the bog (Option 3 in this report).

- The proposed location of the new drain is within a Provincially Significant Wetland which is contrary to the current NPCA Policy. All other drains that are proposed within Provincially Significant Wetlands are rejected by NPCA due to non-conformance with NPCA Policy.
- Negative effects to a Provincially Significant Wetland.
- Unknown whether intended positive impacts would be realized and a significant amount of uncertainty remains whether this would be effective. If the water levels rise too high or drop too low, the bog will transition into another less desirable ecosystem.
- Beaver dams and populations are controlled downstream of the Wainfleet Bog along the Biederman Drain and have been known to cause fluctuating water levels in the bog. Therefore, even if the proposed segment of drain were to be moved, it is not guaranteed to have the intended positive effect as similar impacts will still be realized which are outside the scope of this approach.
- The ballpark estimated cost of the proposed drain movement is $137 000, with possible increase due to actual costs realized. Further, NPCA will be required to pay new costs associated with drainage maintenance on an ongoing basis.
- Additional costs on future water management structures noted by the proponent notes, but not detailed or estimated in costs.
- More research is needed to determine the potential impacts. An Environmental Impact Study will need to be submitted that fully characterizes the pathway of effects (both positive and undesirable) including recommendations that will be followed to the satisfaction of NPCA staff. 8Trees Inc. would remain as the proponent and therefore would be responsible for the development of the Environmental Impact Study.
- The NPCA would have greater flexibility on site activities as this section of the drain would no longer require maintenance access by the Township.

Option 3 -**STAFF RECOMMENDED**: Control drainage of two or more canals on NPCA property.

Summary: Add control structures to select canals that drain the east of the NPCA portion of the Wainfleet Bog that outlet to the Biederman Drain. The best type of water control structures will be assessed (i.e., sluice gates or using flashboard risers potentially in combination with the use of clay dams). This is anticipated to increase water levels in the east portion of the NPCA owned bog and achieve better stability in hydrology.

NPCA staff will need to undertake the addition of two or more water control structures where there are currently no control structures on select canals to achieve an enhanced hydrology of east sections of the NPCA owned bog. The control structures could be manually adjusted by NPCA staff as often as needed to achieve desired water levels in NPCA owned portion of the bog. Beaver mitigation designs would be required for dam maintenance to ensure water is being held.

Anticipated Pro's

- No *Drainage Act* applications or changes to the municipal process are needed. NPCA has full ability to implement immediately without impediment from the *Drainage Act*.
- Increase likelihood of stability of desired water levels in east section of the bog to maintain or further rehabilitate the bog ecosystem. Saturated areas affecting surrounding dam areas before long term desired water levels in the bog centre as intended.
- Decrease in fluctuations of water levels in the east by holding back more water manually in order to meet desired water levels.

- Easy access for site maintenance and can easily change water levels and adaptively manage.
- Potential increase in surface waters across the site would positively affect more Species at Risk habitat for the Massasauga Rattlesnake and Spotted Turtle as well as the overall bog ecosystem.
- Can be done at any time during the growing season, including next budget year.
- Potential mitigation of current theorized flooding of snake hibernacula for Species at Risk.

Anticipated Con's

- Additional cost from current baseline management of bog (~ballpark estimates could range from $5000- $20 000 for control structure build out).
- Potential ongoing costs associated with maintenance and management of designs as well as unseen costs.
- Staff time required to conduct research into design and understanding of potential pathways of effects and determine plan to mitigate unintended consequences (if any).
- Potential increase in water levels may impact access for existing recreational activities
- Potential flooding of snake hibernacula (if not mitigated).
- Potential short-term negative effects to vegetation and wildlife with rising of water levels
- Mitigations needed to address aquatic Species at Risk.

Note: An overall benefit could be sought and likely would not be onerous.

