

# 2014 Bruce Talks: A Meeting of the Scientific Minds



## **Symposium Notes**

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Willie Waterton

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Bluewater Outdoor Education Centre

**Hosted by the Sources of Knowledge Forum Committee**

With the support of:

The Rankin Resource Group  
The Bluewater District School Board  
The Bruce Grey Environment Coalition

## **Acknowledgements**

The Sources of Knowledge Forum would like to thank everyone who participated in this event. For an inaugural event, the turn-out was a testament to the need for such gatherings to occur occasionally.

Presenters, your topics were enlightening and presentations informative and professionally presented.

Participants, your feedback and questions were most helpful and appreciated.

Bill Caulfeild-Browne, you did a wonderful job of keeping us on time, and on-task as our masterful MC for the day.

Bill Graham and Mayor Close, your opening remarks set the perfect tone for the day.

Cheryl Leis Catering, the food was delicious, seasonally appropriate, and plentiful.

John Haselmayer, with the help of Sean Liipere, the technology ran smoothly and without hesitation, which is not an easy task.

Sandra Mielhausen and Sylvia Elliott, registration could not have been easier, and was given top marks on the evaluations.

Willie Waterton, your photos will add an appreciated dimension to this document.

Deborah Diebel, your initial spark of an idea turned into the coordination of an enjoyable and informative event for all involved.

The staff of the Bluewater Outdoor Education Centre, your help setting up and cleaning up, and your assistance coordinating with the visiting school group was most appreciated.

Rankin Resource Group, and Bruce Grey Environment Coalition, your financial support made this event possible.

...And to those who contributed ideas, support, and feedback as this fledgling event got off the ground.....

**We Thank You!**

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## **Bruce Talks Notes**

### **Rankin Resource Group Inc., Craig Todd, MNR Rep on RRG The Work of RRG, Including SAR Inventory Project**

RRG is a local co-management group through  
MNR for the Isaac Lake Wildlife Management  
Unit and Rankin River watershed

Many different interest groups sit around the table –  
field naturalists, fishers, hunters, trappers, land  
owners, ATVers, snowmobilers, Conservation  
Authority, Bluewater District School Board, cottagers

Crown lands were being reviewed to be sold for cottage lots –  
RRG formed with mandate to protect the area from  
being sold and to support management decisions on  
MNR lands and support other public and/ or private land  
owners with resource management and protection

RRG has just completed the first year of a 3-year flora fauna study  
by biologist, John Morton, contracted by RRG and paid through an  
Environment Canada HSP grant with in-kind support from MNR.  
Craig raised the question of using technology to record the  
information, making the study more interactive with citizen participation i.e., website or  
blog, a way people who see species on the property can input their data and make the  
study an on-going living document changing and being updated as people visit the area.  
Copies of the study results from the first year of John Morton's review were made  
available at Bruce Talks. Contact Craig more details.



### **Tricia Stinnissin, Trent University Road Mortality of Reptiles and Amphibians**

NCC collaborates

Dr. Jim Schaefer

Spent past two summers studying her topic.

Roads have indirect (habitat loss, fragmentation, development)  
and direct impacts (road mortality).

Study area is northern Bruce Peninsula

Good place to study because it is not completely covered in  
roads. Many unique species, ecologically significant

Effects of roads on herpetofauna

Why not mammals or birds? - because reptiles have a unique  
life history

Reptiles have late sexual maturity

Some can take a very long time just to be able to breed (10 –  
20 yrs to reach sexual maturity)

Low reproduction rates (in a clutch of eggs, less than 1 % will  
survive)

Dependent on a high adult survival rate – adults are very important in a turtle population  
for reproduction.

### **Effects of Roads on Herpetofauna**



Creates sexual bias

In nesting season, it is usually females crossing the road and they are more likely to be hit. It's harder to find mate. Slow moving on roads, so they get hit (unseen or deliberate).

### **Why should we care?**

Important components in ecological food webs. Control pests such as rodents and insects.

Indicators of environmental health

Biodiversity

Natural movement, finding a mate, dispersal from parents

They cross the road for nesting – when they look at a road shoulder, they see it as a good place to lay eggs. Sunny, sand, easy to dig. Warmer temperatures – need the warmth, so they like to lie on the road

### **Hotspot Identification**

Done by collecting data of all amphibians and reptiles on the road, looking in areas where they are commonly found crossing

Going to develop a model based on road occurrence data and influencing factors

### **Mitigation**

NCC funding comes in here. Based on research, will put in areas of eco-fencing or passages, increased awareness through presentations

### **What factors are affecting road mortality?**

Posted speed limit

Traffic volume

Adjacent land cover composition (habitat beside road)

Weather conditions

Road surface type.

100 km route selected.

Look at high traffic volume/speeds, compare to slower traffic volume areas

Did survey on bike

Collected alive and dead on road

Collect safely, but don't jeopardize yourself if you are helping a turtle cross.

2012, 2013 (longer field season in 2013)

Garter, Massasauga Rattlesnake, Red-bellied, Painted, Milksnake, Ribbon Snake, Ring-necked, Smooth Green, Snapping Turtle

Salamanders don't move after breeding season

Green and Leopard Frog dominant amphibians that were seen at Johnson's Harbour, much busier than thought.

### **What do hot spots have in common?**

Excellent habitat for Massasauga Rattlesnakes, but only found one at Cape Hurd

Just finishing analysis right now, and will start writing soon

90% of what was found was dead, 10 % alive

Collected traffic volume data.

As traffic volume increases, so does road mortality

Frequency goes up in May and June during mating, then July August during high traffic, very vulnerable when they are nesting

Can find time hot-spots.

### **Future Implications**

Working with NCC

Identifying hotspots that need intervention, working on putting in culverts and fencing mitigation to help these species. Can only do so much, but will increase awareness among drivers, as well

Brake for turtles and snakes, help them cross the road when it is safe for you to do so, bring them to a rehab centre when injured (Kawartha Turtle Trauma Centre, Toronto)

Wildlife Centre)

## **Megan Anevich, Nature Reserves Coordinator at Ontario Nature Stewardship of the Massassauga Rattlesnake**

Funding from MNR Species at Risk Stewardship Fund

Myth-Busting on the Bruce

### **4 Goals –**

1. Mapping the southern range limit
2. determine attitudes and change negative opinions
3. Encourage stewardship
4. Identify priority threats

See if bad opinions existed and change them for the better, steward their own property, work towards mitigating threats

Understanding southern range limit – relied on reptile and amphibian atlas-

2 observations from 2013 are now the 2 most southern most observations on the Bruce

By end of Aug 2013, now have a citizen science database of various species.

