2017 CASIOPA AGM Abstracts

This file contains all of the abstracts sent to Steve Murphy via email. They are organized by surname of the presenting (normally, 1st) author listed. They have been formatted for a consistent font size and type but otherwise the authors' original formatting has been left intact (hence, any anomalies arise from there). We will update this file with any further abstracts (e.g. from the Keynote speakers) if we receive them.

The Saving Turtles at Risk Today project in Muskoka, Ontario.

Kelsey E. Bedard[1] and Jeff Hathaway[1]

[1]Scales Nature Park, Oro-Medonte L3V8H9 startturtleproject@gmail.com

Muskoka has some of the best remaining habitat for Blanding's and spotted turtles in Ontario, much of it within parks and protected areas. Since 2013, the Saving Turtles at Risk Today project has aimed to protect remaining habitat, mitigate threats, and answer research questions relevant to turtle conservation in the region. Field technicians have surveyed for turtles, and other species at risk reptiles, in wetlands, water bodies and along roads each year between April and September. Over the course of the project, over 3400 observations of species at risk have been reported, including incidental observations of snakes and lizards and targeted search effort for turtles. Captured turtles are weighed, measured, notched with a unique id and photographed. Claw tips were sampled for chronic stress hormone analysis across a gradient of human influence. Selected Blanding's and spotted turtles have been radio tracked to determine habitat use and nesting, aestivation and overwintering sites to further inform conservation efforts. Blood samples for future DNA analysis were also collected from these two species. Road surveys have been completed nightly throughout the nesting seasons to identify nesting sites. Previously, nests were monitored for predation. Since 2016, nests laid along roadsides and other precarious locations have been extracted and captively hatched for release at the future Georgian Bay Turtle Hospital. This year, the project is incubating over 8000 eggs, of 5 species. Road mortality hotspots have been identified and local municipalities are supportive of mitigation measures. Public response to the project has been overwhelmingly positive. Outreach programs are used as a community engagement tool, facilitating additional observations and helping to recruit community volunteers. The project also has a turtle hotline, 705-955-4284, for public submissions of rare, nesting, injured or dead turtles. This number has gained considerable traction, resulting in over 300 calls this year.

Author:

Chow-Fraser, P. (McMaster University), Markle, C.E. (McMaster University) and Weller, J.D. (McMaster University)

Title:

No Net Loss Policy for Ontario's wetlands: So why are we going down this rabbit hole?

Abstract:

The recent Wetland Conservation Strategy (2017-2030) is boldly moving us backwards to a "no net loss" (NNL) policy for Ontario's wetlands, one that is similar in tone to President George Bush's directive in 1989 to achieve NNL of wetlands in the U.S under the Clean Water Act. Within Canada, the habitat provisions of the Fisheries Act introduced the concept of compensatory habitat in 1986 to offset habitat that is altered or destroyed by human activities. Both legislations effectively allow developers to pay to destroy wetland or fish habitat, paying fees that are used to restore or create wetlands or fish habitat elsewhere. The literature has overwhelmingly concluded that NNL policy does not result in no net loss of wetland function, even if wetland area remains stable. Even though the strategy provides protection for Provincially Signifcant Wetlands (PSWs), the thousands of small coastal marshes and vernal pools in eastern and northern Georgian Bay would become vulnerable to development under such a NNL policy; this is because only a minority of the coastal wetlands in Georgian Bay has been evaluated due to unavailable funds. Yet, they provide essential habitat for ecologically and economically important fish such as muskellunge and pike, and at-risk freshwater turtles like the Blanding's turtle. Given these animals are long-lived and exhibit high site fidelity, creation of larger wetlands that are geographically incongruent with their original habitat is essentially useless. "Creation of effective offsets" is an oxymoron that has no place in biodiversity conservation.

Contact Information:

chowfras@mcmaster.ca, (905)-525-9140 ext.27338

Authors:

Rebekah Church (Environmental Commissioner of Ontario)
Christopher Wilkinson (Environmental Commissioner of Ontario)

Title:

The Missing 68,000 km^2 – Ontario's Protected Areas Shortfall

Abstract:

Ontario does not have enough protected areas. Almost all countries in the world, including Canada, have committed to protect 17% of lands and inland waters by 2020 to combat the global loss of biodiversity. In Ontario, protected areas currently cover only 10.7% of the province. Despite having the lead responsibility for protected areas in the province, Ontario's Ministry of Natural Resources and Forestry does not have a plan for expanding the protected areas system to meet the 2020 international goal. The Ministry of Natural Resources and Forestry must undertake a frank assessment of the current status of the protected areas system, identify key opportunities for expansion, and make a clear public commitment to achieving, and eventually exceeding, the 17% conservation target.

Contact Information:

rebekah.church@eco.on.ca
416-325-9279

Authors:

Cray HA (University of Waterloo) and Murphy SD (University of Waterloo)

Title:

Invasive earthworms and tallgrass prairie: an investigation of the earthworm community in restored and remnant tallgrass prairie across Southern Ontario

Abstract:

Since only 1-3% of tallgrass prairie habitat remains in North America, dedicated citizens, scientists, and government officials are working to restore and protect prairie in Southern Ontario. The vast majority of these restorations are done either by hand-broadcasting or drilling-in seeds on ex-agricultural lands. With respect to tallgrass prairie, this represents a novel interaction between earthworms and the tallgrass ecosystem, as tallgrass prairie was at its historical maximum post-glaciation when earthworms were effectively absent from southern Ontario soils. While there is increasing evidence that invasive earthworms are important ecosystem engineers, surprisingly little is known about their effect on invaded habitat. For example, we are missing key information about their presence/absence, community structure, and population density. Given their role as granivores and their habit of burying seeds, it is the objective of this study to quantify invasive earthworm communities in 22 restored and remnant tallgrass prairie sites across southern Ontario.

