AGENDA
WINDSOR-ESSEX COUNTY ENVIRONMENT COMMITTEE
held on Thursday, January 9th, 2014
Meeting at 5:30p.m. At the Lou Romano Water Reclamation Plant (4155 Ojibway)

1. **CALL TO ORDER**

2. **ADDITIONS TO THE AGENDA**

3. **DECLARATION OF CONFLICT**

4. **MINUTES**

Adoption of the minutes of the meeting held December 5th, 2013 – ***emailed separately.***

5. **PRESENTATION**

5.1 Ian Naisbitt, Chair, Little River Enhancement Group: Phase two – Connecting the Windsor Airport Swamps Spring 2014 – ***attached***.
5.2 Averil Parent, City of Windsor Environmental Coordinator (A): 2013 Report on the State of our Environment – ***attached.***

6. **BUSINESS ARISING FROM THE MINUTES**

6.1 Tree by-law update
6.2 Invitation to Dr. Saad Jasim, Director, International Join Commission, to discuss the algae bloom toxins and the effects on human health as well as ways to mitigate this threat.
6.3 Next Green Speaker Series ideas

7. **COORDINATORS REPORT**

WECEC Coordinator Monthly Report – ***attached***

8. **SUBCOMMITTEE REPORTS**

8.1 Air
8.2 Transportation
8.3 Provincially Significant Wetlands
8.4 Water Quality

9. **NEW BUSINESS**

9.1 WECEC year-end report 2013 – ***attached.***

10. **COMMUNICATIONS**

10.1 Research article published in PLOS One December 11th 2013 – *Artificial sweeteners in a large Canadian river reflect human consumption in the watershed* – ***attached.***

11. **DATE OF NEXT MEETING**

The date of the next meeting is **February 6th, 2014** at the Lou Romano Water Reclamation Plant at 5:30 o'clock p.m.

12. **ADJOURNMENT**

Connecting the Windsor Airport Swamps

Ian Naisbitt, Caroline Biribauer and Kathryn Arthur

Inside the fence of the Windsor International Airport (YQG), three separated woodlands survive: Jefferson (west woodland/ close to Jefferson Avenue), the Shooting Range (middle woodland) and the East Perimeter (east woodland/ close to Lauzon Parkway). The Little River Enhancement Group (Lil' Reg) realized the value of these woodlands and in a February 1998 letter to the City of Windsor stated, *"Lil' Reg is requesting that the three woodlots be preserved and protected. Furthermore, we are recommending that they be connected to create a mega-woodlot (interior forest)."* Interior forest habitat does not exist in the Little River Watershed, so we saw this site as the only opportunity to establish one. Volunteers have attended myriad meetings, open houses, spent hours on the phone and wrote dozens of letters to accomplish our goal of connecting these woodlands.

In April 2008, a letter from the Ontario Ministry of Natural Resources (OMNR) stated that the woodlands had been evaluated and designated Provincially Significant Wetlands (PSWs). The OMNR listed them as the, "Windsor Airport Swamps." A swamp is a wetland that is forested; the Airport Swamps are essentially a forest frequently submerged in water, especially during Spring time. The three PSWs are now preserved and protected with an adjacent buffer zone by the Province of Ontario through the Provincial Policy Statement. As a result of OMNR's designation, Lil' Reg believed the foundation had been set to connect the swamps.

On Tuesday, June 4, 2013, Essex County Nature participated in a significant planting event! Volunteers joined employees of the City of Windsor, Essex Region Conservation Authority (ERCA) and the YQG to plant trees, shrubs and wildflowers on the airport property. 3 hectares/ 8.5 acres of retired agricultural field was machine planted by ERCA and effectively "connected" the Shooting Range and East Perimeter Swamps. As well, Grade 5 and 6 students from David Suzuki Public School helped plant 120 potted trees, shrubs and wildflowers along the Rivard Drain that flows into the Little River.

Morning temperatures began at 13 C and by 1 p.m. they were up to 19 C. Skies were blue with light cloud cover and a slight breeze was welcomed. Volunteers diligently dug holes, placed the trees and shrubs into the holes, returned the soil and mulched the base of the plants with woodchips. Plastic guards were applied to help reduce animal chewing on the bark of the plants and thus increase the survival rate.

Trees hand planted included: Sycamore, Black Walnut, Shagbark Hickory, Burr Oak, Swamp White Oak, Pin Oak and Basswood. These species were obtained, because there were plenty of them already growing in the swamps. Shrubs planted included: Silky Dogwood, Nannyberry, Staghorn Sumac and Elderberry. Wildflowers planted included: Joe-pye weed, Boneset, Swamp Milkweed, Arrowhead and Sweet Flag.

A special thank you to Bill Roesel/ City of Windsor Forester and Phil Roberts/ YQG for leading student tours through the middle swamp. Luckily the ground was dry and we could walk through the area and experience the cool shade and dappled sunlight. Thanks also to Caroline Biribauer and Kathryn Arthur/ ERCA for providing lunch for all the volunteers and especially for coordinating the machine and student planting events.

Wildlife observed during this event included: an Indigo Bunting singing it's heart out and distracting the bird watchers from the speeches, a Giant Swallowtail Butterfly flittering about in the understory, a Turkey Vulture soaring high above us on the updrafts, a Red-shouldered Hawk gliding on the warm currents of air, a Great Crested Flycatcher roosting high on a dead ash tree branch and entertaining us with song and last, but not least, evidence of Wild Turkey in the area – a small pile of leftover feathers!

On behalf of our Windsor-Essex community, I would like to thank the City of Windsor, ERCA, YQG and Detroit River Canadian Cleanup/ Environment Canada for the leadership, organization and funding to make this project happen. We are eagerly looking forward to participating in the next phase!

A Burr Oak was planted to commemorate the 40th Anniversary of the Essex Region Conservation Authority

ECFNC member Tom Henderson (Detroit River Canadian Cleanup), ERCA vice-chair Percy Hatfield, David Suzuki Public School student Adi Brown and ECFNC member Ian Naisbitt (Little River Enhancement Group).

Planting Event

Essex County Nature: www.essexcountynature.com

Little River Enhancement Group (Lil' Reg)

Event:
Essex County Nature, Lil' Reg, Detroit River Canadian Cleanup, Essex Region Conservation Authority (ERCA) and the City of Windsor have planned to participate in a planting event at the Windsor International Airport (YQG).

When:
Tuesday, June 4, 2013.

Time:
Digging, planting, mulching, seed broadcasting and tree identification lesson will commence at 10:00 a.m.

Location and Directions:
The planting site at the YQG can be accessed via a gate on County Road # 42 adjacent to the large billboards. The agricultural access road heading north is a two rut dirt and gravel laneway that will be fine in good weather, but difficult after inclement weather for automobiles.

Funded by:
The Great Lakes Sustainability Fund/ Environment Canada and Ontario Ministry of the Environment through the Canada – Ontario Agreement;
Trees Ontario;
Clean Water – Green Spaces/ Essex Region Conservation Authority.

Supported by:
City of Windsor;
Detroit River Canadian Cleanup (DRCC);
Essex County Nature (ECN);
Essex Region Conservation Authority;
Little River Enhancement Group;
Windsor International Airport.

Contact Information:
City of Windsor: Tiffany Pocock 519-255-6100 ext. 6403
DRCC: Natalie Green 519-776-5209 ext. 356
ECN: Jesse Gardner Costa 519-564-3007
ERCA: Caroline Biribauer 519-776-5209-X 245;
Lil' Reg: Ian Naisbitt 519-735-2087
YQG: Phil Roberts 519-969-9096 ext. 439

WECEC COORDINATOR MONTHLY REPORT
AVERIL PARENT

– DECEMBER 2013 –

ONGOING INITIATIVES

1. Smog Action Plan

The WECEC coordinator has completed a draft Smog Action Plan for the City of Windsor and has met with Parks & Facilities to discuss. Future meetings will be held with the Operations department, Human Resources and likely Local 82 CUPE for further discussion.

2. Tree by-law Discussions

Discussions have been had with members of the tree by-law subcommittee, City of Windsor administration and representatives from ERCA. A previously drafted by-law was reviewed and commented on.

It was noted at the Nov 20th Environment, Transportation and Public Safety Standing Committee meeting that the creation of subcommittee's of WECEC must be approved by Council. As such, the creation of the tree by-law subcommittee will go to Council for approval shortly. There will be no further work on this subject until the subcommittee has been approved by Council.