Outreach and education on southern Bruce Peninsula

6 community presentations

Warton, Ferndale, Stokes Bay, Oliphant, Correcting negative myths and encouraging habitat stewardship, Warton Farmer's Market

Guided hikes

Door to door in some communities

Did surveys about perceptions about rattlers

38% improvement in number of correct responses on knowledge between before and after presentations

Increasing people's knowledge of the species can improve their perception positively towards the species.

Encouraging Landowner Stewardship

Reached 254 people

Did social media campaign – reached another 2000 people

"I would not kill a rattlesnake" responses increased from 81% - 93%

"I would steward my property for Massassauga" – 36% - 53%

Had to target the audience so not preaching to the converted – door-to-door was best way to reach people who did have negative opinions

Farmers markets were also a great place to do this

Identifying threats – road mortality hotspots were identified, proven further direction for new projects

Looking into eco-passages, brake for snake signs, speed bumps, encouraging people to submit sightings to website for reptiles and amphibians

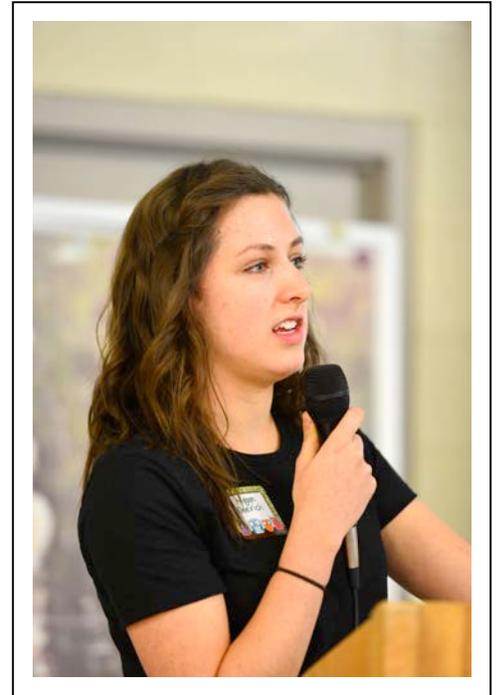
App Store for Ontario nature - there is an app

NCC – mapping for Habitat Loss and Fragmentation

Conservation lands with no current observation – looking at where they should focus future efforts – looking at areas with historical records, but nothing current

To address discriminate killing we have some data, but it is hard to find who is doing this.

Go door to door to find out who's has negative opinions. Distributed educational materials through social media.



## **Britney Niedzielski, Master's Candidate, Trent University Wild Turkey Habitat Selection and Survival**

A master's thesis project

Unregulated hunting and conversion of forest habitat meant

Wild Turkey was extirpated by the early 1900s.

Since reintroduction it has expanded its range and has become a popular game species here in Ontario, thriving but little known, especially at its northern edge

Inform management strategies for northern edge populations  
Wanted to better understand better home range size, selecting or avoiding habitats?

Annual seasonal survival rates, causes of mortality, landscape features influencing mortality

Completed research on Northern Bruce Peninsula. Traditional range was a bit further south. Trapped 59 turkeys in 2012 and 2013

Trapped, made them easy to trap at once because they are in flocks.

Set bait piles, and used rocket net. Then run in and get them before they escape.

Methodology – turkey handling boxes, processed immediately

Looked at sex, age, morphological measurements, DNA sample, disease sampling, GPS, VHF radio transmitter

Used radio telemetry to relocate each turkey each year: Jan 2012 – March 2013

Collected data each day.

Walk in on mortalities (mortality sensor)

Can use this to try to figure out what happened to the dead birds.

35.2 Km squared was annual home range

Winter was 3.3 km squared – they don't move far in winter. Stay close to reliable food source.

Spring 13.9 km squared – females are nesting and travel great distances to look for good nesting sites

Historically preferred habitats still important – deciduous forest, pasture, fields.

Supplemental food is very important for them – bird feeders, cattle

Annual survival rate of 0.37 – among the lowest documented throughout their range

Lowest in winter of 0.69

Mammalian predation 0.45

One drowned in Tobermory Harbour, a couple died on road, coyote and bear predation

What does it all mean?

Moving farther to meet needs – harder to find optimal habitat? Leading to decreased survival?

Able to persist at northern range edge

Supplemental food

Deciduous forest

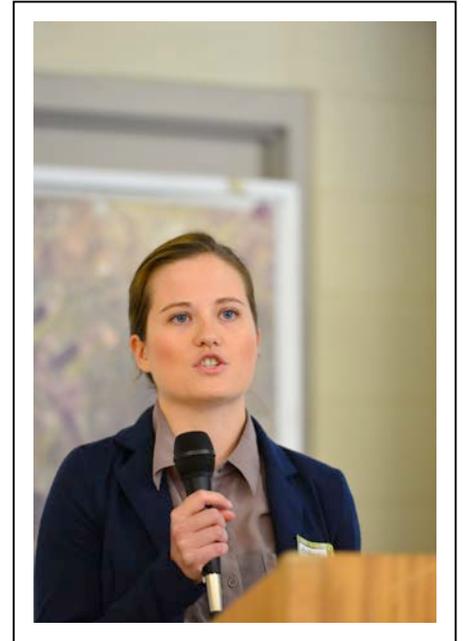
Pasture/fields

Survival rates among the lowest reported

Similar to northern translocations

Decreased survival due to moving farther, reduced resources?