To represent the variation of tallgrass prairies in southern Ontario, the sites selected for this study include 5 remnants, 2 restored-remnants, and 15 restored sites of various ages. Management history among the sites also varies, as does time since restoration, adjacent land use, soil (texture, pH, organic matter, moisture content) and parcel size (0.3 ha to 36 ha). In October 2015 and 2016, ten 20 cm x 20 cm plots per site were sampled using a standard mustard extraction method, soil samples were collected, and the density and size of earthworm middens were recorded. Voucher specimens were collected for adult earthworms which could not be identified on site.

The key finding of this study is that invasive earthworms were found in all remnant and restored tallgrass prairie sites across southern Ontario. By characterizing the earthworm community of restored and remnant tallgrass prairie sites, this research sheds light on these key soil fauna and can become a jumping off point for investigating the ecosystem interactions between our restored ecosystem at risk and our new underground residents.

Contact Information:

hcray@uwaterloo.ca 519.501.2024

Authors:
Rebecca Croke (Ryerson University), Lesley G. Campbell (Ryerson University), Stephanie Melles (Ryerson University), Tyler Smith (Agriculture and Agri-Foods Canada), Eric de Noronha Vaz (Ryerson University), Rebecca J. Parker (Ryerson University), Kevin S. Burgess (Columbus State University)

Title:
Remote method of detecting rare plant populations using pollen and spore eDNA

Abstract:

We present an innovative search technique for sampling, identifying, and locating rare plant populations that release pollen or spores, without extensive ground surveys. Lack of knowledge of the distribution of plant species is a frequently cited gap in recovery planning. We are developing methods that address two factors that contribute to this uncertainty: confident identification of species; and detection and location of populations. Our long term goal is to employ this method as a way to locate lost or previously unknown populations of rare plants by collecting pollen samples, identifying these samples using environmental DNA (eDNA) and using kriging to predict the likely locations of populations, focusing future search efforts.

To demonstrate the technique's utility, we applied the pollen sleuthing system to search for artificially constructed populations of *Brassica rapa* in an old field; population size varied from 0-100 labeled flowers. After characterizing local landscape characteristics, we trapped potential insect pollen vectors in pan traps randomly scattered across the field and washed particulate matter from their bodies to assess artificial pollen abundance. As a first test of our pollen sleuthing system, we used microscopy to assess pollen grain abundance. Population size greatly influenced detection success; our results suggested ground surveys would be best focused on areas of high pollen density with low variation in pollen density. Sampling sites most successfully detected pollen when they were located at higher elevations, and included showy flowering plants (vs. grass) within the local neighbourhood of the pollen trap. Detection of nascent populations using the proposed system is possible but accuracy will depend on local environmental factors (e.g., wind, elevation).

In the future, we will be employing this technique to investigate two at-risk species, *Betula lenta* and *Woodsia obtusa*. The biological and ecological differences between these two species will provide contrasting case studies with which to evaluate proposed methods and their applications for other plant species. We will also have a field-tested, passive-sampling technique for collecting eDNA as an alternative or supplementary approach for locating populations of at-risk species.

Contact Information:
E-mail: rcroke@ryerson.ca
Phone: 905 702 3147

Authors:
Czubat N (Credit Valley Conservation), Bakowski O (Credit Valley Conservation)

Title:
Seasonal variation of calibration factors for infra-red automated trail counter systems

Abstract:
Infra-red Automated Trail Counters are a tool that Credit Valley Conservation (CVC) uses to determine how many people visit CVC Conservation Areas. Specifically, Automated Trail Counters collect statistically valid data on the spatial and temporal distribution and patterns of visitor use. This information supports park management decisions regarding allocation of resources, trail planning, and environmental protection. Various physical and environmental factors can influence the accuracy of Automated Trail Counter data including trail width, counter orientation, and weather. As such, raw data needs to be calibrated to provide high quality, reliable and accurate measures of visitation. Calibration involves taking a data sample and comparing the recorded trail counts from Automated Trail Counters (predicted counts) with those confirmed visually from motion-activated cameras (actual counts). An Error Adjustment Factor is determined from this sample of trail users and then applied to data collected by the Automated Trail Counter in order to produce more realistic results.
CVC determined that calibration can be done on three different levels: (a) single-factor (annually), (b) warm/cold season (bi-annually), and (c) seasonally (quarterly). Much of the literature reviewed for this project suggested that calibration should ideally be done on a seasonal (quarterly) basis. However, no studies were found to have actually conducted bi-annually or quarterly calibration, perhaps due to the high staffing and equipment costs associated with this work. CVC has undertaken a semi-annual calibration approach across nine CVC Conservation Areas for the year 2017. Each Automated Trail Counter was calibrated using a sample size of one week. Semi-annual calibration yielded two Error Adjustment Factors: one applied to warmer month data (May – October); and a second applied to colder month data (November – April). Error Adjustment Factors vary by counter location, time of year, changes in visitor activity patterns and trail characteristics. To further the research, CVC is also undertaking a small-scale quarterly calibration study at two CVC Conservation Areas. Quarterly calibration will yield four Error Adjustment Factors applied to data collected in each season, which will be completed at the end of this year.

Contact Information:
nczubat@creditvalleyca.ca
(905) 670 1615 ext 519

Authors:
Davidson, P. (Friends of Nancy Island Historic Site and Wasaga Beach Park, Wasaga Beach Provincial Park).