WECEC BUDGET – SUMMARY

2013 Budget		
Expense	**Credit**	**Expenditure**
2013 Budget	$8,300.00	
Website domain renewal		$76.32
Conservation Campaign Ad		$1,525.39
Pat on the Back room rental		$246.00
June meeting at Ojibway		$122.50
Promotional Items		$347.92
Conservation Campaign Generator Design		$596.06
Earth Day		$40.00
David Suzuki		$1,000.00
Dan Burden		$1,000.00
Pat on the Back cheques		$2,000.00
Pat on the Back food		$123.13
Wildlife tour		$793.23
Pat on the Back plaques		$57.40
Website hosting fee		
Totals	$8,300.00	$7,927.95
TOTAL REMAINING	**$372.05**	

WINDSOR ESSEX COUNTY ENVIRONMENT COMMITTEE
AVERIL PARENT

– ANNUAL REPORT 2013 –

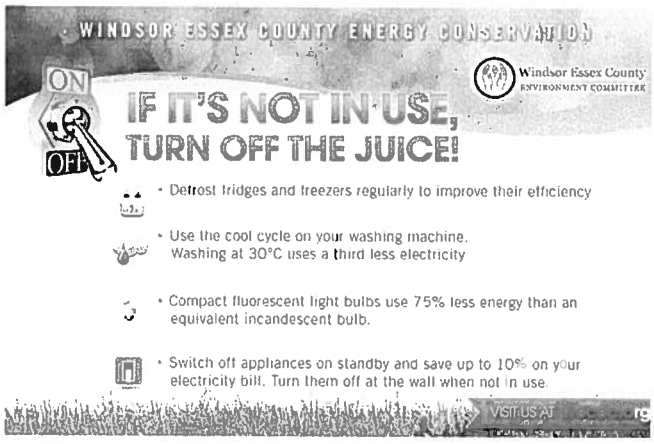
ENVIRONMENTAL ADVOCACY AND COMMUNITY ENGAGEMENT

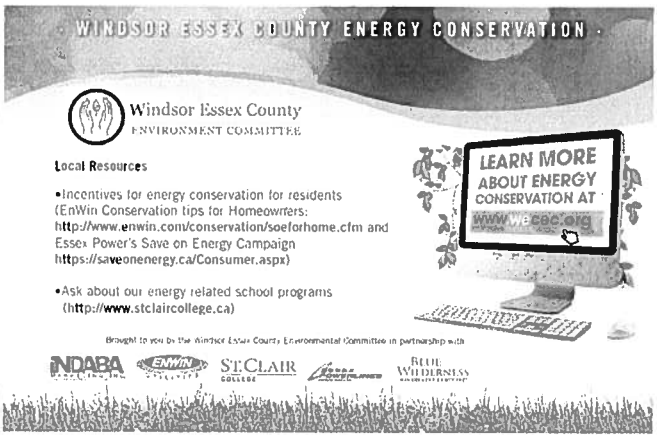
Energy Conservation Campaign ($2,121.45)

WECEC successfully partnered with St. Clair College, Essex Power, EnWin, the Windsor Essex Economic Development Corporation and EcoSpex in an Energy Conservation Campaign. In this way, we were able to pool our resources and develop a $10,000 campaign to promote energy conservation benefits to home owners.

This campaign was launched mid April. A press conference was held on Friday, April 19th at St. Clair's Centre for Construction Innovation and Production and included a tour of the facility. Media coverage was obtained from Blackburn radio, AM800 and The Windsor Star.

Campaign advertisements were placed in the County papers and Windsor Star online. WECEC and our partners participated in Experts on Call sessions April 7th, and April 27th to discuss how homeowners can decrease their energy consumption, available technician programs offered at St. Clair College, as well as how reducing consumption can help small businesses. WECEC participated in the Windsor Home Show (April 5th-7th) to promote the committee and this campaign. Post cards (shown below) were distributed to participants to promote this campaign.





ROSE City Clean Sweep Kickoff ($0)

WECEC partnered with the City of Windsor and the Downtown Windsor Business Improvement Association to organize a successful kick-off event for the City's Rose City Clean Sweep campaign. Over 40 participants met on Maiden Lane West on Friday April 5th to help pick up litter around the downtown. There was significant involvement from the media, including a write-up in the Windsor Star.

Earth Day ($40)

WECEC participated in the Windsor Essex Earth Day celebrations by having a booth at the event on Sunday April 28th at Malden Park from 10am until 3pm. Members distributed our brochure, customized pens and magnets, as well as our Energy Conservation Campaign information.

Green Speaker Series ($1,000): Dr. David Suzuki

WECEC was approached by Canvas Campus for a donation to support bringing Dr. David Suzuki to Windsor to present to over 7,000 school children at the WFCU on April 25th. Committee members were happy to contribute $1,000 from the Green Speaker Series budget towards this cause. WECEC members were able to meet Dr. Suzuki before he spoke.

Pat on the Back Environmental Awards ($2,426.53)

Fifteen applications were received for our third annual "Pat on the Back Awards". A $500 award is given to 4 environmental projects lead by community or school groups. An ad-hoc subcommittee met to review the applications and selected six final applicants who presented their project at the Pat on the Back award ceremony Wednesday May 29th at 7:00pm at the Ojibway Nature Centre.

WECEC is very pleased to announce the four award winners of the third annual Pat on the Back Awards:

1) Together we flourish, a community organization who will be building a community garden and running a Gal Pals mentoring program;
2) Sandwich secondary, to be able to expand their native plant area by amending soil with mulch and compost;
3) St. Jean Baptist, who will be building a vegetable garden and donating some of their produce to the community; and
4) St. Jules School, to make improvements to their outdoor green space through soil amendments and the planting of native species.

The Committee also enjoyed presentations from St. Anne's legacy project, to create an accessible outdoor classroom and student area, as well as the Riverside Green Team, involved in a multi-phase project to turn their courtyard into a "no mow" zone.

The ceremony was well attended by many members of the public and environmental organizations.

Green Speaker Series ($1,000): Dan Burden – Walkable and Livable Communities Institute

On Friday June 7th WECEC continued their Green Speaker Series with host Dan Burden, Co-Founder and Director of Innovation and Inspiration at the *Walkable and Livable Communities Institute*. Dan spoke to over 100 people about how creating more walkable streets can contribute to healthier, more vibrant communities with thriving economies.

WECEC partnered with the City of Windsor Planning and Environmental Master Plan departments, the Wyandotte and Walkerville Business Improvement Areas as well as the St. Clair Society of Architects to coordinate this event.

Participants included many members of City of Windsor administration as well as county municipality administration, City Councillors, architects, students, St. Clair College professors, BIA members, the Windsor Essex County Health Unit, Tourism Windsor Essex, members of the public, the Ontario Ministry of Citizenship and Immigration, Windsor Essex Community Housing Corporation, non-profit organizations and the Greater Essex County District School Board.

During the walking audit, Dan pointed out many simple solutions to begin improving walkability. For instance, clearly viable crosswalks and signage were often missing from city streets. Dan suggested using bumpouts at intersections, diagonal parking along side streets and more greenery and places to sit. He also demonstrated that Wyandotte East is wide enough to accommodate bike lanes by lying on the street perpendicular to a parked car. A bike lane is one "Dan" wide, and there was plenty of space for cars to pass by.

After the walking audit, participants were split into small working group around aerial maps along Wyandotte. The groups brainstormed how to increase walkability. The diverse backgrounds of participants allowed for lively and passionate discussion while working towards a common goal.

There was a great media presence leading up to as well as during the workshop. Days before the event, the Windsor Star did an article with City Planner Thom Hunt highlighting areas in Windsor that are very walkable as well as areas that need improvement. Representatives from the Windsor Star, Blackburn media, AM800 and CBC attended the presentation. The Windsor Star and CTV accompanied the group on the walking audit and CBC radio hosted Dan on their show after the event. Positive media stories were released that day discussing walkability and the potential it has in Windsor.

Dan has provided all workshop participants with his presentation. Many valuable resources are on the Walkable and Livable Communities Institute page: www.walklive.org.

Caesars Code Green EXPO ($0)

WECEC participated in Caesars Windsor's Code Green EXPO by having a booth at the event. The event was on Wednesday August 28th 2013 and was free to the public. Many environmental organizations participated and networked at this event.

Green Speaker Series ($0): Dr. John Hartig, Manager, Detroit River International Wildlife Refuge & Richard Wyma, General Manager, Essex Region Conservation Authority.

Over 60 residents attending the third Green Speaker Series event this year, featuring Dr. John Hartig, Manager of the Detroit River International Wildlife Refuge and Richard Wyma, General Manager of the Essex Region Conservation Authority. The speakers talked about conservation efforts on both the Canadian and American sides of the Detroit River. Richard discussed the Priority Natural Area strategy and the recently creates Canadian Registry of Lands, and John discussed successes on U.S side including Humbug Marsh. Many questions were asked by the audience and CBC interviewed both speakers at the event. Media coverage prior to the evening was obtained by The Windsor Star and Blackburn radio.

WECEC BUSINESS

Website Maintenance ($76.32)

The WECEC Coordinator maintains our website, www.wecec.org. Here we post news and events along with information about WECEC and our meeting agenda's and minutes. The website is an important part of our communication and advocacy strategy. We pay yearly website hosting fees as well as a domain renewal fee.

Promotional Supplies ($347.92)

WECEC often participates in community events such as Earth Day and the upcoming Code Green EXPO hosted by Caesars Windsor. At our booth we hand out promotional supplies such as WECEC customised pens or magnets to encourage members of the public to visit our website and learn more about what we do.

June Meeting at the Ojibway Nature Centre ($122.50)

This year, WECEC decided to host one of their meetings at the Ojibway Nature Centre. This was to encourage members of the public to attend, as our meeting place at the Lou Romano Water Reclamation Plant may not be viewed as a publicly accessible location.

Trip to the Detroit River International Wildlife Refuge ($793.23)

The tour of the Detroit River International Wildlife Refuge on Friday June 14th was very successful. Nearly 20 people participated and attended a tour of Humbug Marsh along with a presentation by Refuge manager Dr. John Hartig. Participants included WECEC members, Essex County Field Naturalists, City of Windsor administration, Detroit River Canadian Cleanup as well as their Public Advisory Committee members. Dr. John Hartig discussed the process by which Humbug Marsh was saved from development as well as highlighted many ongoing Brownfield restoration and manmade wetlands sites.

RECOMMENDATIONS TO CITY AND COUNTY COUNCILS

Report No. 69 of the Windsor Essex County Environment Committee:

THAT the City of Detroit Environment Affairs, State of Michigan Department of Environmental Quality and the United States Environmental Protection Agency **BE CONTACTED** on behalf of the Windsor Essex County Environment Committee over the environmental concerns that are mounting regarding the petroleum coke being stock piled along the Detroit River shoreline (just east of the Ambassador Bridge), and

THAT a letter **BE SEN**T from Windsor City Council to the three levels of government (City, State and Federal government) outlining the environmental concerns over the stock piling of petroleum coke along the shoreline, and

THAT the City of Windsor **PETITION** the Town of LaSalle, the Essex Region Conservation Authority (ERCA), Michigan Representatives Rashida Tlaib (D-Detroit), U.S. Representatives Gary Peters (D-Bloomfield Township) and John Conyers (D-Detroit) as well as regional MPs and MPPs for support in this initiative.