Proposed Next Steps Should the Board endorse Option 3, NPCA staff propose the following approach:

- NPCA staff will further research appropriate structures to use and on which canal outlets to the Biederman Drain would have the intended effects of further rehabilitating the NPCA owned portion of the Wainfleet Bog.
- NPCA staff will work to identify estimated inundation areas of water impoundment options associated with control structures. Existing topographic information and estimates of where areas may be inundated exists and can be readily attained through MNRF. Targeted inundation areas will be established working closely with key MNRF staff. This will also include avoidance and mitigation measures to reduce negative effects to Species at Risk. Where appropriate, NPCA staff will gain the necessary permits from MNFR/MECP in advance of any required work. NPCA will work within the allowable conditions of such permits for where they apply.
- NPCA staff will create a standing committee. NPCA will develop methods to achieve the proposed recommendation and bring it the committee for discussion and NPCA decision. Such a Committee will also help to achieve the NPCA goal of encouraging surrounding bog landowners for coordinated bog restoration efforts. Through this committee, efforts will be made to revitalize and update the 1997 Management Plan to ensure currency with the conditions of the bog, new information and any necessary adaptive management that is recommended. Through this committee, NPCA staff will consider recommendations from the experts who would sit on this committee on the water heights to be impounded to maintain an optimal hydrology for species at risk. A detailed terms of reference and implementation plan will be developed in 2022.
- NPCA staff, along with relevant partners (e.g. MNRF staff) will create an ecological monitoring plan that will identify appropriate ecological monitoring to ensure the targeted hydrology is reasonably attained through the control structures. This monitoring plan will also

have response plans for several potential scenarios with management actions. For example, determining if the levels are too high or too low and what measures should be taken and when.

Financial Implications:

Option One has no additional anticipated financial implications.

Option Two carries by far the greatest financial implication with a preliminary estimate of $137,000 plus any unknown costs and additional annual drain maintenance costs of the drain.

Option Three (NPCA staff recommended) will have a modest increase in budget requirements. The budget for Option Three (i.e. Control structures) will need to be more fully understood although could be ballparked to $5,000 to $20,000.

Costs of managing an expert committee will be absorbed within staff workplans in 2022.

Note: Estimates are very approximate.

Links to Policy/Strategic Plan:

Links to the Policy and Strategic Plan through recognition of an existing Conservation Area and the values of its ecological significance and biodiversity for furthering the conservation objectives of the NPCA.

Related Reports and Appendices:

None

Authored by:

Original Signed by:

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Senior Planning Ecologist

Reviewed by:

Original Signed by:

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Submitted by:

Original Signed by:

Chandra Sharma, MCIP RPP
Chief Administrative Officer/Secretary-Treasurer

Report To: **Board of Directors**

Subject: **Conservation Authority Act Phase 1 Regulations Guide - NPCA Comments**

Report No: **FA-41- 21**

Date: **June 18, 2021**

Recommendation:

1. **THAT** Report No. FA-41-21 RE: Conservation Authority Act Phase 1 Regulations Guide with appended NPCA comments **BE RECEIVED**.

2. **AND FURTHER THAT** the transition actions, as listed in the report, **BE REFERRED** to the Governance Committee for consideration.

Purpose:

The purpose of this report is to update the Board on NPCA comments provided to the Province via Environmental Registry of Ontario and shared with municipalities. The report also provides a high-level overview of actions resulting from the proposed regulations.

Background:

The Ministry of Environment Conservation and Parks (MECP) has posted a consultation guide to the Environmental Registry on Thursday, May 13, 2021 “Ministry of the Environment, Conservation and Parks Regulatory Proposal Consultation Guide: Regulations Defining Core Mandate and Improving Governance, Oversight and Accountability of Conservation Authorities”. Phase 1 Regulations deal with Program and Services, Governance and Oversight as well Section 29 matters related to Conservation Authority (CA) lands. Section 28 regulations related to CA planning and permitting roles will be released in the coming months, and Phase 2 Regulations regarding the Municipal Levy will be released later in 2021.

Earlier this year, the Province established a Working Group of stakeholders to provide guidance in developing the proposed regulations. CA Representatives on the working group have worked diligently to ensure that the regulations being developed by the Province can be efficiently implemented by the conservation authorities and stay true to the mandate of CA’s to protect Ontario’s watersheds.

Discussion:

Staff attended information sessions scheduled by MECP and participated in discussions with Conservation Ontario. Conservation Ontario is also working with Conservation Authorities to prepare a direct submission to the government. NPCA staff comments are being submitted directly to the ERO with copy to NPCA municipalities and attached as Appendix 1.