Title:
The challenges of managing the Piping Plover Recovery Program at a Recreation Class Park

Abstract:
After being extirpated from Ontario for over 30 years, Piping Plovers once again nested in Wasaga Beach Provincial Park (WBPP) in 2008 and subsequently they are now in their 10th year at this location. Piping Plovers are an endangered shorebird, thereby protected under the federal Species at Risk Act and the provincial Endangered Species Act. Establishing their nesting site within 200 meters to one of the busiest beaches in the province, WBPP has been carefully managing the Piping Plover Recovery Program while also working directly with the public to balance the demands of operating a busy Recreation Class Park. WBPP is a unique situation given its proximity and interconnected relationship to the Town of Wasaga Beach–a small community which relies heavily upon the beach for a significant bulk of their revenue.
Challenges include:

- Maintaining ecological integrity of the beach in a heavily tourist/commercial area, including but not limited to:
    - no mechanical grooming in Piping Plover habitat for a period of 10 years
    - barricading a 500 meter stretch of beach from being used by visitors during prime beach season
- removing invasive species within critical Piping Plover habitat
- engaging public, community, and media in conservation efforts and education
- support of multiple departments (ie. maintenance, enforcement, revenue) to aid in the success of Piping Plover nesting
- coordination of volunteer support for monitoring of Piping Plovers and outreach to visitors

Despite all these issues, over 50 chicks have fledged from WBPP since the program commenced which has made significant contributions to the 75 breeding pairs in the Great Lakes population. What more, the Piping Plover chicks from Wasaga Beach are now establishing new nesting sites across the province (e.g.., Darlington Provincial Park, Presqu'ile Provincial Park, Limestone Nature Reserve and North Beach Provincial Park).

Contact Information:
Patricia Davidson, Piping Plover Coordinator
wasagaplover@gmail.com
705-351-0109

Authors:
Ian Fife (Piping Plover Biologist – Ontario Parks Southeast Zone)
Anne MacLachlan (Social Media Marketing Specialist, Ontario Parks)
Travis Cameron (Ecologist - Ontario Parks Southeast Zone)

Title:
Effectively engaging the public in conservation and monitoring volunteer programs through social media.

Abstract:
Social media can be an instrumental and effective resource for reaching out to engage and involve the general public in monitoring and conservation projects within protected areas. It can be a valuable tool to draw-in park visitors who want to learn about nature and environmental activities. We used popular social media outlets to initiate and promote a volunteer-based monitoring and conservation. Our posts were not only designed to educate but also get the public actively involved in conservation and monitoring projects.
I am involved with coordinating and implementing conservation efforts to protect endangered Piping Plover nests and chicks within parks in southern Ontario. As many of the beaches in our parks see high recreational activity and human induced disturbance, Piping Plovers that nest on these beaches are subjected to enhanced pressures and threats. For conservation purposes, nests and the chicks require continuous monitoring during peak beach recreational use periods. In addition to reaching out to all Ontario Parks followers on Twitter, Facebook and Instagram, we also geo-tagged and focused social media posts to people in geographic locations nearby to the nesting sites, allowing us to effectively reach over 31,000 people.
I received direct contact from 65 interested and potential volunteers of which 49 people actively participated in volunteering for Piping Plover monitoring resulting in a total of 357 volunteer hours over 32 days. Social media allowed us to engage a wide range of age groups and diversity of people to meet project goals. Availability of volunteer resources allowed us to collect information regarding Piping Plover behavior, specific habitat requirements, predator occurrences, recreational beach use and ecotourism. By involving the public as citizen scientists to collect information, they assisted in providing important information regarding human beach use to help manage recreational beach use with Piping Plover conservation. In addition, we were able to use social media posts as an education and awareness initiative for our conservation and monitoring project.

Contact Information:
Email: Ian.fife@ontario.ca
Phone: 705-755-1760

Authors:
Gilhespy, KE (Bruce Trail Conservancy), Diamond, AY (Bruce Trail Conservancy)

Title:
Engaging the public in biodiversity protection

Abstract:
With a steadily increasing Southern Ontario population, the resulting competition for space, rising real estate prices and all the pressures of a growing population, the protection of natural spaces is becoming more urgent and more difficult. The Province of Ontario has set a goal of 17 percent protected natural lands by 2020, and is committed to the protection of Species at Risk that need these natural spaces in which to thrive. Increasing the amount of protected natural land from the current 10.6 percent will be a monumental task. Traditional approaches to land conservation, through acquisition by government bodies, are helpful but ultimately insufficient given the financial constraints and immediate pressures on land. We need to think creatively, and turn the challenge that Southern Ontario's large population poses for natural spaces, into its greatest opportunity for conservation success.
The Bruce Trail Conservancy, while best known for its world-famous footpath, is leading the way in preservation and conservation of natural land on the Niagara Escarpment. Since the 1970s the Bruce Trail Conservancy has contributed to the preservation of over 11,000 acres of land on the Niagara Escarpment, protecting over 1,333 occurrences of 83 species that are At Risk or Provincially Rare.
The presentation will outline the Bruce Trail Conservancy's approach to land acquisition, the organization's successes to date, and the role that volunteer and public engagement plays in ensuring continued preservation and conservation of the Niagara Escarpment.