This report was approved by City Council on March 18th.

Report No. 70 of the Windsor Essex County Environment Committee:

THAT the resolution presented by the Great Lakes and St. Lawrence Cities Initiative to the Windsor Essex County Environment Committee emphasizing the serious nature of the Asian carp crisis in the Great Lakes and the urgency of finding a solution **BE ENDORSED** and

THAT the City of Windsor **BE REQUESTED** to pass a resolution endorsing the same.

This report was approved by the Environment and Transportation Standing Committee on April 24th and City Council on May 27th.

Report No. 71 of the Windsor Essex County Environment Committee:

T**HAT** City Council **BE REQUESTED** to reconsider/revoke/review Council Resolution CR433/2007 relating to a rezoning for Part of Block Z, Registered Plan 927 as there are no adequate plans for the mitigation of identified species and further, that a new bylaw **BE ADOPTED** relating to the Official Plan Amendment rezoning.

This report was rejected by the Planning & Economic Development Standing Committee on May 13th and by the Environment, Transportation & Public Health Standing Committee on May 17th. It was rejected by City Council on June 17th.

Report No. 72 of the Windsor Essex County Environment Committee:

T**HAT** the City of Windsor **BE REQUESTED** to engage the Windsor Port Authority to discuss their intentions for the activities occurring on the Ojibway Shores property, namely the hiring of a consultant to undertake a biological survey of the property.

This report was rejected by the Environment, Transportation & Public Safety Standing Committee on May 22nd.

Report No. 73 of the Windsor Essex County Environment Committee:

T**HAT** a letter **BE SENT** to Minister Lebel asking him to inform the Windsor Port Authority that they **CANNO**T proceed with the clear-cutting of Ojibway Shores **NOR** accept fill as they intend to start September 1, 2013.

This report was rejected by City Council on July 8th 2013.

Report No. 74 of the Windsor Essex County Environment Committee:

T**HAT** City Council favorably consider designating the recommended parks as part of the Detroit River International Wildlife Refuge.

This report was accepted by the Environment, Transportation & Public Safety Standing Committee on November 20th.

Report No. 75 of the Windsor Essex County Environment Committee:

THAT the City of Windsor and County of Essex is not in support of the Kincardine location for a Deep Geologic Repository at this time, and requests more information, alternatives and plans be presented, and more research and results be reported and critically reviewed before a final decision is made.

This report was accepted by the Environment, Transportation & Public Safety Standing Committee on November 20th.

Report No. 76 of the Windsor Essex County Environment Committee:

THAT in reviewing development proposals adjacent to the LaSalle Woodlot ESA, that City Council **BE REQUESTED** to support projects which adhere to the following principles:

1. To respect the LaSalle Woodlot ESA boundary as displayed in the Town of LaSalle Official Plan and LaSalle Woodlot ESA Management Plan.
2. To respect Massasauga critical habitat as displayed in the Recovery Strategy for the Massassauga in Canada.
3. To implement edge treatments which discourage human snake conflict (i.e. snake fencing) between the LaSalle Woodlot ESA and adjacent developments.

This report was received by the Environment, Transportation & Public Safety Standing Committee on December 18th.

FINANCIAL SUMMARY

2013 Budget		
Expense	**Credit**	**Expenditure**
2013 Budget	$8,300.00	
Website maintenance		$76.32
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Wildlife tour		$793.23
Pat on the Back plaques		$57.39
Totals	$8,300.00	$7,927.94
TOTAL REMAINING		**$372.06**

*As of December 24th 2013.

WECEC IN THE NEWS

Big-box retail development plan near Ojibway draws fire

Doug Schmidt
Mar 27, 2013 - 8:35 PM EDT
Last Updated: Mar 28, 2013 - 6:57 AM EDT

A developer is hoping to have found a more acceptable way to win approval for a long-delayed but controversial big-box retail development on lands abutting the environmentally sensitive Ojibway Prairie Complex.

Coco Paving Inc. has submitted a proposal under a rarely used clause of Ontario's Endangered Species Act that allows development in protected areas subject to the proponent providing "benefits that exceed the adverse effects" on several listed plant and snake species.

"It's a win-win — good for the environment and good for the economy," said company spokesman Anthony Rossi. The proposal was posted on March 7 on the province's Environmental Registry, which provides details and offers opportunity for the public to comment and ask questions until April 8.

One of the biggest changes, said Rossi, is Coco's willingness to carve about 10 acres from its 47-acre holdings east of recently-closed Windsor Raceway and establish a "restoration area" and natural buffer between the development, at the corner of Matchette Road and Sprucewood Avenue, and Ojibway park.

But the proposal hasn't found much favour from activist Nancy Pancheshan and her Save Ojibway group. "The problem with this application is that many of the endangerered species are not included ... and (the plan) is incapable of offsetting the disturbances it will create," said Pancheshan, who has been fighting the developer's plans since they were approved by city council in 2007.

She said part of the development will lie just metres away from sensitive tall-grass prairie lands, and the estimated 18,000 additional vehicles per day along Matchette Road, to be more than doubled in width from two lanes to four lanes with a median, will greatly increase snake mortality.

"This will just cause future blight in the city and compromise our remaining environmental habitat," said Pancheshan.

Nancy Pancheshan looks out at the property near the former Windsor Raceway site where a proposed development is planned. Pancheshan has environmental concerns with the wildlife in the area. (JASON KRYK/The Windsor Star)

Pancheshan appealed the original plan to the Ontario Municipal Board and has spent about $20,000 so far (raised mainly through public donations) enlisting the help of independent experts — a biologist, herbologist and hydro geologist — to dispute the company's own reports.

It wasn't until Pancheshan's efforts that a number of rare and endangered species were identified on the lands targeted for development. An OMB hearing was indefinitely adjourned in August 2011 after the company was instructed to take a deeper look at the native species on its lands.
Rossi said Coco's latest proposal represents "a significant accommodation," one that will see plants like the dense blazing star and willowleaf aster dug up and replanted, as well the homes of Butler's gartersnake and eastern foxsnake relocated. The 10 acres to be restored to prairie habitat, which includes an existing horse training track, "will eventually be conveyed (to the city or province) for park purposes," said Rossi.

While still wanting to see the details, Ward 1 Drew Dilkens said if the developer is improving on a plan he and a majority of council already approved, then: "Bravo, Coco." Dilkens said "the demand of the market is going to drive the development," and that it's "a reflection on how people like to shop."

Ward 4 Coun Alan Halberstadt, however, said he'd like to see whether council might reconsider its original vote, particularly in light of the additional information Pancheshan and her group uncovered during the OMB appeal process.

Environmental issues aside, a big-box retail development on the outskirts of the city "would be another blow to the downtown and the core area," he said. Halberstadt is co-chair of the Windsor Essex County Environment Committee, and he said Pancheshan will be addressing the group at its next meeting on April 4, just days before the Environmental Registry public input deadline.

WECEC is already warning on its website that the Coco proposal "goes against our city's efforts to revitalise." It also provides a "sample comment" letter to the province which begins with a denunciation of the developer's plan.

Clean Sweep crew kicks litter's butt

Volunteer Joan Ziriada uses a stick to clean gum from a Maiden Lane grate as Scott McMullan helps out during Rose City Cleanup on downtown streets Friday.
Photograph by: Nick Brancaccio, The Windsor Star

Share

Doug Schmidt, The Windsor Star | Apr 12, 2013 | Last Updated: Apr 12, 2013 - 7:05 UTC

It seemed at times that it was raining butts as smokers strolling down Ouellette Avenue continued casually tossing their spent cigarette stubs at the same time as clean-up volunteers were bowed over sidewalks picking them up.

"This definitely makes one prejudiced against smokers," said Joan Ziriada, one of about 40 volunteers who hit the downtown streets Friday for this year's Rose City Clean Sweep kickoff.

Ziriada, who works at a downtown law firm, said she loves the trees along Maiden Lane, which she traverses several times during each workweek, but she complains that smokers use the large iron grates that surround the trunks as ashtrays.

"They're a great idea, but they're giant butt receptacles," she said of the grates. Taking an early lunch break, Ziriada made bagging those butts her Clean Sweep mission.

When it comes to litter, the downtown's looking "pretty good" compared to in the past, said Ward 4 Coun. Alan Hal-berstadt, but he agreed that "the bad part are the cigarette butts."

Before being dispatched out into the streets and alleys, volunteers, armed with brooms, bags and protective gloves, were warned to avoid druggie needles and anything else deemed too gross or dangerous.

"I think the message this sends is more important than the actual cleanup," Ward 3 Coun. Fulvio Valentinis said of the annual spring ritual.

"I believe the politicians should be setting an example," added Ward 7 Coun. Percy Hatfield, who also participated.

The three city councillors said all Windsorites share in the responsibility of maintaining a clean city and tackling litter. "The image it projects is not a positive one," said Valentinis.

"All neighbourhoods are being encouraged to clean up," said Averil Parent, Windsor's environment and sustainability coordinator.

She said the city is still looking for groups, organizations and individuals to come forward to participate in the month-long Rose City Clean Sweep. To register, call the city's 311 line, or email cleancity@city.windsor.on.ca, or visit online at www.citywindsor.ca.