A high-level summary of required transition actions is provided below and will be integrated with the Governance Committee Work Plan. The transition period for completion of these actions has been extended to January 1, 2023. It should be noted that these actions are in addition to the governance related changes resulting from proclamation of governance provisions in February of 2021. Additionally, more actions are anticipated through Section 28 regulations and levy regulations.

a) Create an inventory of all programs and services by December 31, 2021.

b) Develop a Transition Plan to be submitted to the Province by the December 31, 2021.

c) Develop a core Watershed-Based Resource Management Strategy.

d) Develop a Strategy for all Conservation Authority owned or controlled lands and Land Management Plans for each property. (The NPCA is already in the process of launching this process in 2021.).

e) Develop a Land Acquisition Strategy (LAS). (The NPCA LAS is near completion.)

f) Enter into agreements for municipal funding of non-mandatory programs and services that require municipal levy by January 1, 2023.

g) Oversee the formation and operation of a Public Advisory Board. (The NPCA Public Advisory Committee structure and Terms of Reference will need to be updated.)

Financial Implications:

The proposed CA Act changes continue to create an extensive amount of workload and need for resources to ensure timely conformity of actions. Staff are currently working on a pan to address this need.

Related Reports and Appendices

Appendix 1 - Letter to MECP Regarding Environmental Registry of Ontario Posting 019-2986 - CA Act Phase 1 Regulation Guide (to be circulated under separate cover)

Authored by:

Original Signed by:

David Deluce, MCIP, RPP
Senior Manager, Planning & Regulations

Reviewed and Submitted by:

Original Signed by:

Chandra Sharma, MCIP, RPP
Chief Administrative Officer/Secretary-Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

STRATEGIC PLANNING COMMITTEE MEETING
ON-LINE VIDEO CONFERENCE
MEETING MINUTES
Friday May 21, 2021
11:25 a.m.

MEMBERS PRESENT:	K. Kawall (Chair) R. Brady J. Hellinga B. Mackenzie W. Rapley E. Smith M. Woodhouse B. Wright
OTHERS PRESENT:	D. Cridland
MEMBERS ABSENT:	S. Beattie D. Huson
STAFF PRESENT:	C. Sharma, C.A.O. / Secretary – Treasurer G. Bivol, Clerk R. Bisson, Manager Communications and Public Relations N. Green, Project Manager

The Chair called the meeting to order at 11:26 a.m..

1. APPROVAL OF AGENDA

Recommendation No. SPC-09-2021
Moved by Member Woodhouse
Seconded by Member Smith

THAT the Strategic Planning Committee Meeting agenda dated Friday, May 21, 2021 **BE APPROVED** as presented.

CARRIED

2. DECLARATIONS OF CONFLICT OF INTEREST

None declared.

3. APPROVAL OF MINUTES

a) Minutes of the NPCA Strategic Planning Committee meeting dated March 19, 2021

Recommendation No. SPC-10-2021
Moved by Member Wright
Seconded by Member Hellinga

THAT the minutes of the NPCA Strategic Planning Committee meeting dated March 19, 2021 **BE APPROVED**.

CARRIED

4. CORRESPONDENCE

None.

5. DELEGATIONS

None.

6. PRESENTATIONS

a) Strategic Planning Progress Update including Survey Results and Input on Goals and Actions – C.A.O. Sharma spoke. Natalie Green, Project Manager presented. R. Bisson, Manager Communications and Public Relations also commented. Members posed questions and provided input. Revisions and feedback were discussed and Members offered direction and suggestions regarding next steps.

Recommendation No. SPC-11-2021
Moved by Member Brady
Seconded by Member Rapley

THAT Strategic planning progress update incl. survey results and input on goals and actions **BE RECEIVED**.

CARRIED

7. CONSENT ITEMS

None.

8. DISCUSSION ITEMS

None.

9. NEW BUSINESS

None.

10. ADJOURNMENT

By consensus of the membership, the Strategic Planning Committee meeting of May 21, 2021 **ADJOURNED** at 12:53 p.m..

CARRIED

K. Kawall Committee Chair	C. Sharma, MCIP, RPP Chief Administrative Officer / Secretary - Treasurer

NIAGARA PENINSULA CONSERVATION AUTHORITY

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DATE: May 21, 2021

RESOLUTION NO. FA-103-2021:

Moved By: Member Kawall

Seconded By: Member Wright

THAT the Niagara Peninsula Conservation Authority **ACCEPTS** the Canada Revenue Agency determination and **DIRECTS** that the Canada Employment Wage Subsidy be returned.

Chair: _____

CARRIED: ____ - ____

DEFEATED: _____- _____

No. ____