Contact Information
Antoin Diamond adiamond@brucetrail.org 800 665 4453 Ext. 235
Beth Gilhespy bgilhespy@brucetrail.org 800-665 4453 Ext. 223

Authors
Dr. Micah J. Hewer (University of Toronto)
Dr. William A. Gough (University of Toronto)

Title
Using a Multi-year Temporal Climate Analogue Approach to Assess the Impacts of Projected Climate Change on Park Visitation in Ontario (Canada)

Abstract
Due to the perceived weather sensitivity of park visitation in Ontario, several assessments have been made over the years concerning the impact of climate change. However, these assessments have all been based on conventional modelling approaches. The current study uses a multi-year temporal climate analogue approach to reassess the impact of climate change on visitation to Pinery Provincial Park in southwestern Ontario. The assessment is guided by two developing methodological instruments, namely the use of a new metric referred to as "Climatic Distance" for selecting a representative weather station, as well as a "Selective Ensemble" of Global Climate Model outputs to produce seasonal climate change projections. The effect of non-climatic socio-economic variables such as local gasoline prices and the Canadian/U.S. currency exchange rate were also explored to identify and control for potentially confounding variables within the analysis. Consideration was also given to major events such as the North American Terror Attacks on September 11, 2001 as well as the Global Financial Crisis in 2008 and the Canadian/American Economic Recession in 2009. There were no statistically significant relationships (at the 95% confidence level) between seasonal climatic anomalies and park visitation in Ontario during the winter or spring seasons. There was a weak statistical relationship between anomalously warm summer seasons and park visitation, when compared to summer seasons with climatically normal temperatures; however, the presence of non-climatic variables may have confounded these results producing a false positive. Autumn season park visitation was most sensitive to climatic anomalies, with the warmest temperatures (+2.4°C) causing visitation to rise by 37%, while the wettest conditions caused visitation to decline by 11% and the driest conditions resulting in a 24% increase. The seasonal temperature anomalies (+1.9 to +3.0 °C) represented temporal climate analogues for projected climate change during the beginning and middle of the 21st century, causing the results of this study to call into question the near-future impacts reported in all previous assessments, as they relate to park visitation, apart from during the autumn season.

Authors: Garrett Hutson, PhD, Department of Recreation and Leisure Studies, Brock University.

Title: Ontario rock climbing management: Partnerships and strategies that work

Abstract: Southern Ontario contains one of the fastest growing rock climber populations in the world. As the popularity of climbing continues to grow, both climbers and protected area managers are faced with the ongoing challenge of how to best support outdoor recreation while protecting the natural environments where climbing activities take place. The purpose of this presentation will be to highlight sustainability initiatives in southern Ontario rock climbing over the last 9 years developed between members of the Ontario Climbing Access Coalition (OAC) and a variety of protected area personnel. The OAC is a volunteer, not-for-profit group that works with the climbing community, land owners, conservation authorities and property managers to keep climbing and bouldering areas open in an environmentally responsible manner. This presentation will be informed by both experiential and empirical evidence related to climber behaviours, environmental impacts, and cliff-face ecology. Insights will be shared about collaborative approaches that have resulted in the successful management of climbing at areas such as the Niagara Glen Nature Reserve, Halfway Log Dump, Kolapore Uplands (the Swamp), and Old Baldy in southern Ontario (among others). Lessons learned will be presented with a view toward future management planning. A fieldtrip to local climbing ar eas may complement this presentation.

Contact Information: ghutson@brocku.ca; 905-688-5550 x4784

Using Broadscale Monitoring data to evaluate fisheries conservation success in provincial parks and conservation areas

Lennox, PA (Science and Research NE)

Ontario's Broadscale Monitoring (BsM) Program, since its implementation in 2008, has produced one of the most comprehensive, accessible, and extensive lake fisheries databases in the country. Unfortunately, despite its open availability to all branches of the Ontario Government, academia and the public, this data is amazingly underutilized. Here, we demonstrate how this database can be used to inform government initiatives adjacent to those of Science and Research Branch; providing a means to evaluate the achievement of fisheries conservation objectives in provincial parks and conservation areas (PP-CAs). The legislature governing these conservation objectives is the Provincial Parks and Conservation Reserves Act, 2006. Upon reviewing the PPCRA, and defining its guiding principle of "maintaining ecological integrity", a suite of indicators were identified which could be used to evaluate the achievement of the act's objectives as they apply to fisheries conservation in PP-CAs; fish abundance, fish diversity, fish growth, and a fourth which describes how these indicators are changing through time (trend). Using BsM data, we compared these indicators among lakes which exist within the boundaries of PP-CAs and those not. Moreover, because of the influence of fisheries management zone (FMZ) initiatives on PP-CA fisheries management, we performed these analyses at both the FMZ and provincial level. Finally, we examined stressors measured by BsM, such as angling pressure, water quality, and habitat quality in an effort to provide reasoning for observed differences among test groups. In total, the dataset includes 1293 lakes, 407 PP-CA, 886 non PP-CA. Provincially, fish abundance was lower in PP-CA lakes, true for all FMZs but 8 and 17. Species Richness, in contrast, was greater in PP-CA lakes provincially and in all FMZs but 15. There were no notable differences in growth among any sport fishes for which sufficient data was available. With regards to stressors, daily angling pressure was twice as great in PP-CA lakes compared to non PP-CA lakes, offering a possible explanation for observed differences in fish abundance. Though analyses presented here are simple in nature, we hope they open a channel for future, more in depth, collaborative research endeavours.