The plugged-in world needs to unplug

St. Clair College power engineering student Madan Roy operates the main steam control valve while learning the functions of a steam plant at Centre for Construction Innovation and Production on Friday. Steam power is an energy efficient power generation process and officials were on hand at St. Clair College to bring awareness to energy conservation benefits. **Photograph by:** Nick Brancaccio, The Windsor Star

Share

Craig Pearson, The Windsor Star | Apr 20, 2013 | Last Updated: Apr 20, 2013 - 8:17 UTC

Our increasingly plugged-in world needs to unplug, according to a new green initiative.

A freshly created campaign dubbed If It's Not In Use, Turn Off the Juice - which launched Friday in Windsor - urges people to turn off appliances when not in use.

"We're so used to plugging in, plugging in, that it becomes second nature," Charlie Wright, deputy mayor of Leamington and co-chair of the Windsor-Essex County Environment Committee, said at the energy-saving program launch at St. Clair College.

"We always feel we have to be plugged in to the Internet, to our cellphones. Yet it's good to be unplugged sometimes. You can save a lot of money."

Wright said consumers can save 20 per cent in energy expenses by simply turning off appliances and committing to other green initiatives, such as using new LED light bulbs.

"We had become the throwaway society," Wright said. "Then we became the recycling society. Now we're becoming the more efficient society. We're using energy smarter."

Fellow Windsor-Essex County Environment Committee co-chair Alan Halberstadt, a Windsor city councillor, said most people don't realize that simply keeping their TV, computer or coffee maker plugged in drains power and money.

"A lot of people might turn off their lights when they're not in use, but not appliances," Halberstadt said. "But if it's plugged in, you're using power."

If It's Not In Use, Turn Off the Juice is an energy-conservation, public-awareness campaign supported by WECEC, Essex Powerlines, Blue Wilderness Management Group, St. Clair College, WindsorEssex Economic Development Corporation and Enwin Utilities.

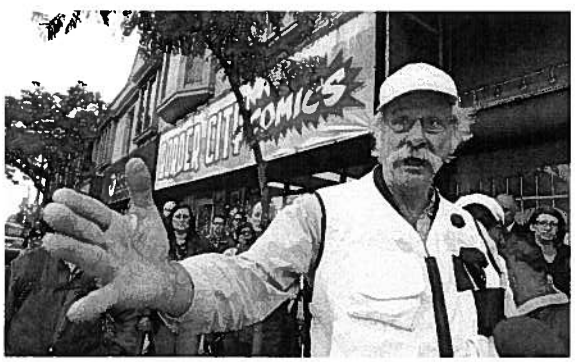
After the campaign launch, students at St. Clair College showed guests a recent recycling project at the school's Centre for Construction Innovation and Production.

Waseem Habash, St. Clair's associate vice-president of academic operations, said the school already offers three programs centred around energy conservation, and that the campus continues to add more and more courses on the topic.

For instance, students in the power engineering technology lab convert excess steam into condensed air, which has a number of industrial applications.

"Energy conservation is important," Habash said. "Students are learning about greener design and greener construction."

American expert says Wyandotte Street full of opportunity



Wearing his bright green safety vest, Dan Burden, co-founder and director of Innovation and Inspiration, Walkable and Livable Communities Institute, picks out some of the possible improvements on Wyandotte Street East in Walkerville, Friday June 7, 2013. (NICK BRANCACCIO/The Windsor Star)

Jun 07, 2013 - 5:49 PM EDT
Last Updated: Jun 07, 2013 - 8:28 PM EDT

An American expert on street walkability toured the Walkerville stretch of Wyandotte Street Friday afternoon to give city officials pointers on how to redesign the aging roadway.

Dan Burden, co-founder of the Walkability and Livable Communities Institute, said the East Windsor neighborhood shows a lot of promise.

Outfitted in a lime green reflective vest and matching farmer's cap, he stopped at the intersections of Wyandotte Street and Chilver Road and decried to the about 90 people around him: "I just love your opportunity on Wyandotte!"

The walkability audit with Burden was organized by the city and local organizations, such as the Wyandotte and Walkerville BIAs. City official Averil Parent said the event was so popular that she had to limit registration. Mike Palanacki heads city road maintenance and said Burden, named by TIME magazine in 2001 as one the six most important civic innovators in the world, was brought in as part of the plan to make Windsor's roads more "people friendly."

He said the city is taking a new approach in resurfacing Wyandotte over the next two years. He said moving cars efficiently and safely was the biggest concern in the past, but that things are changing.

Dan Burden walks Wyandotte Street in Walkerville "I think we have to rethink that whole philosophy," he said.

Now other ways of getting around – such as walking and cycling – are getting their time in the spotlight. Palanacki said it's to help promote healthy lifestyles, but that it's also to address functionality.

Building highways isn't always the solution when dealing with traffic congestion, he said, giving Toronto as an example.

Burden echoed the point in his analysis of Wyandotte, currently two lanes wide on each side in some areas. He said smaller single car lanes – 10 feet wide being ideal – are actually safer, because it allows room for separate cycling lanes and larger sidewalks.

To illustrate his point, he stretched out on the busy road flat on his back, showing that bike lanes – which he said need to be marked with thick painted lines – can be as wide as he is tall, and still allow traffic to flow easily.

He said cars currently have more space than they need and that adding bike lanes makes motorists safer, "because they're not jockeying for space."

The benefit of wider sidewalks is also commercial, Burden said. "Everybody wins," he said, because if pedestrians have room to stroll, shops lining the streets will see more foot traffic.

Motorists are more likely to slow down when they approach intersections with extended curbs as well, he said, making it a safer area to walk.

James Elliott, a 20-year-old architectural technology student at St. Clair College, was in the crowd with a friend. He said that as a student who's taught to design buildings with surroundings in mind, he liked what he was hearing from Burden.

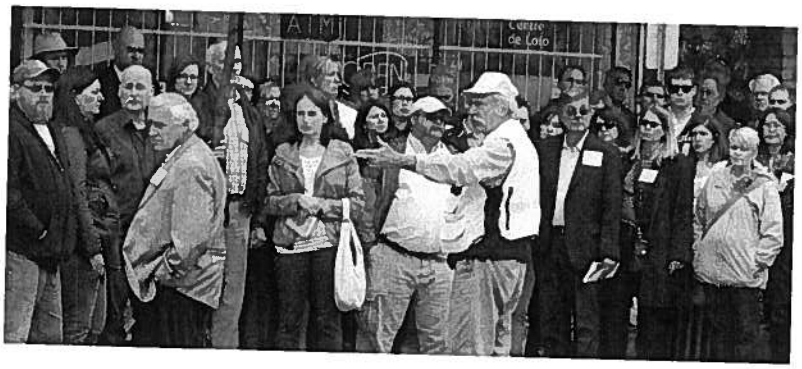
"It's really simple stuff," Elliott said, adding that small projects can still have a big impact.

Palanacki said the goal in bringing Burden in to evaluate Wyandotte was to learn how to revamp the road while keeping spending to a minimum.

Parent said the cost to bring Burden to Windsor for the audit was about $7,000, but that the groups involved in the event pitched in with funds.

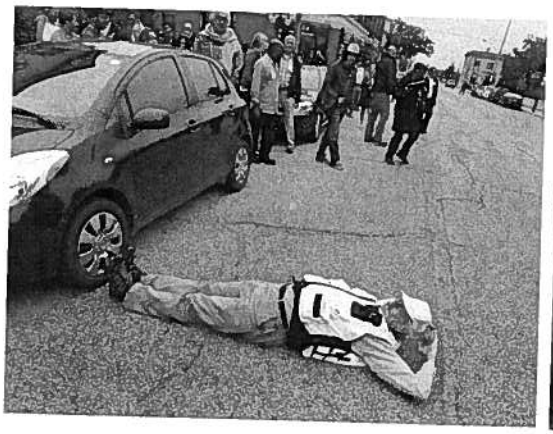
Palanacki said the city will "look hard" at the suggestions made by Burden and implement as many as the budget can handle.

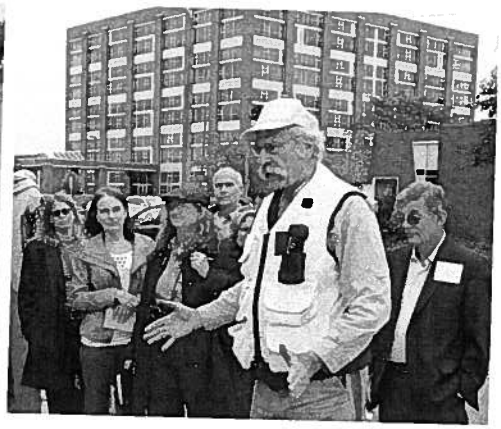
Dan Burden, left, co-founder and director of Innovation and Inspiration, Walkable and Livable Communities Institute, begins his tour to point out possible improvements on Wyandotte Street East in Walkerville, Friday June 7, 2013. (NICK BRANCACCIO/The Windsor Star)



Dan Burden, centre, co-founder and director of Innovation and Inspiration, Walkable and Livable Communities Institute, picks out some of the possible improvements on Wyandotte Street East at Devonshire Road, Friday June 7, 2013. (NICK BRANCACCIO/The Windsor Star)