Population being maintained by



Source-sink dynamic – turkeys from south could be moving north and supplementing population  
High productivity?  
Areas of future research

## **Theresa Stafford, Friends of Oliphant Coastal Environments The Work of the Friends of Oliphant Coastal Environments**



The Friends of Oliphant Coastal Environments is a volunteer conservation group that seeks to preserve and protect the natural environments of Oliphant and the Fishing Islands. In 2010 the Oliphant Coastal Stewardship plan was published with funding and support of the Ontario Ministry of Natural Resources, Species at Risk Stewardship fund, the Lake Huron Centre for Coastal Conservation, the Bruce Stewardship network and the Town of South Bruce Peninsula. Judith Jones of Winter Spider Eco - Consulting did the biological report with assistance from the Owen Sound Field Naturalists and consultation with Jarmo Jalava, John Morton and Peter Middleton and reference to the 1985 inventory by Joseph Johnson.

The Coastal Centre employed The ABC resource survey approach where the abiotic, biotic and cultural elements of the coastal areas were examined and recommendations proposed.

Coastal Meadow marshes are extremely sensitive to the water fluctuations including short-term changes due to seiches and storm surges as well as the seasonal and long-term lake level fluctuations. In the last 14 years the levels have been in the lower range causing large areas of exposed lakebed. Vehicles have not been restricted from this area and are contributing to damage of the hydrology and ecosystem.

Oliphant is a biological wonderland with orchids, a diversity of plants and several species at risk including the piping plover, tuberous Indian Plantain, Dwarf Lake Iris, Spotted Turtle, Eastern Massasauga Rattlesnake, Stiff Yellow Flax, Beaked Spike Rush, Blue Leafed Willow and the Monarch Butterfly.

Oliphant has long been a historical summer playground. Many of the cultural uses are benign to the environment such as swimming, Kayaking, fishing, bird watching, bicycling, and recently, kite boarding. Unfortunately the North American Car culture has many proponents who feel that their vehicles and ATV's are fun on the beaches and don't believe that they are causing harm.

The Friends of Oliphant want to work collaboratively with other groups and the town to reduce human impact. This has been a process of two steps forward one step back. The town is dealing with the invasive species *Australis Phragmites* but they have not stopped the destruction caused by vehicles.

From a scientific perspective the diversity of nature and the fragile ecosystem needs to be protected from human impact. From my personal point of view the sacredness of

creation should be honoured and celebrated so that my grandchildren and their children can appreciate their natural inheritance.

Theresa Stafford [www.fooce.org](http://www.fooce.org)

## **Karen Alexander, Lake Huron Centre for Coastal Conservation Coastal Habitat Stewardship And Benthic Abundance Projects**

### **Stewardship Guides for areas on the Southern Bruce Peninsula**

South Sauble Beach  
North Sauble Beach  
South Georgian Bay  
Oliphant's Coastal Wetlands

Phragmites Australis, ongoing

Mapping shoreline from Sarnia to Tobermory - Where you can access the water with a vehicle

### **Habitat Stewardship Project - Focused on the Huron Fringe**

Doing some work in three communities along shoreline, but will focus on Oliphant

SAR – Dwarf Lake Iris, Massassauga, Piping Plover, Turtle Species, Tuberous Indian Plantain, Dense Blazing Star, Pitcher's Thistle, Eastern Hog-Nose

**Mitigating Threats for SAR-** vehicle use in wetlands, Phragmites Australis, deliberate killing, road kill  
Focusing attention on education and letting people know how wildlife species are using the area

Phragmites rapidly colonizes open areas.

2011 water levels dropped, need to keep Phragmites out to allow time for the native species to regenerate. Cars are causing more of a challenge to native species to regenerate.

Restoration plots

### **Massassauga Monitoring**

Wanted to understand how the Massassauga Rattlesnakes are using the wetland  
Community workshop, monitoring in spare time, or accidental finds, how do you survey for snakes safely, hopefully translated into more time with locals looking for snakes.  
Map from NCC shows high priority areas.

### **Habitat Restoration**

Plots in highly visible locations

Hoping to encourage some habitats to regenerate more quickly

Want to broadcast seeds, but it was really wet, so they held onto seeds, and they are growing them into plugs to use to plant

Planting them in June

Plots are out, fenced, signs will be going up. Someone ATVed through them

August – October 2013

### **Internship Program**

Characterize the macroinvertebrate community structure along Lake Huron's shoreline ( $\leq 1\text{m}$ )

Bruce County – Lorne Beach, Inverhuron, Scotts Point, Brucedale CA, MacGregor Point, Mirimichi Bay, Sauble Beach, Oliphant

Found 54 taxa in the survey she took.



Protected sites (Oliphant) – really stood out as a unique environment  
Sandy sites- bugs that hang on  
Coastal wetlands and cobble beaches – wetlands have more plants, but similar species between the two overall  
Future studies – collect more habitat information (abiotic and biotic)  
Quantify algae

### **Conclusions**

1. OBBN protocols prove useful in nearshore zone of Lake Huron
2. ?
3. ?

**Coast Watchers** – looking for more volunteers to monitor the coastal environments

**Living Beaches**

**Green Ribbon Beach**

**Shoreline Cleanup**

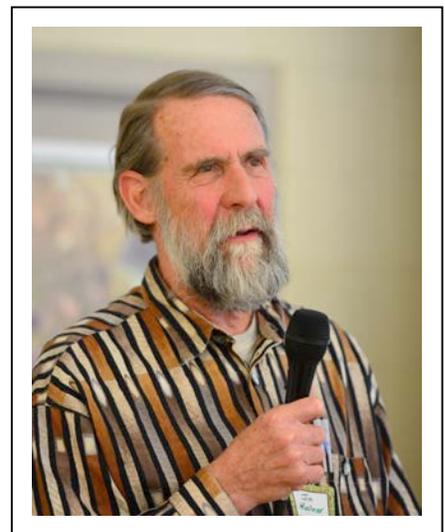
**Upcoming Biennial conference – Is the Coast Clear?**

June 20<sup>th</sup> at Oakwood Beach in Grand Bend

Minister Bradly, and Mayor Bradley will be there to speak

### **Jim Kuellmer, Bruce Peninsula Biosphere Association Tree Plots (Jim was also representing the Bruce Peninsula Environment Group)**

The BPBA (Biosphere Association) has forest plots that have been monitored according to EMAN protocols since 2002. This is done in accordance with the UNESCO pillars of balancing the social, economic, cultural, and environmental values of any actions to maintain sustainability. The focus of BPBA is on the environmental, and facing governmental cutbacks and biases, the importance of citizen science is growing. The BPBA plots are generally working landscapes on private lands. The plots measure 20x20 meters and are surrounded by 40 boards to create salamander habitat. The Redback variety is counted since it is the commonest type and can be seen as an indicator of ecological health. During the time period between the disappearance of the snow and the onset of the mosquitoes, 4 counts are recorded by volunteers. The forestry data includes tree size, condition and regeneration. This portion is now done every 5 years, typically with paid interns. Getting permission to have access to private land for the 20-year period needed for drawing conclusions is difficult, but these are the sites that yield the best data concerning the effects of human intervention. We would like to compare the results from our area to those from other areas, but this information is difficult to find. The US program called “Hands on the Land” does have an excellent program, but they do not count Redbacks.