Email: preston.lennox@ontario.ca
Ph.: (705) 235-1214

Authors:
Nick Luymes (McMaster University) and Pat Chow-Fraser (McMaster University)

Title:
Strategies for mapping vernal pool habitat in Ontario: Building off best available data and techniques to map a cryptic habitat

Abstract:
The identification and classification of critical habitat in Ontario is integral to conservation planning. Habitat mapping strategies can aid in the identification of land that should be given conservation priority. When habitat patches are small and cryptic but the area of interest is large, mapping strategies need to be optimized for time and effort in addition to accuracy. In Ontario, some of the most widespread and under-studied habitat for species at risk are vernal pools. Vernal pools are temporary forested wetlands that fill in with water in the spring and dry up in the summer or in drought years. They are used by several at-risk species of reptiles (e.g. Blandings turtle, spotted turtle) and amphibians (e.g. Jefferson salamander) for breeding, feeding, mating and overwintering/hibernating, and contribute to overland habitat corridors. Vernal pools are difficult to map due to their small size and concealed location under the forest canopy. For this project, we plan to make use of different remotely sensed datasets to classify vernal pool habitat in Ontario including leaf-off SWOOP and SCOOP orthophotography and synthetic aperture RADAR (e.g. RADARSAT, Sentinel, PALSAR). We plan to use a combination of mapping techniques from successful mapping projects to classify potential vernal pool habitat in southern and central Ontario. Not only will maps of habitat be useful for informing management strategies and delineating areas to protect, but they can also be used to forecast how this habitat type might change under different stressors such as forest fragmentation and climate change.

Contact Information:
luymesnw@mcmaster.ca 705-715-2057

Marcaccio, J.V. and Chow-Fraser, P. (McMaster University).

To Drone or Not To Drone: What you should know before you invest

Use of unmanned aerial vehicles (UAVs), or drones, in ecology and conservation has exploded in recent years. Their benefits are clear: they can provide researchers and agencies with quick updates of base maps, seasonally-relevant imagery for habitat mapping, and a means to track changes in distribution of flora and fauna in inaccessible terrain that would otherwise require costly field campaigns. Given the right circumstances, UAVs can be an indispensible tool to scientists and managers, especially for managing protected areas that require regular surveillance. Using a drone effectively, however, requires knowledge beyond just operating the camera or launching and landing the UAV safely. First, operators must be familiar with federal rules and regulations designed to keep airspace and people (both operators and any by-stander) safe. Secondly, agencies must have geomatics support to work with and manipulate the large amount of image data. In 2014, we developed a workflow involving both multi-rotor and fixed-wing machines over wetland environments. Based on own experience in Great Lakes wetlands, we will discuss how we decide on the features to purchase in our UAVs, how we develop and implement flight plans, assess data needs to decide on the better platform (rotor or fixed-wing) to use in a case-by-case basis, and last but not least, how to post-process the raw images. The legal process must also be considered, including permissions from land owners, flight training, airspace, and insurance. Individual photos and videos can provide good reconnaissance, but true basemaps (in both colour and multi-spectral versions) are an achievable end goal with additional processing. Flying over wet environments like Big Creek NWA or smaller Georgian Bay wetlands can be challenging, but the rewards are innumerable and well worth the effort.

James V Marcaccio
Life Sciences Building, Room 206
1280 Main Street West
Hamilton, ON
L8S 4K1
905 525 9140 x27461
marcacjv@mcmaster.ca

Authors:

Markle CE (McMaster University), Waddington JM (McMaster University), Chow-Fraser P (McMaster University).

Title:

Mapping suitable habitat for at-risk turtles: Using integrative approaches to identify areas for protection.

Abstract:

Mapping suitable habitat for a species at risk is one of the first steps in conservation planning. Creating habitat suitability maps can be very challenging when the area of interest is large and remote, where field excursions can be difficult to implement or high-resolution spatial data are difficult to obtain. Such is the case for Blanding's turtles, an at-risk species, that live on the Georgian Bay archipelago. With increasing anthropogenic pressures, maps indicating suitable habitat can aid management decisions and prioritize areas for protection. We apply an interdisciplinary approach using traditional field data and generalized linear models to produce high resolution, regional maps which identify suitable habitat for Blanding's turtles throughout the archipelago. We assessed the accuracy of our models using an independent survey dataset of 16 island sites distributed throughout the archipelago, and evaluated models using a reference island as a threshold for determining suitability of survey sites. Islands with higher proportions of wetlands and vernal pools were generally considered to be suitable for Blanding's turtles compared to those with lower proportions. Based on our final model, approximately 64% of evaluated islands support habitat for Blanding's turtles. Since our findings highlight the importance of both permanent and temporary wet habitats for Blanding's turtles, our next steps focus on using LiDAR data to map fine scale aquatic connectivity on the inland Georgian Bay landscape. Our new model aims to link the hydrology of the landscape with turtle movements and habitat use patterns to enable more accurate predictive mapping of resilient conservation areas. This study is the first to produce detailed habitat suitability maps for Blanding's turtles on the Georgian Bay archipelago, and our integrative approach can be applied to create habitat suitability maps and identify priority conservation areas for other species and regions.

Contact Information:

marklece@mcmaster.ca, (905)-525-9140 ext.27461

Authors:
McTavish MJ (University of Waterloo), and Murphy SD (University of Waterloo)

Title:
Ecosystem engineer invasion: Exotic earthworms introduce ecological novelty and require novel management and restoration approaches

Abstract:
One of the most widespread introductions of ecological novelty in eastern North America has been the invasion of exotic earthworms. Without practical prevention or control options, we require a better understanding of how these ecosystem engineers interact with the management of protected areas that have been invaded. We provide an overview of key findings from three projects using laboratory mesocosms and field plots to explore the interaction of exotic earthworms with three amendments commonly used in the management and restoration of protected areas: (a) seed; (b) mulch; and (c) wood ash.