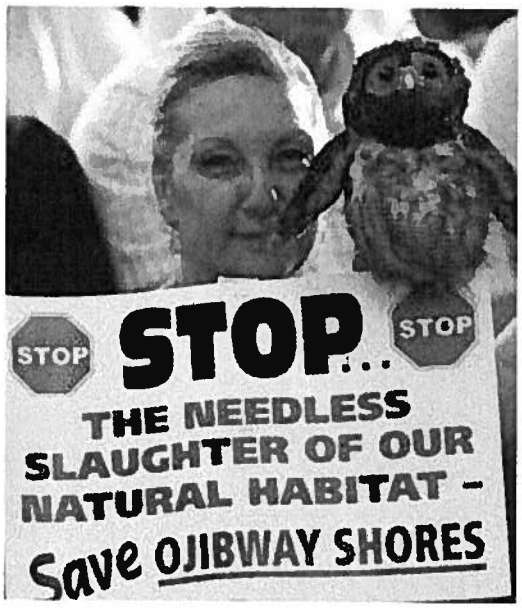
Using his lanky frame as a measuring tool, Dan Burden, co-founder and director of Innovation and Inspiration, Walkable and Livable Communities Institute, points out the size of bicycle lanes, one of many possible improvements on Wyandotte Street East in Walkerville, Friday June 7, 2013. (NICK BRANCACCIO/The Windsor Star)





Dan Burden, centre, co-founder and director of Innovation and Inspiration, Walkable and Livable Communities Institute, picks out some of the possible improvements on Wyandotte Street East in Walkerville, Friday June 7, 2013. (NICK BRANCACCIO/The Windsor Star)

Ojibway shores plan to store dric dirt



Lorna Martis sits with hundreds of concerned citizens at an Ojibway Shores meeting this week at Mackenzie Hall.
Photograph by: Nick Brancaccio, The Windsor Star , Windsor Star

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Doug Schmidt, Windsor Star | Jul 05, 2013 | Last Updated: Jul 05, 2013 - 7:05 UTC

The Windsor Port Authority wants to raze the forest along the city's last stretch of natural shoreline because it hopes to land a contract to store dirt for the new Detroit River bridge.

In explaining its plans to the public Wednesday night to remove the forest and in-fill the 36-acre federally owned property, the authority said only that it had "attracted a potential tenant" to the site.

But rather than for some major new economic or port employment opportunity, the clear-cutting would allow temporary dirt storage, port authority president and CEO David Cree told The Star Thursday.

He said the land would be used as a storage site for perhaps five years as dirt is needed for the eventual approach to the new international crossing to be built to the immediate north.

Cree said the hope is that, in preparing the site, which the WPA has owned since 1998, it could lead to a long-term occupant.

"I find that a bit appalling, really," Ward 4 Coun. Alan Halberstadt said on hearing of the rationale behind the clearcutting proposal that has been met with strong opposition from the local environmental community.

Every one of dozens of speakers at a public meeting hosted by the WPA Wednesday at Mackenzie Hall urged the federal agency to preserve the property.

On Thursday, Windsor Mayor Eddie Francis added his voice to the opposition.

Francis said the port authority should reconsider its plan to clear-cut at Ojibway Shores.

"They don't have a tenant, they don't have an investor ... my advice to the port authority is for them to re-evaluate the future of that property," he said.

The authority recently announced its intention to clear the forest cover at Ojibway Shores as soon as September, with the final decision by the federal agency's board expected in August.

The WPA's plans, however, may have suffered a lethal blow after outside pressure, including from Windsor West MP Brian Masse Wednesday, saw Amico Construction, responsible for excavating the $1.4-billion Herb Gray Parkway, deny it had a deal to supply a large volume of in-fill dirt to the property.

"There was no agreement in place," Cindy Prince, Amico's vicepresident of development, said in speaking on behalf of company head Domenic Amicone.

"That's certainly going to be a factor in the board's decision-making process," Cree said.

He said it was only last Friday that the WPA learned of a June 11 letter from Transport Minister Denis Lebel to the local Citizens Environment Alliance assuring the group that "Transport Canada has no intention of using the Ojibway Shores land to accept fill for the Detroit River International Crossing project."

Cree said the WPA had been expecting about 150,000 cubic metres of parkway dirt trucked in to raise the property about four feet to bring the site to the required 100-year floodplain level.

Without the fill, "their business case falls apart," said Francis, adding he called Amicone Thursday morning after he "saw what happened" at the previous night's public meeting.

A capacity crowd of 230 filled a rented room at Mackenzie Hall, but a similar number who couldn't get in filled the adjacent corridor, downstairs lobby and outside parking lot.

Francis also said the city has no intention of investing the several million dollars required to service the property. A municipal servicing agreement was part of the 1998 deal that saw the city initiate a land swap with the port authority for the industrially zoned Ojibway Shores.

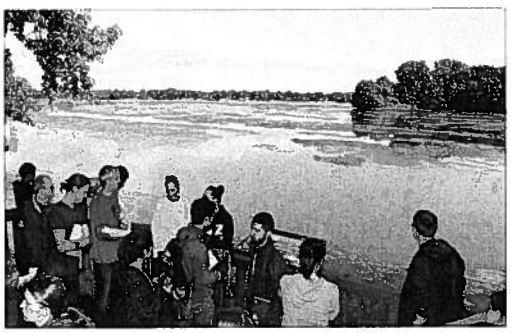
But that was then. "We value that area, and we value these properties," Francis said of the Ojibway Complex, containing the richest collection of rare and endangered plant and animal species in Ontario.

Also on Thursday, the Windsor Essex County Environment Committee met and voted to step up the lobbying of Ottawa to halt the chainsaws, as well as to seek municipal support to help in the search for a longerterm green solution.

A petition is currently circulating, calling for the creation of a "national urban park" that would serve as a green gateway into Canada from the new border crossing.

Halberstadt, who co-chairs WECEC, said he will meet Tuesday with MP Jeff Watson (C - Essex) to see what else can be done to protect Ojibway Shores.

The incredible story of Humbug Marsh



Students from Wayne State University tour Humbug Marsh, part of the Detroit River International Wildlife Refuge and located about 30 kilometres south of downtown Detroit. Humbug Marsh is the last piece of natural shoreline on the Michigan side of the Detroit River. "It's a great treasure," U.S. Congressman John Dingell said. At top, some hickory seeds from the area are displayed.

John Hartig, manager of the refuge, is a limnologist (study of fresh water). He graduated from the University of Windsor and lived on Campbell Avenue for more than a decade. "Who made (Humbug Marsh) possible?" Hartig asked. "Citizens."

Anne Jarvis, The Windsor Star | Oct 18, 2013 | Last Updated: Oct 18, 2013 - 8:13 UTC

It's the Detroit River like you've never seen it.

And what a story it is. The water gently washes the shore, shaded by shagbark hickory and cottonwood. You can hear the birds and the insects and the wind. It's an oasis in an industrial heartland.

It's Humbug Marsh, the last mile of natural shore on the American side of the river. If you want to know what's at stake - and what it will take to win - in the fight for Ojibway Shores, the last natural shore on the Canadian side, read the story of Humbug Marsh.

The marsh, about 30 kilometres south of Detroit, in Trenton, Mich., is part of the Detroit River International Wildlife Refuge. The first international wildlife refuge in North America, it spans 77 kilometres of the lower Detroit River and western Lake Erie. Its islands, wetlands and shoals are widely recognized for their unique habitats and biodiversity.

The 166-hectare marsh, the only internationally important wetland in Michigan and one of only 30 in the U.S., has hundreds of species of plants, fish, birds, even reptiles, amphibians, dragonflies and damselflies. It's at the intersection of two major migratory bird routes and is an important spawning and nursery ground for fish.

Bald eagles nest here. You can see 100,000 broad-winged hawks fly over here in one day. The biggest walleye ever caught in a professional tournament was caught here.

The threatened eastern foxsnake lives here. So do two very rare types of dragonflies. There are oak trees that are more than 300 years old, there when Cadillac founded Detroit.

"Thirty-one of the 32 miles of the Detroit River on the U.S. side are hardened with concrete and steel," says John Hartig, the manager of the refuge. "One mile remains in its natural state: Humbug Marsh."

With a chemical plant, a steel plant and a power plant at our backs, we stood staring at this unlikely vista - Grosse Ile, Humbug Island, Calf Island, all part of the 23 islands that make up the archipelago that dots the river.

"All this in the industrial heartland," marvelled Hartig, a limnologist (study of fresh water) who graduated from the University of Windsor and lived on Campbell Avenue in Windsor for more than a decade. "We're not just the Rust Belt. We're an international wildlife refuge. How important is that in Windsor, in Detroit? Very important, because there are so many people who are disconnected from nature. People have to drive four or five hours north to get this experience.

"Opening this up to the public - you can imagine what this is going to do," he said. "We have such limited access to natural shore on the Detroit River. It's projected there will be tens of thousands of visitors a year."

But it almost didn't happen.

A developer bought Humbug Marsh in the mid-1990s and doomed it to suburbia - houses, strip mall, bowling alley, golf course, marina. Then almost 1,000 people from all over Michigan jammed the first public hearing. Traffic was so bad that the nearby exit off I-75 was closed, and the fire marshal locked the door to the hearing room to prevent more people from crowding in.

"The energy was so high," Hartig remembered.

The campaign to preserve the marsh went on for almost 10 years. It was a catalyst in establishing the refuge in 2001. Hartig's wife became mayor of Trenton over the issue.

"I never had a real expectation it would succeed," admitted U.S. Congressman John Dingell, who was instrumental in establishing the refuge and purchasing the marsh.

But, he said, "it's the last mile of natural shoreline, and it's beautiful. It's a great treasure. It was a chance to do something damned important."

He battled the usual legislative inertia, Republican recalcitrance, private interests and budget constraints. "This was viewed as a piddling matter," he said.

But he went at it, "piece by piece," approaching players and calling in favours. And all the while, the public backed him up.

Finally, the federal government bought the marsh for $5 million, in 2004, and it was added to the refuge.

"Who made that possible?" Hartig asked. "Citizens. Not the government. If those citizens hadn't spoken out, we wouldn't be standing here. It would be like any suburb."