3 years ago the Ontario Forest (Monitoring) Network was convened to address the lack of inventory knowledge of Southern Ontario forests, including maples and rare species. This group has been organized as a joint MNR/NEC venture in be open to all willing to share data. The NEC plots are monitored according to the Smithsonian protocol which is more extensive but international in scope.

We are regularly cutting maple for sawlogs and firewood, but without an existing inventory, there is no way to know how to manage for sustainability. The sugar bush owners have a protocol which is designed to be sustainable, and based on the fact that

a managed forest produces trees that can be tapped much earlier than in an unmanaged forest. These sugar bushes may represent our best forests after more than 100 years of high-grading which diminishes the forest ecological health and biodiversity. We need a data registry that is accessible to not only compare data, but to encourage private landowners to collect and share data from their lands.

## **Daniel Kim, Association for Canadian Educational Resources Citizen Science and Beyond**



We use tree tags to monitor trees. Numbers embossed on aluminum

Last for 100 years.

Climate's Sake – also known as ACER (Association for Canadian Educational Resources)

Currently monitoring 20000 trees in Ontario

Many organizations plant trees, but only a few actually monitor what they planted. It's a huge challenge to tag, measure, and monitor them.

ACER does this with the help of schools, scientists, municipalities, CAs, et

Planting for Change – 26 schools in T.O. area are involved.

Every time they plant and measure, hundreds of students are involved.

Number and tag the trees, we measure parameters like diameter, crown width, height, status

Do this to monitor global climate change

IPCC data says climate change is already

happening, the rate of warming is greater than ever, on N. hemisphere, species are moving north in search of cooler temps.

Graph shows how species move their range. Species can only move so quickly – trees – they are most vulnerable to climate change.

We also monitor trees because we realize people are disconnected from nature.

Kids often have a fear of being outside in the natural environment – increase in obesity rates, more prone to anxiety and depression, ADD

Every time we monitor trees, we involve kids and adults and have them interact with nature. We have over 10 000 volunteers involved.

Scientific studies – data we have can be compared with data from other regions. Can help city managers to know what to plant. We can compare our data with other nations and see how species are changing their range

We train citizen scientists to monitor climate change. Very specific skills

Online resources – how to measure trees, identify trees, Dynamic Auto-report – kids measure their trees and enter their data and then graphs come up. Graphs are dynamic. If you change the data, the graphs change. They can bring this home at the end of the day to show their parents.

We can also calculate how much Carbon is stored in the trees they measured, and how many cars can be mitigated by this tree annually

Increased public awareness

QR codes on trees – If you have a smartphone and scan this code, info about this tree will pop up.

Create a public tree database for long-term monitoring.

Overcoming Challenges

Quality Assurance Program  
Continuous improvement of our database  
Constantly seeking funding for “monitoring”  
How can you help? Our protocols can be used in an hour. Send us your tree data! Or,  
add QR codes to your trails.  
905-891-6004  
[www.acer-acre.org](http://www.acer-acre.org)

**Kelly Moores, Master’s Candidate, University of Waterloo**  
**Forest Health Based Scenario Building**  
**Building Climate Change Into Management in National Parks**

Evidence of climate change is already being felt/seen, and this presents challenges for parks

Changes to temp, precipitation patterns  
Altered disturbance regimes  
Invasive species  
Changing phenology  
Decoupling of biotic interactions  
Northward shifting biomes

**Importance**

-  
-  
-

**Barriers**

Human Resources  
Financial Resources  
2012 Budget Cuts exacerbate problems

Idea is to take monitoring and research and shift how you look at it and add a climate change lens. Make it simple and a way of thinking about how things might be in the future without huge cost.

**Stage 1**

Examine Historical Monitoring – Knowledge for a Key System Driver

+

**Stage 2**

Use Primary Climate Scenarios to Assess Potential Changes to Temperature and Precipitation

+

**Stage 3**

Build Management Scenarios based on Stage 1 & Stage 2 and Budget for Anticipatory

**Restoration**

6 plots studied by Kelly – 3 deciduous, 3 coniferous

Monitored long-term growth and mortality to compare levels to the state of the park report.

Mortality was looked at – balsam fir was the one with the highest mortality

Seedlings were looked at – maple is by far the most prevalent, they will thin as they grow

Use ICC website to plug in your parameters, and you can see increments in the time period you’re looking at

Used polar opposite from the most hopeful to least hopeful scenario

Even a 2 – 2.5 degree increase in temps can cause great change in our environment, so

Precipitation patterns will be a lot more erratic

Possible future outcomes if we go in a certain direction



#### **Four Scenarios**

- B1 - # 1 – Active Management
- B1 - #2 – Passive Management
- A2 - # 3 – Active Management
- A2 - # 4 – Passive Management

**Scenario 1 – Status Quo**, if there was minimal climate change, but with passive management

Forest remains similar with small reduction in northern boreal species

Most change due to succession forest type dictated by soil depth

#### **Scenario 2 – Regional Resilience – Active Management**

Forest of generalist trees experience minimal impact

Opportunity to build ecological integrity by targeting.

#### **Scenario 3 - Novelized Forests**

##### **Passive Management**

Declines in health of several boreal conifers but conifer overtake minimal due to poor soil. Increase in

##### **Scenario 4 – Anticipatory Restoration**

##### **Active Management**

Use planting to maintain coniferous/deciduous forest structure

More effort needed to maintain hardwood forest, and reduce invasive species

#### **Conclusions**

Most trees are generalists

Soil and light requirements important

Ecological Integrity of BPNP forest not in danger

#### **Recommendations**

More funding is always better

Emphasis is on invasive species/pest management

Soil conservation measures

Selective planting?