As organisms that impact both the below- and aboveground components of the soil profile, earthworms were found to have notable interactions with all three amendments. For seeds, key results included observation of strong earthworm preferences for different types of commercial seed mixes (e.g. seed with a water-absorbing coating) which corresponded to reduced performance of those preferred seed mixes in the presence of earthworms. For mulch, observation studies of an abandoned corn field illustrated the ability of earthworms to aggregate large amounts of surface woody debris into a small fraction of the total soil surface area. Mesocosm studies indicated that this burial and collection of organic residues occurs rapidly following application but can be partially mitigated by increasing mulch application quantity. For wood ash, earthworms were found to tolerate most types of ash and were actually helpful in facilitating the desired incorporation of surface-applied wood ash belowground by burying ash-covered litter and burrowing.

As ecosystem engineering earthworms become increasingly common, their interactions with management and restoration techniques require ongoing evaluation and consideration. Our experiments describe both detrimental impacts to be mitigated and beneficial effects to be optimized when restoring earthworm-invaded protected areas. In both cases, our work illustrates how exotic species-driven ecological interactions can influence anthropogenic land management and the importance of considering novel management options when working under novel ecological conditions.

Contact Information:
mmctavis@uwaterloo.ca
(226) 750-9277

Authors:

Jeff Monague, Beausoleil First Nation, Manager, Springwater Provincial Park
Scott Thomas, Park Superintendent, Bass Lake, Mara, McRae Pt, and Springwater Provincial Parks

Title:
Wiidookdaadiwin – Working Together

Abstract:
"Ontario and Beausoleil First Nation have embarked on a journey based on mutual respect and the principles of recognition and reconciliation" and have agreed to work together in an exciting co-management partnership operating and managing Springwater Provincial Park.

This is much more than a "collaborative approach to management". The current positivity grew out of the ashes of a troubled situation, and will continue to grow, as long as it is nurtured.
Our joint presentation, with diverse perspectives will discuss the relationship environment at all stages of its path with a focus on the possibilities of the future. There is also a focus on prevention and how to be aware of the opportunities that exist in situations of adversity.

Contact Information:
Scott Thomas – scott.thomas@ontario.ca 705.326.7054 x223

Authors:
Moores KD (Grand River Conservation Authority), Allen C (GRCA), Messier R (GRCA)

Title:

Mill Creek Stewardship Rangers: A model for community led stream restoration

Abstract:

Summer 2017 was the 15th anniversary of the Mill Creek Stewardship Ranger program, demonstrating the sustainability of this community led model of habitat management. Over these 15 years, areas throughout the watershed of cold water creek have been restored, and over 60 students have been given a jump start to their careers in conservation science. Funds are raised by a committed group of stakeholders to employ a team of four high school graduates and a crew leader. The crew develops a strong working knowledge of fluvial geomorphology and stream restoration techniques. They improve the health of the system at properties as requested by land owners. Enrichment opportunities for the crew include an introduction to the industries that influence the creek environment and about the career opportunities in these fields. The community model used by the Friends of Mill Creek working group brings together government organizations, local land owners, industry, and the research community. It is an opportunity for collaboration and understanding among stakeholders with different, and possibly opposing interests and connects them with the environment in their own backyard.

Protected areas are essential for providing core habitat areas, but research continues to demonstrate the importance habitat connectivity beyond designated protected areas in developing a landscape resilient to the impacts of industry and a changing climate. The model of the Mill Creek Stewardship Ranger program can be an excellent tool for making connections within a community and building support and opportunity for improved habitat and ecological health. The Mill Creek Stewardship Ranger model can be adapted and tailored to other communities and ecological systems taking into account the unique set of influences, stakeholders, and ecological needs.

Contact Information:

Kelly Moores
Email kmoores@grandriver.ca
Phone: 226-988-9444

Authors:

Morris ER (Ontario Parks-NE), Enneson JJ (MNRF-Sudbury), Rogge RA (Ontario Parks-NE).

Title:

Modelling Functional Connectivity Within Protected Area Complexes Using Umbrella Species and Circuitscape.

Abstract:

Maintaining the connectivity function within and between natural areas facilitates the dispersal of organisms, contributing to genetic diversity, and even recolonization of habitat patches following local extinction events. In a changing climate it is vital that organisms are able to disperse into local refugia, or range shift with changing climate envelopes. In this exercise, we sought to identify functional corridors for dispersal in the Killarney Provincial Park complex using Circuitscape. Circuitscape is connectivity analysis software that models organism dispersal or gene flow across complex landscapes based on electronic circuit theory. Natural and modified habitat patches can be assigned a resistance (or cost) to movement. We selected four umbrella species that specialize in different habitats, yet are also known to be sensitive to human activity: Spotted Salamander, Smooth Greensnake, Blanding's Turtle, and North American Porcupine. We constructed habitat/cost matrices for each species based on published literature on their movement–behaviour, energetic cost, and mortality risk associated with different habitat patches. Using ArcMap, we then constructed a cost-surface model for each species. We used Circuitscape to generate omnidirectional current density models. Each species model output was standardized, and then the average of all four models was calculated. Our analysis showed that, even in a large intact park complex, some areas function as movement corridors while others are relatively isolated. Corridors within the park may be given consideration in planning and management decisions. Corridors which cross the park boundary may be given consideration during landscape scale planning. In combination, connectivity models and microclimate models have the potential to provide a powerful tool for developing connectivity strategies in both protected areas and the broader landscape.

Contact Information:

edward.morris@ontario.ca

(705) 564-3162

Authors:

Parker, S. (Parks Canada); Nelson, E. (Parks Canada); and, Thomas, J. (Parks Canada)

Title:

A place for “natural solutions”: Parks Canada’s response to climate change.

Abstract:

As a lead protected area authority, and the largest federal land owner and third largest federal asset manager in the country, Parks Canada response to climate change is a matter of importance. The experience and impacts to Parks Canada’s sites are diverse and representative of the many climate change challenges facing the nation. This presentation will explore how Parks Canada has come to understand and respond to climate change across its network of national parks, national marine conservation areas, and national historic sites.