When the public was first permitted onto the marsh, the sign that said "Save Humbug Marsh" was changed to "We Saved Humbug Marsh."

But that was only the beginning. Contaminated land has since been cleaned and capped. The Monguagon Creek, which had been buried, has been unearthed. Thirty thousand cubic yards of fill have been removed to help restore more than six hectares of wetland. Willows and dogwoods have been planted to stabilize the shore, and trails and a canoe and kayak launch have been built. Most incredible, the site of an adjacent former Chrysler plant, surrounded by barbed wire, has been transformed into a 10-hectare buffer for the marsh, the contaminated sediment, abandoned underground storage tanks and drums of hazardous waste all removed.

And it was all done during the recession, with the help of more than 200 public, private and non-profit organizations.

"There's never enough money," Hartig said, "but you can make it work. It's kind of heartening for all of us in conservation to look back."

Humbug Marsh, along with a new visitors centre, will open permanently to the public in two years.

Hartig will tell the story of Humbug Marsh at the Ojibway Nature Centre next Tuesday at 7 p.m.

PLOS | ONE

Artificial Sweeteners in a Large Canadian River Reflect Human Consumption in the Watershed

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Abstract

Artificial sweeteners have been widely incorporated in human food products for aid in weight loss regimes, dental health protection and dietary control of diabetes. Some of these widely used compounds can pass non-degraded through wastewater treatment systems and are subsequently discharged to groundwater and surface waters. Measurements of artificial sweeteners in rivers used for drinking water production are scarce. In order to determine the riverine concentrations of artificial sweeteners and their usefulness as a tracer of wastewater at the scale of an entire watershed, we analyzed samples from 23 sites along the entire length of the Grand River, a large river in Southern Ontario, Canada, that is impacted by agricultural activities and urban centres. Municipal water from household taps was also sampled from several cities within the Grand River Watershed. Cyclamate, saccharin, sucralose, and acesulfame were found in elevated concentrations despite high rates of biological activity, large daily cycles in dissolved oxygen and shallow river depth. The maximum concentrations that we measured for sucralose (21 μg/L), cyclamate (0.88 μg/L), and saccharin (7.2 μg/L) are the highest reported concentrations of these compounds in surface waters to date anywhere in the world. Acesulfame persists at concentrations that are up to several orders of magnitude above the detection limit over a distance of 300 km and it behaves conservatively in the river, recording the wastewater contribution from the cumulative population in the basin. Acesulfame is a reliable wastewater effluent tracer in rivers. Furthermore, it can be used to assess rates of nutrient assimilation, track wastewater plume dilution, separate human and animal waste contributions and determine the relative persistence of emerging contaminants in impacted watersheds where multiple sources confound the usefulness of other tracers. The effects of artificial sweeteners on aquatic biota in rivers and in the downstream Great Lakes are largely unknown.

Citation: Spoelstra J, Schiff SL, Brown SJ (2013) Artificial Sweeteners in a Large Canadian River Reflect Human Consumption in the Watershed. PLoS ONE 8(12): e82706. doi:10.1371/journal.pone.0082706

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Introduction

Artificial sweeteners (AS) are increasingly used as a sugar substitute to reduce caloric intake, for dental health protection and for control of diabetes. As a result of the use of artificial sweeteners in food and beverages and the ability of some of these compounds to pass non-degraded through wastewater treatment plants (WWTPs), AS are being detected in rivers and lakes (e.g. [1–4]) and groundwater (e.g. [4–7]) around the world. Some AS are also able to pass through water treatment plants and are subsequently found in municipal potable water supplies (e.g. [2], [9], [10]), typically where the source water intake for one municipality is downstream from the WWTP discharge of another.

One AS, acesulfame, is particularly resistant to degradation in WWTPs and has been proposed as an ideal tracer of wastewater in the environment (e.g. [2]). Acesulfame has been shown to be mobile and recalcitrant in groundwater [2], [5], [6], making it a suitable wastewater tracer in the subsurface as well as surface water bodies. Additionally, acesulfame removal by the various processes used in water treatment plants for the production of municipal potable water has been shown to be incomplete [9]. To investigate the concentrations and behavior of AS at the scale of an entire watershed, we conducted a study of the Grand River in Ontario, Canada.

The Grand River Watershed in southern Ontario contains the largest Canadian river discharging to Lake Erie, one of the Great Lakes bordered by Canada and the United States (Fig. 1). Predominant land use in the watershed is agricultural (over 80%) but a large urban population (>600,000) is concentrated in the central portion of the watershed. A total of 30 WWTPs servicing a current population of approximately 800,000, discharge to the Grand River and its tributaries. The total population of the Grand River Watershed is currently 960,000 and expected to increase to over 1,400,000 by 2041 [11], with most of this increase occurring in urban areas on sewers. Currently, over 500,000 people rely on Grand River water for domestic use either directly after treatment (>120,000 people) or via groundwater recharge schemes. Therefore the ability of the Grand River to function both as a diluter/assimilator of waste and as a safe source of raw water for drinking water production, while conserving ecological health, is of vital concern.

Analysis of artificial sweeteners (AS) presents an extremely powerful tool for tracing the impact of wastewater constituents on receiving waters. Nutrient loads to the Grand River are high due to

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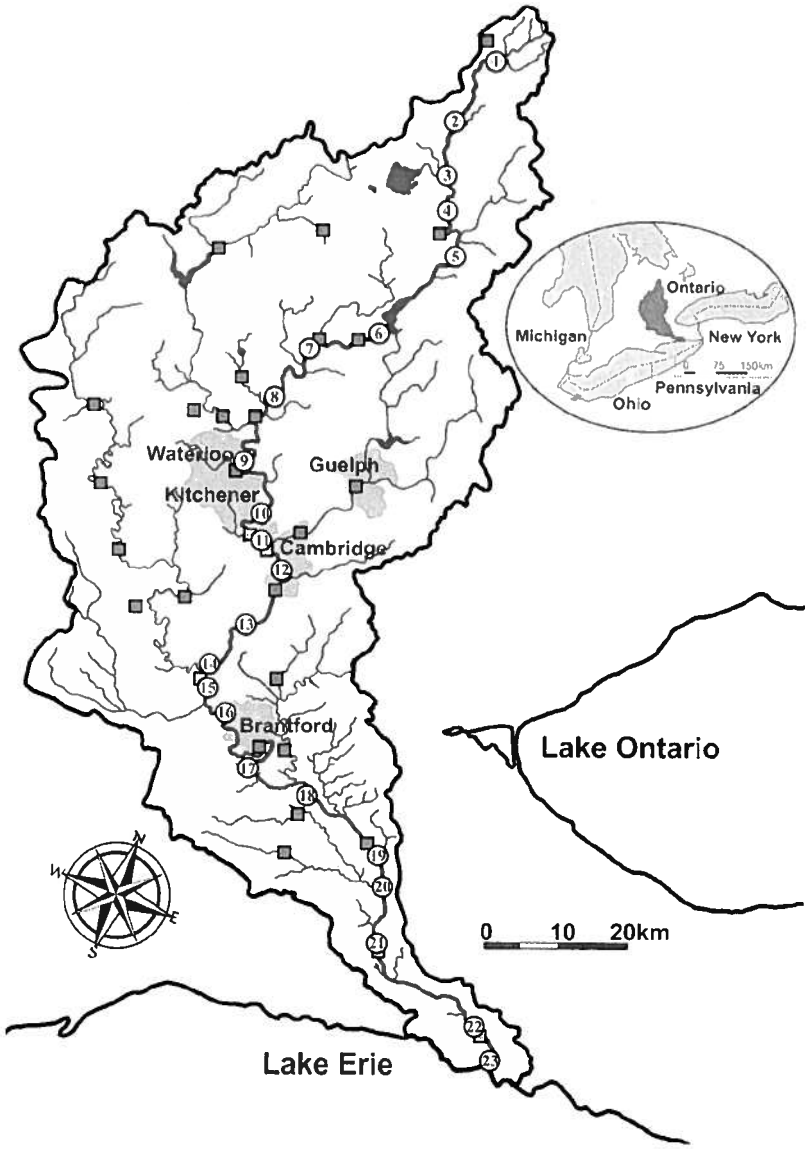

Figure 1. Grand River Watershed (6,800 km^2), Ontario, Canada. Numbered circles and red squares indicate the 23 sampling sites and 30 WWTPs, respectively. Site numbering starts in the headwaters and increases downstream, terminating at Port Maitland where the Grand River discharges to Lake Erie. The 3 largest WWTPs by rated capacity are Kitchener, Brantford and Waterloo.
doi:10.1371/journal.pone.0082706.g001

intensifying agricultural activity and WWTPs, leading to high rates of river metabolism, large daily cycles in dissolved oxygen (DO) [12] and summer nighttime hypoxia below the largest WWTP (Kitchener). River discharge is heavily regulated by reservoirs used for flood prevention and low flow augmentation. To assess the load and persistence of AS in a highly impacted river, we conducted a longitudinal survey by selecting 23 sites over the 300 km river length, starting at the upper 2nd order reach and ending at the discharge point to Lake Erie where the river is 7th order (Fig. 1).

Methods

Samples were collected along the length of the Grand River at 23 sites from headwaters to mouth (Fig.1). No specific permissions were required for these sampling locations since they were all publically accessible sites. In the upper one third of the watershed (sites 1–9), the surficial geology is characterized by glacial till. The urban reach near the center of the watershed (sites 10–12) is followed by a zone of higher groundwater recharge (sites 13–16) due to the presence of glacial moraines. The lower third of the watershed (sites 17–23) is covered by clayey tills and the topographic gradient is diminished. Maximum annual discharge increases from <1 m^3/s at site 1 to >80 m^3/s at site 23. Below the largest WWTP, nighttime hypoxia is a stressor because river DO varies from less than 1 mg/L on hot summer nights to over 14 mg/L during the day.