#### **Take Home Concepts**

Minimal resources required

Show outcomes of multiple outcomes

Anticipates action required

Efficient use of restoration funds

Focus on EI mandate

### **Bogdan Hlevca, University of Toronto Amplification of long-period waves in two shallow coastal embayments of Fathom Five National Marine Park**

#### **Slide 1**

This study is part of a bigger project that aims to determine the relationship between the geometry of the coastal embayments and optimal habitat for fish. It is a collaborative effort between University of Toronto and Parks Canada.



Scott's observations of the striking differences between the water level oscillation amplitudes in two adjacent embayments in FFNMP: The Boat Passage (BP) and Cove

Island Harbour (CIH) have determined us to seek to understand the causes of these differences.

Although the two adjacent FFNMP embayments in this study receive similar wave forcing from the lake the visual observations showed that the amplitudes have much higher values in Boat Passage.

## **Slide 2**

The two embayments are located on Cove Island

There are some significant difference in terms of turbidity, vegetation and fish population BP is more turbid, has higher density of vegetation and supports more fish species.

The only obvious difference between the environmental parameters of these two adjacent embayments seem to be the hydrodynamic regimes.

According to our estimates the differences in water level fluctuations mean that currents should be on the order of 1-2 m/s in BP, therefore, the bed sediment might be constantly stirred up. In CIH currents levels reach much lower values around 0.4 to 0.6 m/s.

## **Slide 3**

The factors that influence the hydrodynamic regime can be classified in two categories: Barotropic and Baroclinic

Barotropic – are those processes where the density of the water is influenced only by depth (it is the case when the water is not stratified)

Examples of barotropic process:

- Effluents such as tributaries or industrial
- Wind entrainment
- Long -period standing waves (known as seiches) that have a pumping like effect.

## **Slide 4**

The second category are the Baroclinic processes – the density of the water is influenced by other factors other than depth and therefore may have different densities at the same depth.

Examples of baroclinic processes:

- Shallow waters of the bay warm faster and create a density driven gravity current that favours the water exchange between the lake and the bay. The gradients are most of the year too small to produce important flows.
- Also caused by the wind and storms are the upwelling events when the warm surface water is pushed from the shore and cold bottom water is brought to the surface. Temperature changes are very fast. Temperature can drop by 10-15 degrees in a matter of hours.
- Similar to surface waves where there is an air water interface at the thermocline level internal waves are formed and they may influence the hydrodynamics in coastal waters.

## **Slide 5**

These embayments are very shallow, with depths between 4 and 1 m and an average depth under 2 m.

In Lake Huron the thermocline is at a depth ~ 20 m Therefore stratification here does not play a big role and we can safely assume that water level oscillations represent the main driving force for the hydrodynamic processes within the embayments

We have recoded the water level oscillations at an interval of 2 minutes that allowed us to detect with accuracy wave with periods greater than 4 minutes. One can observe that the highest water level oscillations were recorded in Outer Boat Passage while the smallest excursion was recorded in the lake.

### **Slide 6-7**

I used spectral analysis to determine the water level oscillations frequencies and amplitudes. I used both Wavelet Transforms and Fast Fourier Transform. The wavelet transform has the advantage that presents the results in both time (X axis) and frequency (Y-axis) domains, which allows us to understand the variation of the signal in time. The darker the colour the stronger the signal. Black lines mark the signals above the 95% confidence level, which is the signal that is considered beyond any doubt that it is not random or background noise. Here we can see that the signal in CIH is quasi-stationary with strong oscillations with periods around 11 minutes (700 sec). In the scalogram for Boat Passage one can distinguish two significant water level oscillations: at 8.4 min (550 sec) and 16.8 min (1100 sec)

### **Slide 8**

The Fast Fourier Transform shows the signal in frequency domain averaged over the time period. In CIH there is a group of strong peaks centered around the 11.2 minute period. This period corresponds to the Helmholtz frequency of CIH suggesting that resonance is the cause of the strong amplification in the bay. Most of the strong peaks in the spectral analysis for CIH have correspondent peaks in the lake spectra, which suggest that lake long-period waves are the main driver for resonance in CIH.

### **Slide 9**

In the BP spectra we can distinguish 3 groups of amplified peaks that corresponding to the natural frequency and first and second harmonics of the bay. In addition, can see many more peaks that do not correspond to oscillations in the lake suggesting that these frequencies have formed inside the bay through nonlinear energy transfer from the shorter period wind waves. The two shades of gray represent the 95% confidence interval for the lake and bay spectra.

### **Slide 10-11**

The models presented here aim to find a relationship between the geometry of the bay and the response by trying to reproduce the field results. The Helmholtz model assumes that the bay is a resonator the similar to a bottle or a guitar that resonates when the forcing signal is in the neighbourhood of the natural frequency of the cavity.

There are a number of assumptions made to simplify the mathematical equations:

- Regular geometry
- Smaller than the wavelength
- No tributary

The equation of momentum and the equation of continuity are converted through a number of algebraic operations into the response equation that gives us the amplitude of the oscillation in the bay. Bays with narrow entrances and channels such as CIH can use directly the equations. However, the fjord like shape of BP created a quarter wavelength oscillator (similar on organ pipe). We can still use the same model, but we need to calculate an equivalent channel length since a real channel does not exist.

While the Helmholtz model for practical purposes gives good results for embayments with narrow mouths, for long embayments with large openings such as Boat Passage calculations lead to significant errors because it ignores the high energy of the short-period wind waves. Therefore, a second model has been used to account for forcings that the Helmholtz linear mode did not. The second model considers the the energy transferred nonlinearly from groups of short wind waves, with a group velocity  $C_g$ , to long waves that in turn resonate in the bay. The condition that the energy can transfer nonlinearly from short wind wave to longer period waves is that the length of the bay ( $L$ ) is greater than its width ( $B$ ), which in turn is greater than the wavelength of wind waves.