Canada’s network of protected areas provides a **natural solution** for climate change by conserving biodiversity, protecting ecosystem services, connecting landscapes, capturing and storing carbon, building knowledge and understanding, and inspiring people. To provide some content and context for Parks Canada’s response, observed and projected climate trends and impacts were compiled for each site and presented along with possible natural solutions in a regionally-based “Let’s Talk about Climate Change” series. Vulnerability assessments have been undertaken in several national parks, and a national assessment is underway. Work on a system-wide carbon atlas to better understand carbon stocks and fluxes has been initiated. In general, climate change is emerging as a mainstream theme for Parks Canada, as is demonstrated in a recent asset management and planning process and the Agency’s commitments to national collaborations, initiatives and frameworks, including the Adaptation Platform, Canadian Parks Council Climate Change Working Group and the Pan-Canadian Framework.

Contact Information:

Scott Parker
Office of the Chief Ecosystem Scientist, Parks Canada
e. scott.parker@pc.gc.ca

t. 519-377-4040

Author:
Potter, K (Orland Conservation)
Collaboratively with
Lobley, N (NEPOSS Chair) and Cooper, S (MNRF)

Title:
Prioritizing Future Land Securement for the Niagara Escarpment Parks and Open Space System

Abstract: (Protected Area System Design Theme)
The Niagara Escarpment Parks and Open Space System (NEPOSS) consists of more than 163 parks and open spaces on public land owned and/or managed by conservation authorities, municipalities, Ontario Parks, Royal Botanical Gardens, the Bruce Trail Conservancy, Ontario Heritage Trust, Parks Canada and other conservation organizations capable of managing land in the public interest.
NEPOSS strives to protect the Escarpment's significant natural and cultural heritage resources while providing opportunities for compatible recreation and development.
One of the many objectives of NEPOSS as stated in Part 3 of the Niagara Escarpment Plan is to complete a public system of major parks and open spaces through land acquisition and Master/Management Planning. To acquire land, they must first know what is currently there (Phase 1 of this project) and then where to focus limited land acquisition money for future acquisition (Phase 2). Incorporating the objectives from Part 3 as well as partner objectives, the mapping prioritizing project has created landscape-wide priority areas and targets for future land acquisition.
This prioritization project is interesting because

- It prioritizes a large landscape feature into manageable areas for best use of limited resources
- It will provide a financial forecast for acquiring the high priority lands
- It has a way to check the results of the GIS analysis with the field experience of the partner organizations.
- It has gone through several iterations of the analysis to ensure focused objectives that relate back to Part 3 objectives and include partner buy-in

The major outcomes from this project (results expected in August) include X number of high and medium priority properties for acquisition; X number of priority areas by theme as well as overall priority level across the NEP; X number of dollars needed to secure the high priority properties.

Contact:
Kate Potter, kate.potter@orlandconservation.ca , 905.926.2431

Authors:

Rupasinghe PA (McMaster University), Markle CE (McMaster University), Marcaccio JV (McMaster University) Chow-Fraser P (McMaster University).

Title:

Determination of treatment effectiveness of *Phragmites autralis* at Rondeau Bay Provincial Park, ON

Abstract:

A multi-year program involving various control strategies (burning, rolling, cutting and herbicide applications) has been implemented in Rondeau Bay Provincial Park (RBPP) to control and reduce the spread of the aggressive invasive *Phragmites australis* since 2010. Besides ground assessments at the site level to determine short-term effectiveness, no large-scale assessment has been carried out to assess the longer-term changes in distribution of invasive *Phragmites* within RBPP. Here, we use freely available multispectral satellite data from Landsat 7 and Landsat 8 to assess the response of the RBPP vegetation community to the treatment program between 2010 and 2015. We used the Support Vector Machines classification method in ENVI 5.4 software to classify Landsat images acquired in July 2010 and 2015. We chose July based on results of a parallel study that showed satellite images acquired during July and August corresponded with the highest accuracy for *Phragmites* in the automated classification. Manually digitized orthophotos from the Southwestern Orthophotography Project as well as field data obtained during 2011 and 2012 were used as ground truth data for accuracy assessment. Change detection statistics indicated an overall reduction in areal cover of *Phragmites* of 62% between time periods; approximately 2.0 km^2 of *Phragmites* stands in 2010 had been replaced by *Typha*, mixed forest, open beach, water and swamp by 2015. Unfortunately, approximately 0.30 km^2 of new *Phragmites* patches had also replaced *Typha* stands, as well as mixed forest, swamp and open water. Approximately 0.62 km^2 of the treated areas remained covered with *Phragmites*. Although the control program at RBPP was partially effective, continued treatment is probably required to prevent re-colonization; however, complete eradication of *Phragmites* within the Park may not be possible unless all infected areas are treated simultaneously and repeatedly over several years.