Three sampling campaigns were designed to capture the effects of seasonal variability during lower flows and non-ice covered seasons when biological transformation should be the most effective: 14-June-2007 (early summer, peak photosynthetic

activity), 5-September-2007 (late summer, end of growing season, past peak biomass) and 24-April-2009 (spring, higher flows and prior to the emergence of macrophytes). Samples were collected close to solar noon on the specified dates by teams of samplers who waded into the river to manually collect the samples or sampled from piers or bridges in the lower river sections. Travel time of the river from one sampling site to the next was not explicitly factored into the sampling design as sites were sampled at approximately the same time of the day (within 2 hours). Samples were kept on ice in the dark and filtered to 0.45 μm in the laboratory before being stored frozen until analysis. Stability data for samples processed to date shows no indication that freezing causes the four AS to precipitate out of solution (data not shown).

Effluent discharge volume from the larger WWTPs exhibits daily fluctuations (a factor of 2.5) with peaks in morning and evening corresponding to the beginning and end of a normal workday. As a result, AS concentrations downstream from the WWTPs also vary on a daily cycle with changes in the dilution factor. Samples were collected at 6 to 8 sites within the effluent plume from below each of the two largest WWTPs (Kitchener, Waterloo) to a distance of 5 km in 2 different years. The plume location and highest concentrations were independently confirmed using conductivity, chloride and bromide. Results demonstrate the conservative nature of AS in the WWTP plume in the river at this distance (data not shown). Samples were also collected within the two largest WWTPs from the effluent stream every 3 hours on a diel basis on 4 occasions. Plume and WWTP samples were processed as above.

Municipal water supply samples were collected from private residences at taps not influenced by additional treatment systems (e.g. water softeners). Prepared sample containers were filled and stored frozen prior to transport to the laboratory for processing and analysis.

The four sweeteners were analyzed by ion chromatography (Dionex 2500 system) coupled with tandem mass spectrometry (AB Sciex QTRAP 5500 triple-quadrupole), operated in negative electrospray ionization (ESI) mode. Sample pre-treatment (e.g. SPE) is not required for this method, thereby increasing sample throughput compared to some other methods used for AS analysis. The minimum detection limits (mdl) for acesulfame, saccharin, cyclamate, and sucralose were 0.008, 0.021, 0.003, and 5 μg/L, respectively. Precision for the method is better than ±20% for all four artificial sweeteners. For sucralose, our mdl and practical quantification limit (pql: 15 μg/L) are relatively high compared to other analytical methods (e.g. 0.01 μg/L [3]) and therefore a detailed analysis of our sucralose data in the Grand River was not included here. A comprehensive description of the analytical methods has been published in the supplementary material (Appendix A) of Van Stempvoort et al. [4].

The field work conducted for this study did not involve endangered or protected species.

Results and Discussion

All four AS analyzed were detected at elevated concentrations in the Grand River (Fig. 2, Table 1). The larger river volume available to dilute WWTP effluent resulted in lower AS concentrations during April compared to June or September (Fig. 3). The maximum concentrations that we measured for sucralose (21 μg/L), cyclamate (0.88 μg/L), and saccharin (7.2 μg/L) are the highest reported concentrations of these compounds in surface waters to date anywhere in the world.

Saccharin and cyclamate concentrations in the Grand River ranged from less than the minimum detection limit (<mdl) to 7.2 and 0.88 μg/L, respectively. Many of these values, measured downstream of the major urban centres (e.g. below site 9), were higher than previously reported for rivers (Table 1). Although previously detected in groundwater [4–7], our study is the first to report detectable cyclamate concentrations for a North American river.

Sucralose had the highest concentration of any of the artificial sweeteners (max. value of 21 μg/L). However, only two samples in the synoptic survey had sucralose concentrations above our quantifiable limit, both at a relatively short distance (23.8 to 35.8 km) below the largest WWTP. Sucralose has previously been measured at concentrations ranging from <mdl to 3.56 μg/L in rivers in European countries [1–3], [9] and <mdl to 10 μg/L in North America [4], [10], [13], [14].

Acesulfame was the most consistently detected AS and present at 21 of the 23 sites. In addition to contributions of much smaller WWTPs along the river and tributaries, acesulfame is the only one of the 4 AS to record the input from WWTP lagoons located just upstream of site 2. Concentrations reached as high as 3.6 μg/L downstream of the main urban centre, comparable to levels reported for European surface waters (<mdl to 6.9 μg/L, Table 1) and an order of magnitude higher than previously reported for Canada (<mdl to 0.34 μg/L, Table 1). Acesulfame was often the only AS detected in the upper reaches of the watershed.

Cyclamate and saccharin are more easily degraded during WWTP processes whereas removal rates for acesulfame and sucralose are very low to not detectable [1], [3]. As a result, cyclamate and saccharin concentrations in WWTP effluents and receiving waters are typically much lower than acesulfame and sucralose [2], [3], (this study). Acesulfame and sucralose have been proposed as tracers of wastewater in aquatic systems because of their conservative nature and ubiquitous occurrence [2], [3]. We show here that all 4 of these AS pass through WWTPs resulting in elevated concentrations in the Grand River (Fig. 2). Unusually high concentrations of saccharin and cyclamate, recorded at site 11 in June 2007, could be the result of the discharge of under-treated wastewater from the largest WWTP. Effluent samples collected within this WWTP in June 2007 also show unusually high saccharin and cyclamate concentrations compared to effluent samples collected on 3 other dates (data not shown). High saccharin and cyclamate concentrations in the effluent likely resulted from a decreased hydraulic retention time within the WWTP, although the specific mechanism responsible is not known.

Relatively little is known about the fate and effects of artificial sweeteners in rivers. Acesulfame has been shown to behave conservatively in groundwater [2], [5], [6] indicating that biogeochemical activity in the subsurface does not significantly affect acesulfame. In contrast, sucralose is attenuated under aerobic and sub-oxic to anoxic conditions [3], [5], [6], [15], [16]. Our samples collected in the plumes below two of the largest WWTPs to a distance of 5 km also demonstrate the persistent nature of all four AS in temperate rivers despite the large range in daily DO and high rates of microbiological activity. Furthermore, elevated concentrations of acesulfame persist for over 300 km in the Grand River and reflect the cumulative human population in the watershed (Fig. 4). Because of the daily variation in discharge at the large WWTPs (a factor of 2.5), single river samples may not capture the full diel range of AS concentrations, especially close to the WWTPs where the river is not fully mixed. However, the general agreement of increasing acesulfame with population (Fig. 4.) demonstrates the conservative behavior of acesulfame in natural waters and its suitability as a long-term tracer of wastewater in the environment.

Large rivers often serve as raw water sources for municipal potable water production. Acesulfame is also only partially removed by the various processes used in municipal water

Table 1. Summary of published data on the concentration of artificial sweeteners measured in freshwater surface waters (streams and lakes) and the data from the Grand River.

			Concentration (μg/L)			
Reference	**Country**	**n**	**Acesulfame**	**Saccharin**	**Cyclamate**	**Sucralose**
[1]	Sweden	15				<mdl to 3.56
[3]	Germany	23	0.27 to 2.7	0.01 to 0.35	0.03 to 0.32	0.01 to 0.11
[4]	Canada	9	<mdl to 0.34	<mdl to 0.066	<mdl	<mdl
[8]	Germany	3–4	2.0*	0.01*	0.25*	0.05*
[9]	Germany	24	2.1 to 3.6	0.03 to 0.11	0.10 to 0.24	0.12 to 0.16
[10]	USA					<mdl to 2.9
[13]	USA	22		<mdl		<mdl to 1.8
[14]	USA	26				<mdl to 10
[27]	Switzerland	20	<mdl to 6.9	<mdl to 0.18	<mdl to 0.13	<mdl to 0.6
[28]	EU	125				<mdl to 0.924
[29]	Germany	1	23†			
[30]	Sweden	3				0.11 to 0.41
[31]	Switzerland	80	<mdl to ~10			
This study	Canada	57	<mdl to 3.6	<mdl to 7.2	<mdl to 0.88	<mdl to 21

n = the number of samples; does not include our measurements in the WWTP plume.
<mdl = less than the minimum detection limit.
Blank cells indicate that the parameter was not reported.
*Maximum value reported.
†About 50% of flow is derived from wastewater sources.
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treatment plants. Of the common treatment methods used, ozonation is the most effective but complete removal of acesulfame is unlikely given ozone concentrations and treatment times typically used in water treatment plants [9]. Acesulfame is therefore the most suitable of the four AS as a tracer of wastewater contamination from source water to end user.

In addition to receiving the effluent from 30 WWTPs, the Grand River is a source of raw water for drinking water production for major urban centres in the watershed. For example, Brantford takes 100% of its municipal water from the Grand River. Kitchener and Cambridge receive groundwater supplemented by Grand River water via an artificial recharge scheme. In contrast, Waterloo typically receives only groundwater as a municipal water source. Given the high concentrations of AS in the Grand River, especially downstream of the City of Waterloo, it is not surprising that AS were also detected in tap water in these large cities (Table 2). Brantford had the highest concentrations of AS of the cities sampled, including high concentrations of more easily degraded saccharin. Brantford's water treatment system consists of screening, coagulation, sand ballasted flocculation, sedimentation, ozonation, biological filtration, UV disinfection, chlorination and chloramination [17].