### Slide 11-12

The results of the Helmholtz model describe well the CIH response to lake forcing, but grossly underestimates the oscillation amplitudes in BP. On the other hand the nonlinear model reproduces with good accuracy almost all the important peaks determined through spectral analysis.

### Conclusions

The nonlinear model has shown that Boat Passage allows for higher frequency wind waves to enter the bay that through energy transfer induce resonance of long-period waves, therefore dramatically increasing the amplitude of the superimposed resonant wave in BP.

- Long-period waves with periods ranging between 4 and 30 minutes have a greater influence on the hydrodynamics of coastal embayments of the Great Lakes than previously believed.

## John Haselmayer, Parks Canada BPNP/Fathom Five NP Short Overview of Resource Conservation at BPNP and FFNMP

**Team:** 2 ecologists year-round, 5 seasonal technicians, 1 GIS specialist, 1 Visitor Safety Coordinator

### Structure of Presentation:

Terrestrial Monitoring  
Aquatic Ecological Monitoring  
Active Management and Restoration  
Invasive Plant Control and SAR programs  
Research Needs

### Terrestrial Monitoring

Terrestrial Monitoring at PC: system-wide there is a suite of indicators to give a state of ecological integrity of park

We select our indicators, then within that we pick various measures (species, processes, etc.) that are good indicators of ecological integrity and monitor them annually:



Forest bird community by acoustic surveys

Eastern Red-backed Salamander Abundance

4 sites with 40 cover boards per site

4 visits per year

7 years of data

more salamanders than any other vertebrate in our forest = greatest biomass, too  
great indicator of ecological change

Black Bear population index using DNA mark-recapture method every 5 years

Essentially an island population, genetically isolated from other bears. They are smaller

Forest Fragmentation

Measured via remote sensing

Assessed using GIS

The upper Bruce Peninsula contains the largest continuous forest in southern Ontario  
(around 384 km square)

### **Aquatic Monitoring**

Colonial Waterbirds

Gulls, terns, herons, and cormorants nest colonially on several offshore islets

All nests of all species counted annually

Lake Huron Water Quality

relies on data from Environment Canada

13 permanent stations around FFNMP

surveys for nutrients and ions performed every other year

Coastal Wetland Monitoring

9 coastal wetland sites

Indices of wetland quality developed by Pat Chow-Fraser

We use three indices: wetland fish index, wetland macrophyte index, and the water  
quality index

Wetlands surveyed annually

6 years of data

### **Restoration**

Protecting and restoring the continuity of the forest

Reducing fragmentation by restoring disturbed landscapes

Trying to restore some of the representative forest types that are now underrepresented.

Lack of succession happening in these disturbed areas. Hay grasses form such a thick  
thatch that trees cannot regenerate

### **Research Needs**

Some high priority examples:

Social and ecological carrying capacity at key visitor nodes as our visitation continues to  
increase

Techniques for reforestation of former agricultural lands

Lake trout restoration

Brook trout restoration (coldwater stream habitat restoration)

Many others provided on hand-out – email John for details.

## Daryl Cowell, Daryl W. Cowell & Associates Bruce Peninsula Geopark at Cabot Head



Global Network of National Geoparks, supported by UNESCO, operates in close synergy with UNESCO'S World Heritage Centre, the Man and the Biosphere Reserves, national and international undertakings and non-governmental organizations active in geological heritage conservation.

The Global Geoparks Network is working to include all regions of the world. It serves to develop models of best practice and sets quality standards for programs that integrate the preservation of geological heritage with a strategy

for regional sustainable economic development. The establishment of a Geopark brings sustainability and economic benefit to the local populations, usually through the development of sustainable tourism and other economic and cultural activities.

Global Network of geoparks provides a platform of cooperation and exchange between experts and practitioners in geological heritage matters globally

UNESCO umbrella, but LOCAL jurisdictional control

Common values, interests, backgrounds following specific methodology and management at global level

Joint initiatives including publications, twinning, communication

Canada currently has 1 – it's a new idea to North America, one in NB in Canada

8 candidates in Canada

<http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/geoparks/some-questions-about-geoparks/where-are-the-global-geoparks/>

Goal is "...to integrate the preservation of significant examples of geological heritage within a strategy for regional sustainable socio-economic and cultural development while safeguarding the environment."

### **Objectives**

- ✓ Stimulate local sustainable economic activity;
- ✓ Link local culture to its geological heritage (fishing, forestry, mining, marine, First Nations);
- ✓ Stimulate local interest and enterprises;
- ✓ Communication of geoscience knowledge and environmental concepts (infrastructure);
- ✓ Not a national park or nature park but protection of geological heritage in accordance with local traditions and legislative obligations.

### **What Is A Geopark?**

- ✓ Scientifically important, or especially striking, scenic, or unusual geologic phenomena of National or Global significance;
- ✓ Important sites where particular geologic features, rock types, landforms or type specimens of fossils were first recognized and described (type sections);

- ✓ Outstanding examples of geologic features, structures, fossils, processes, and landforms; and/or
- ✓ Historical sites where cultural events were tied to an area's geologic features, such as those in the history of geology, mining, and geology in early exploration and settlement.

#### **Geopark Guidelines and Criteria**

- ✓ A geographical area representing the geological setting of the region rather than a single site/feature (NE; MB; NA Craton);
- ✓ Non-geological themes, especially cultural/historical, may be integral component;
- ✓ Accessible to public;
- ✓ Large enough to support local economic and cultural development;
- ✓ May comprise a number of sites...or a system of geological sites.

#### **Geopark Land Ownership**

- ✓ NOT a new form of land ownership;
- ✓ Multiple existing landowners linked through a common strategic management plan with established goals (NEP/NEPOSS);

#### **Geopark Management**

- ✓ Accessible to visitors, linked, formally protected with common strategic management plan
- ✓ Partnership amongst local communities;
- ✓ Clearly visible on the ground and through promotion;

Not violate goals or restrictions of Global Biosphere designation.

#### **Geopark Economic Development**

- ✓ Sustainable;
- ✓ Stimulate local economic activities and growth through geoscience;
- ✓ Stimulate and enhance tourism through geoscience;
- ✓ Link regional economics to area's specific geological heritage.