Contact Information:

Email: rupasinp@mcmaster.ca
Phone: +1 365 888 2019

Authors:

Shabaga, Jason A (OMNRF), Jones, Trevor A (OMNRF), Elliot, Ken, (OMNRF)

Title:

Group selection silviculture conditionally enhances recruitment of yellow birch in a tolerant hardwood forest

Abstract:

The abundance of yellow birch in the Great-Lakes St. Lawrence hardwood forest region declined significantly during the early 20th century following over-harvesting. Recovery has been inhibited by wide-spread use of single-tree selection (STS) silviculture since the 1950s, which favours growth of more shade tolerant tree species (e.g. sugar maple and beech). Shelterwood harvesting can improve yellow birch recruitment, but requires higher tending costs, longer harvesting cycles, and produces an even-aged structure that may reduce ecological function. Group selection (GS) harvesting provides an alternative method with benefits of STS (mixed-age structure, greater species diversity, shorter harvesting cycles), yet produces larger gaps that improve light availability. GS has shown promise in recruitment of yellow birch in parts of the USA, but long-term results vary and differences in soils, climate, and competition dynamics in Ontario may influence responses. We evaluated the efficacy of GS on recruitment of yellow birch in an Ontario tolerant hardwood forest by comparing changes in abundance in harvested gaps over ten years relative to STS and unharvested forest. Some gaps were harvested in summer, others in winter. Vegetation was assessed as percent ground cover (stems 0.2-0.5 m height) or large stem counts (>0.5 cm tall, <2.5 cm DBH).

Yellow birch abundance increased significantly in gaps by year ten, but remained unchanged in unharvested controls and the STS treatment throughout the study. Summer harvested gaps recruited 7x more yellow birch stems than winter harvesting. In contrast, winter harvesting recruited 2x as much sugar maple as ground cover within the first post-harvest year, which was correlated to exponentially lower recruitment of yellow birch stems by year ten. Together, these indicate that summer harvesting optimised conditions for germination and growth of yellow birch (e.g. mineral soil exposure from disturbance, reduced competitor abundance, seed dispersal timing). Winter harvesting favoured maple regeneration in gaps (reduced mechanical disturbance likely better preserved advanced regeneration), increasing competition for yellow birch. While these results remain preliminary, we cautiously suggest that use of GS harvesting in summer can improve recruitment of yellow birch in tolerant hardwood stands, and should be considered where shelterwood harvesting is not feasible.

Contact Information:

Email: jason.shabaga@ontario.ca, jason.shabaga@mail.utoronto.ca
Phone: 705-946-7473 (Office), 647-464-2785 (Cell)

Authors:
Watmough SA (Trent University) and Jennings B (OMNRF)

Title:

Impact of Invasive Earthworms on soil C fluxes and pools in the Kawartha Highlands Signature Site in central Ontario.

Abstract:

Forests in Canada have developed largely in the absence of earthworms but they are now prevalent in many parts of Canada including southern Ontario and are spreading. At the same time, improving the current understanding of the factors that control soil carbon (C) dynamics in forest ecosystems remains an important topic of research as it plays an integral role in the fertility of forest soils and the global carbon cycle. Invasive earthworms have the potential to alter soil C dynamics, though mechanisms and effects remain poorly understood. To investigate potential effects of invasive earthworms on forest C, the forest floor, mineral soil, fine root biomass, litterfall and litter decomposition rates and total soil respiration (TSR) over a full year were measured at an invaded and uninvaded deciduous forest site in the Kawartha Highlands Signature Site in central Ontario.

The uninvaded site was approximately 300m from the invaded site and a distinct invasion front between sites was present. Along the invasion front, the biomass of the forest floor was negatively correlated with earthworm abundance and biomass. There was no significant difference between litterfall, litter decomposition and TSR between the invaded and uninvaded sites, but fine root biomass was approximately 30% lower at the invaded site. There was no significant difference in total soil C pools (0-30 cm) between the invaded and uninvaded sites. Despite profound impacts on forest floor soil C pools, earthworm invasion does not significantly increase TSR, most likely because increased heterotrophic respiration associated with earthworms is largely offset by a decrease in autotrophic respiration caused by lower fine root biomass.

The long-term impacts of invasive earthworms on soil carbon stocks and forest vegetation remain uncertain and should be the focus of future studies.

Contact Information:
swatmough@trentu.ca (705-748-1011 ex 7876).

Authors:
Anne R. Yagi and Glenn J. Tattersall (Biology Department, Brock University)

Title: MANAGING AN ECOLOGICAL TRAP ON AN ENDANGERED SPECIES MASSASAUGA (*Sistrurus catenatus*) BY USING FORCED HIBERNATION

Reptiles require cues such as temperature and moisture gradients to locate suitable habitats to complete their annual life cycle. Anthropogenically altered habitats such as previously mined peatland mimic these cues and attract animals. However habitat quality is not maintained for the duration of the animal or progeny's life span and animals die. Ecological trap theory suggests that the continued presence of a trap will drive populations to extinction. Declining neonates and gravid females followed a flood event of a small but viable hibernation area which lends support that a partially mined peatland is acting as an ecological trap on an endangered Massasauga rattlesnake population. "Forced hibernation" is a conservation biology technique tested during the last 3 winters. This term refers to the method of placing neonatal snakes into enclosed artificial burrows located in ideal subterranean habitat for the duration of their hibernation period. This prime habitat must meet the criteria of maintaining an annual "Life Zone", which is a subterranean space that does not freeze or flood completely during winter. The purpose of this experiment is to test whether the forced hibernation technique is a suitable strategy for headstarting neonatal massasaugas. Results indicate a favorable outcome with 100% survival of neonatal Eastern gartersnakes and 90% survival of neonatal massasaugas. However sample size was small (n=10 for each species) and Winter 2016-17 was dry and mild. Winter 2014-15 and 2015-16 were studied using neonatal and juvenile gartersnakes (n= 11 and 10) with 95% overall survival. Forced hibernation will directly manage the ecological trap effect by eliminating a neonate's naïve selection of a potentially lethal burrow and ensure over winter survival in areas where the life zone is annually maintained. Hibernation site fidelity will then ensure winter survivors return to hibernation sites with an annual life zone and the population should increase.

Contact Information:
ayagi@cogeco.ca 905-892-4964**, gtattersall@brocku.ca** 905-688-5550 ext 4815