Artificial sweeteners in municipal tap water could also result from the presence of groundwater that has been impacted by leaking sewer pipes (e.g. [8]) that subsequently enters compromised water supply mains. For areas sourcing their water from groundwater aquifers, septic tile bed plumes are another source of AS [5], [6]. The presence of acesulfame in municipal water distribution systems could be a very sensitive way of detecting areas where old or failing infrastructure has compromised the integrity of the sewer and water systems.

Although concentrations of AS in the Grand River are small compared to the products they are derived from (e.g. diet drinks), mass fluxes of these compounds to Lake Erie via the Grand River are substantial. The mass of acesulfame flowing past site 20 ranged from 2.9 to 6.7 kg/day (Fig. 4) or 4 to 10 mg/person/day, similar to the WWTP effluent loading of acesulfame in the region of Zurich, Switzerland (11±4.2 mg/person/day [2]). Calorie reduced beverages (mainly carbonated soft drinks) constitute a major contributor to the human dietary intake of AS, including acesulfame [13]. Given a mean acesulfame concentration of about 100 mg/L in these beverages [18–21], this mass flux equates to the equivalent amount of acesulfame in 81,850 to 188,650 355mL-cans of soda pop flowing past site 20 each day or 0.12 to 0.28 cans of soda pop per person.

Although some studies of the effects of sucralose on aquatic biota have been done [22–26], the ecological effects of AS on aquatic organisms are largely unknown. Furthermore, even less is known about the chemical breakdown products of AS in the aquatic environment or their toxicity. We demonstrate here that aquatic organisms likely experience long-term exposure to significant concentrations of AS downstream of urban centres that discharge WWTP effluents. Furthermore, impacts are not confined to the immediate reach below WWTPs but persist for hundreds of kilometers. In systems where both animal manure and human sewage are potential sources of contamination, presence or absence of acesulfame is a powerful geochemical tool to distinguish between these two sources. As we are not aware of acesulfame currently being used in animal feed, the presence of acesulfame indicates an anthropogenic wastewater source. Our finding that acesulfame loading reflects the human population in the Grand River Watershed, coupled with the fact that human sources are concentrated in the center of the watershed whereas large livestock operations are distributed throughout the watershed, supports the use of acesulfame to separate animal and human waste sources. In contrast, saccharin is used in animal feed [27], primarily for pigs. Therefore, in the absence of acesulfame, saccharin in groundwater or surface water could indicate a nearby animal manure source, likely of porcine origin. Since cyclamate and saccharin are largely

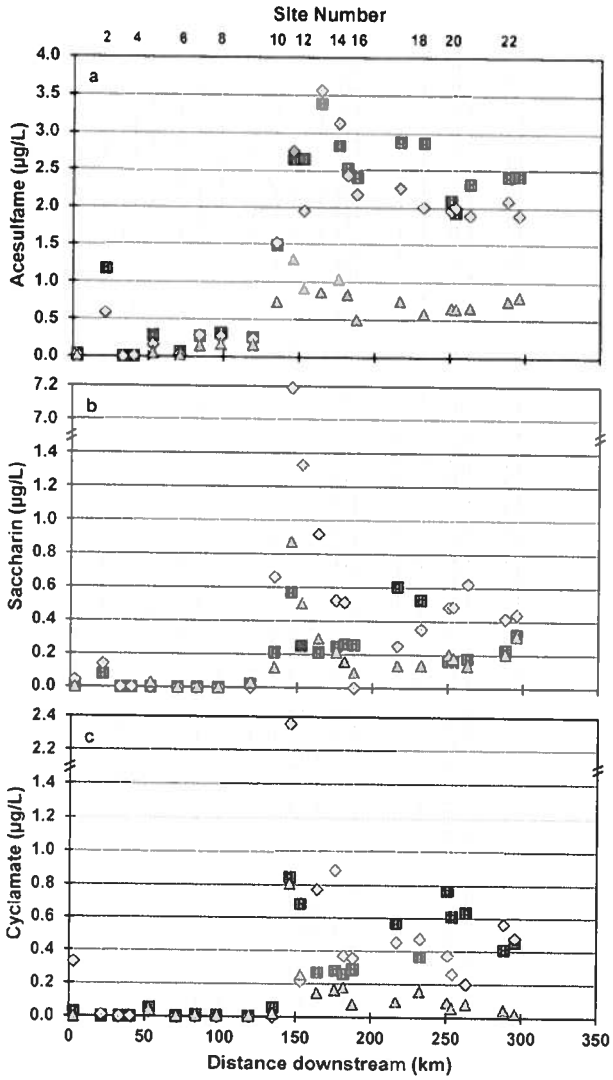

Figure 2. Concentrations of 3 artificial sweeteners in the Grand River. Acesulfame (a), saccharin (b) and cyclamate (c) concentrations in the Grand River on three sampling dates; Jun 2007 (blue diamonds), Sep 2007 (red squares), Apr 2009 (green triangles). Samples plotted at y = "0" have concentrations less than the minimum detection limit.
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degraded in WWTPs or by natural processes in groundwater and surface water, presence of these compounds at high concentrations signifies recent contamination by under-treated sewage or a proximal source. Thus the combination of different AS can also be used to trace and differentiate human and animal waste sources.

At the larger scale, Lake Erie receives discharge from numerous rivers like the Grand River from both Canada and the United States. Given that AS have been in use for many decades and both use of AS and population have been increasing, AS concentrations in the Great Lakes, including Lake Erie, are likely increasing. Acesulfame could be used as a tracer of wastewater impact at the scale of the Great Lakes, especially in the nearshore environment.

Conclusions

Our study demonstrates elevated levels of AS in a large, human-impacted river. The ubiquitous occurrence of acesulfame in

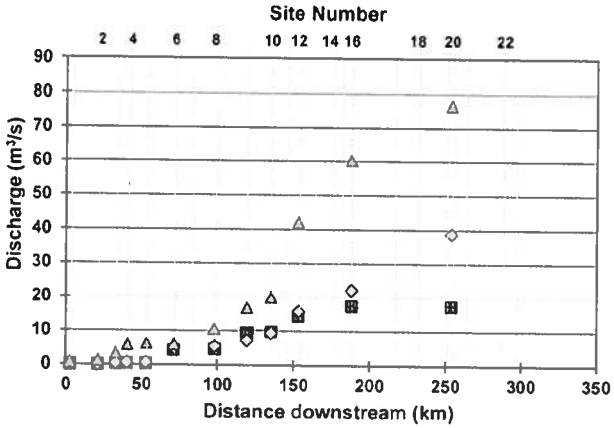

Figure 3. Grand River discharge. Daily mean discharge for the Grand River at gauged sites for each sampling date; Jun 2007 (blue diamonds), Sep 2007 (red squares), Apr 2009 (green triangles).
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wastewater effluents, its high concentration coupled with the high sensitivity of available analytical methods, and its resistance to breakdown in both WWTPs and in groundwater and surface water environments, makes it an ideal tracer of human derived wastewater. Acesulfame will be particularly useful for studying groundwater - surface water interaction, nutrient assimilation and other wastewater constituents including emerging contaminants released to rivers, lakes, and nearshore marine environments. Acesulfame can be used to distinguish and quantify dilution versus attenuation and it circumvents problems of confounding source inputs common with other tracers such as chloride (e.g. road salt, groundwater inputs). Given the persistent nature demonstrated here and solely human source, we expect that acesulfame will become the most reliable detector of wastewater presence, dilution, and transformation in surface and ground waters.

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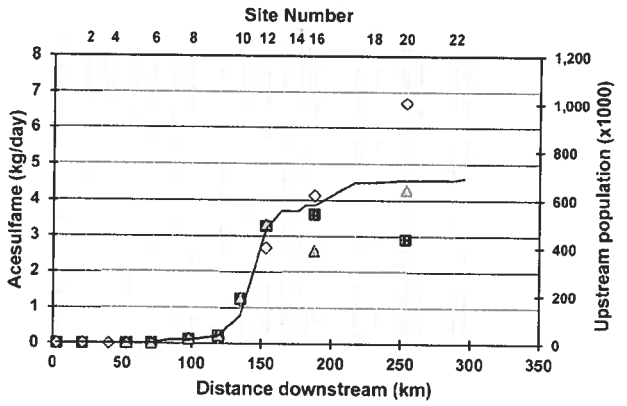

Figure 4. Mass flux of acesulfame in the Grand River. Daily mass flux of acesulfame at gauged sites for each sampling date; Jun 2007 (blue diamonds), Sep 2007 (red squares), Apr 2009 (green triangles). Cumulative population contributing to WWTP discharge upstream of each site is indicated by the black line.
doi:10.1371/journal.pone.0082706.g004

Table 2. Concentration of artificial sweeteners in municipal water collected from household taps.

Water Source	n	Concentration (µg/L)		
		acesulfame	saccharin	cyclamate
Brantford: river water	7	0.55 – 1.59	0.18 – 0.35	<mdl (6), 0.24
Cambridge: groundwater, groundwater from ARS	9	<mdl (4), <pql (3), 0.04 – 0.39	<mdl (7), <pql (2)	<mdl (8), 0.01
Kitchener: groundwater, groundwater from ARS	4	0.08 – 0.12	<pql (3), 0.07	<mdl (4)
Waterloo: groundwater	8	0.05 – 0.12	<mdl (2), <pql (6),	<mdl (8)

n = total number of samples.
Brackets indicate the number of each type of result.
<mdl = less than the minimum detection limit.
<pql = below the practical quantification limit.
ARS = artificial recharge scheme.
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Authority provided discharge data for the Grand River. Comments from two anonymous reviewers helped improve a previous version of this manuscript.

Author Contributions

Conceived and designed the experiments: JS SLS. Performed the experiments: JS SLS. Analyzed the data: JS SLS. Contributed reagents/materials/analysis tools: JS SLS SJB. Wrote the paper: JS SLS.

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