#### **Geopark Education and Science**

- ✓ Education and outreach activities (geoscience/ environment);
- ✓ Outreach supported by interpretive program with facilities;
- ✓ Support and promote local geoscience education;
- ✓ On-going research and investigation;
- ✓ Develop partnerships with academic communities.

#### **Geopark Protection and Conservation**

- ✓ Define intensity of use and economic development based on sensitivity;
- ✓ Develop best practices for conservation of area's geological heritage (features and processes);
- ✓ Also contribute to conservation of landscapes and ecology;
- ✓ Conservation and education tied to earth sciences (e.g., mining, caving).

#### **Geopark Management Authority**

- ✓ Ensure appropriate site protection;
- ✓ Undertake appropriate monitoring and maintenance;
- ✓ Develop specific regulations/rules within the relevant federal, provincial local legal framework.

#### **Geopark Management (other)**

- ✓ Public/private partnerships;
- ✓ Inter-jurisdictional partnerships (e.g., outside NEP);
- ✓ Protect the natural and local cultural character and traditions;
- ✓ Indigenous population involvement.

The Niagara Escarpment IS a Geologic Feature

This Geologic Feature HAS Cultural Values, and Creates Ecological Diversity

## **Elizabeth Thorn, Bruce Peninsula Bird Observatory Voice of the Birds on the Bruce**

Scientific organization, which monitors long-term trends in wild bird populations  
Starting our 14<sup>th</sup> year of operations  
BPBO operates the Cabot Head Research Station  
10 years of data!

CHRS ideally placed at tip of Bruce Peninsula  
Station at Wingfield Basin  
Captured birds are carefully and safely removed from the 15 mist nets at regular intervals  
Biometrics are taken and recorded for each bird before they are released

Very dedicated volunteers – migrating Red-Necked Grebes  
survey

Cabot Head/Dyers Bay is an Important Bird Area because of the ring-necked grebe migration through the area

Daily 1-hour census of birds in the area

Hawk and lake watches and causal observations also made each day

Detected and estimated totals calculated daily to create a more complete picture

BPBO entering the final year of a 3-year HSP-funded project studying SAO on the upper Bruce

Gathered baseline data on 7 populations of target species

All 154 survey data points for the SAR study

Field data was gathered in June and July of both 2012 & 2013

Established the abundance of target species and identified threats to local species

BPBO moves into the future of migration monitoring with cutting edge radio telemetry technology

Fall 2012 collaborative project with Western U

Provides better idea of birds' actual migration path



## **Sean Liipere, Bruce Peninsula Biosphere Association**

### **Introduction**

Love the Bruce!

95% of global lakeside daisies are here and on Manitoulin

Recognized by UNESCO, international Designation

Our livelihoods, wellbeing, and a way of life intimately connected to the health of our community

### **Mandate**

- Conservation
- Sustainable economic development
- Community capacity building



## **Strategic Directions**

1. Improve Capacity for Planning
2. Build a culture of sustainability
3. Conserve Biodiversity and Natural Capital
4. Promote Sustainable Economic Development
5. Maintain Organizational Excellence.

## **Conservation and Stewardship Plan**

- Action plan and guiding framework for our community to create a common vision, place-based action, non-regulatory document
- Process guided by a 23 person Steering Committee: Property Owners Associations; Not-for-Profit Organizations; Federal, Provincial, and Municipal governments; and First Nations and Métis.
- Coordinated approach to conservation and stewardship
- Bring resources together to use most effectively
- Extensive community consultation with over 700 people participating
- Extensive research focused on gathering and using existing knowledge

Steps in planning process:

1. Identified important biodiversity features, including:
  - Forests
  - Alvars
  - Open Lands
  - Inland Waters
  - Great Lakes Shoreline Complexes
  - Coastal Wetlands
  - Nearshore Waters
2. Conducted viability assessment using a range of indicators to assess current health of biodiversity features
3. Ranked potential stressors based on scope, severity, and irreversibility
4. Identified 176 recommended actions and prioritized actions over 3-5 years organized by themes:
  - Land and water management
  - Species management
  - Education and enjoyment
  - Science
  - Land Use Planning and Policy
  - Protection

Different actions to be led by different groups

Next Steps:

- Now finalizing plan
- Shift Steering committee to Conservation and Stewardship Network to oversee Plan implementation
- Develop implementation strategies

- Produce public-friendly summary document
- Create knowledge repository of Bruce Peninsula specific information and resources

### **Six Streams Restoration Project**

- To maintain and restore the health of six rivers on Bruce Peninsula, including: Stokes River, Old Woman's River, Swan Lake Drain, Judges Creek, Black Creek, Unnamed Creek (Little Pike Bay)
- Restoration of the six streams is a five year, multi-pronged initiative addressing water pollution from:
  - cattle access in streams
  - field run-off
  - septic contamination from permanent and seasonal residences
- **Project components:**
  1. Water Quality and Benthic Sampling:
    - Six adults and eight students participated in CABIN Training (10 certified as water quality data collection technicians with 20 hour on-line course and 2-day field exam)
    - Water samples taken from April-October
  2. Agricultural Drainage Control:
    - Supporting farmers to provide better control of field run-off using tile drain control structures
    - Two interested farmers for spring 2014
  3. Cattle Exclusion Projects:
    - Supporting farmers to provide alternative watering systems for livestock to reduce access to streams, including solar pumps, water troughs, and fencing
    - 12 installed on farms located on Stokes River which have already reduced phosphorus inputs by 165kg
    - Funding pending for 10 additional systems on Judges Creek
  4. Septic System Management:
    - Conducted landowner survey to understand local perspectives on septic system management
    - Will provide workshops and information sessions

### **Dark Sky Program**

- Building on past efforts of Bruce Peninsula Environment Group to preserve the natural night sky of the Bruce Peninsula
- Project components:
  1. Stewardship
    - Residential conversion incentive program (e.g. voluntary home inspections and rebates)
    - Local dark sky lighting catalogue
    - Developed and proposed to municipal council a dark sky lighting by-law

- Encouraged outdoor lighting conversions by municipalities and ferry terminal
2. Education
    - Bayside Astronomy Program includes star observation deck and interpretation by staff and local volunteers in Lion's Head
    - Piloted star gazing on Chi Cheemaun last season
  3. Sky Quality Monitoring Program
    - Initiated a sky quality monitoring program in 2010 to assess the quality of Bruce Peninsula's night sky
    - 11 sites throughout the Northern Bruce Peninsula monitored by group of volunteers

**Gaps, Restrictions, and Limitations**

Fish inventories - Great Lakes and inland lakes

New LiDAR (Light Detection and Ranging) imaging

Determining impact of variation in lake levels - Fisheries and Oceans is being petitioned to do this for Bruce Peninsula

Alvars - No standardized protocol to assess their condition

Limitations in sharing data (i.e., data sharing agreements, owning or using data layers, being able to share these between agencies)

ie. Habitat mapping, GIS, getting what other organizations have done, reduce red tape.

Tax-payers bought all of that data

Government organizations should

Standardized riparian planting and restoration protocol.

## **Brainstorming Session – Bridges and Barriers** **Feedback from Participants**



### **One: Communication Within the Scientific Community**

**How can collaboration be improved? How are you sharing your data and documents now? Are there barriers to sharing your data? Are you easily able to access the data of others when needed? If not, why? What could be done to improve this sharing? Is there a common sharepoint that you know of? If so, how do you access it and who is contributing? Other comments?**

Public presentations promote word of mouth and support  
More networking opportunities like this –common thread of network groups  
Face to face opportunities  
Open up communication lines/doors  
Using online tools like Google Docs, email lists (i.e., OREG – Ontario Road Ecology Group), drop box, Facebook pages

#### **Barriers:**

Having funding or organizational support to get foot in the door – sometimes there are restrictions to sharing data  
No central resource site, bookmark various organizations or start with Google Scholar  
Ideally would have one source to go to, req ongoing need, have to bridge disciplines.





**Two: Bridges and Barriers to Research on the Bruce Peninsula**  
**What barriers make your work on the Bruce a challenge? Are these barriers enough to hinder future work on the Bruce on your behalf? What solutions would you propose to bridge these challenges and make it easier for you to consider further work on the Bruce? Who would need to be involved? Other comments?**

Establish buffer zone (5 km?) around Bruce Peninsula National Park and corridors.

Target future research here

Education around best management practices for soil

Need paradigm shift towards ecological farming

Establish research station (university) on Bruce, comparable to WRC at Algonquin –

Central facility to coordinate/host research



### Three: Communication Outside of the Scientific Community

**How do you share your work with the public? How do scientists best tell their stories to engage the wider population? What could help you communicate your work to a wider audience? What challenges exist which make sharing your work difficult? Other comments?**

Advertise, Advertise, Advertise

Public Education Programs

Project-Based Initiatives that speak to specific crowds

(i.e., farmers) – funding attracts people

Story-telling/narrative – change the lingo

Address different learning styles

- use different modalities to communicate
- now your audience

Social media –apps

Community mapping

Science/student partnership –students become experts in a report/research project and present to:

Footprints Conference

Bruce Peninsula Environment Group

Bruce Peninsula Biosphere Association (Cont'd...)

Bruce Peninsula Bird Observatory

OFA (? Not familiar with this acronym)

Chamber of Commerce

Rankin Resource Group

Any of the other groups represented here today



### Four: Gaps and Overlaps

**What gaps in scientific research on the Bruce Peninsula do you see? What's missing? Do you see any overlap in the research that is being done? How can these gaps/overlaps be overcome? Comment on the science being done, policy supports or restrictions, etc.. Other comments?**

Gaps:

Cold and warm weather stream determination

ELC for different communities on Bruce Peninsula (species at risk)

Nearshore (streams, lakes)

Fisheries (inland, Great LakeS)

Shoreline LIDAR

Alvar monitoring & Assessment Protocols

Standardize riparian planting success protocol

Also see list circulated by John Haselmayer of Parks

Canada

Limitations:

Data sharing restrictions (Mapping – outdated data

[LIDAR], limitations to owning/using data layers)

Water quality monitoring at beaches

Solutions to Limitations:

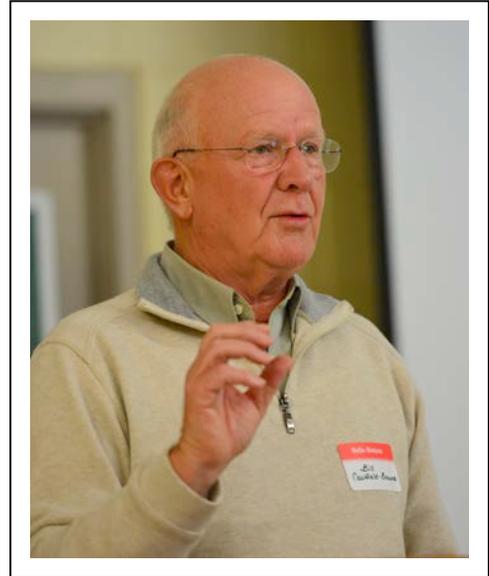
Make data on-line that can be shared



## Five: Opportunities for Citizen Science

**What opportunities do you see for student involvement in the research or work being done by citizen groups on the Bruce? Are there opportunities for volunteerism in science? Anything specific to your project(s)? Do you see opportunities for “voluntourism” on the Bruce related to what you saw/heard presented here today? Who do you think is best positioned to address these opportunities? Other comments?**

Data management and mapping  
Need trained volunteers to ensure quality, trained professionals  
Training course for data entry  
Week-long training course for standardized protocols here on the Bruce – tree planting, monitoring  
Pollinators  
Dark Sky Monitoring  
Benthics  
Coast Watchers  
Loon Survey – bird studies  
Marsh Monitoring  
Reptile and Amphibian Atlas App: E-Bird  
North American Butterfly Count  
Forest (1 ha) plot monitoring  
    10 % planting success of community plantings  
    help groups, agencies  
Bruce Peninsula National Park tree planting  
MNR stewardship rangers  
EDD Maps  
Feeder-watch  
Christmas Bird Count



Thank-you for making this first inaugural Bruce Talks event a success!

The Sources of Knowledge Forum Committee will take your comments back for further consideration of next steps!

If further thoughts come to mind, please email [deborah\\_diebel@bwdsb.on.ca](mailto:deborah_diebel@bwdsb.on.ca)

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