2012 Annual Report

Research and Monitoring in the Greater Kejimkujik Ecosystem

Parks Canada Parcs Canada

Canada

Mersey Tobeatic Research Institute

Citation:
Mersey Tobeatic Research Institute and Parks Canada. 2013. Annual Report of Research and Monitoring in the Greater Kejimkujik Ecosystem 2012. Kempt, Nova Scotia, 110 pp.

Cover photos from top left:
- Coastal waves by B. Caverhill
- Old growth conifers by A. Belliveau, MTRI
- Sunset by A. Belliveau, MTRI
- Painted turtle sunning by M. Boucher, MTRI
- Cabin at Hog Lake by M. Boucher, MTRI

Printed on 100% post-consumer paper

2012
Annual Report

Research and Monitoring in the Greater Kejimkujik Ecosystem

TABLE OF CONTENTS

WETLANDS

HUMAN DIMENSIONS

APPENDIX

M. Boucher, MTRI

INTRODUCTION

This is the eighth Annual Report of Research and Monitoring in the Greater Kejimkujik Ecosystem. As with previous editions, this one was inspired by a very similar series piloted by the Parks Canada Western Arctic Field Unit. This report serves as a compilation of the research and monitoring projects that were conducted in the Kejimkujik area. The summaries are all written by the researchers who are listed as contacts for each project but the report as a whole is a collaborative effort between Kejimkujik National Park and National Historic Site of Canada (Kejimkujik) and the Mersey Tobeatic Research Institute (MTRI). Many thanks to all the researchers who took the time to submit the research and monitoring project summaries this year.

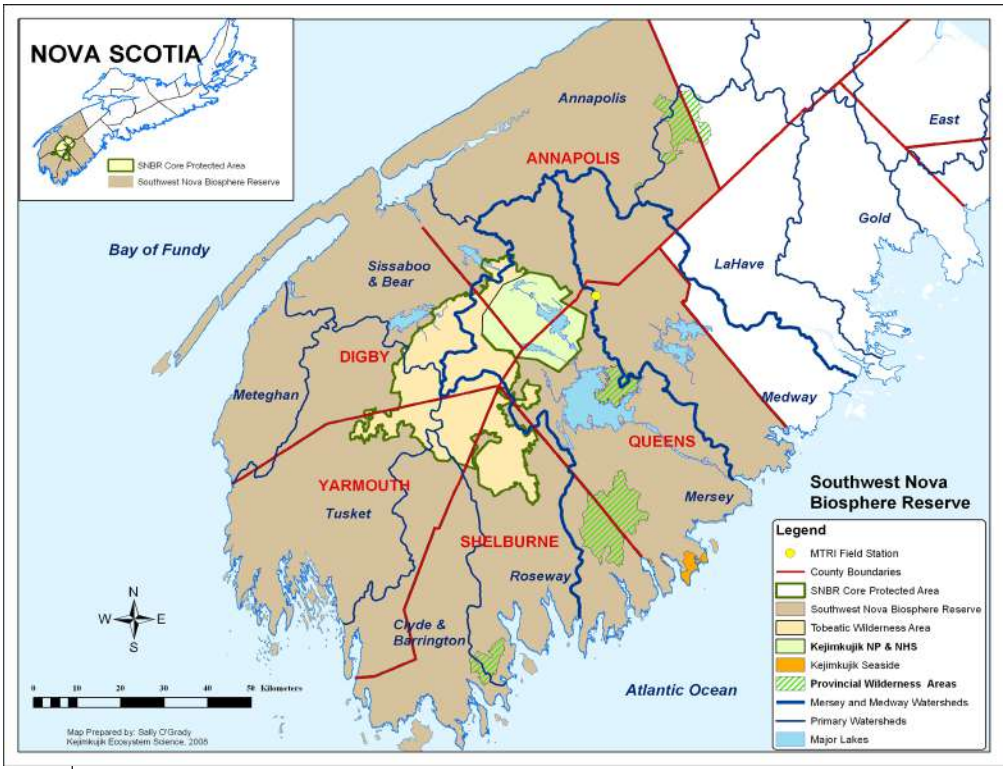
This report was produced in spring 2013 and is a compilation of the research and monitoring projects that were conducted in the Kejimkujik area in 2012 by Parks Canada, MTRI and their partners. The purpose of the report is to make information about these projects available to the public, government agencies, researchers and other stakeholders.

Research and monitoring projects provide the information necessary to make wise management and conservation decisions. The projects in this report are organized in four chapters corresponding to ecosystems: Coastal, Forest, Wetland and Freshwater, with an additional chapter highlighting research about the Human Dimensions of sustainable resource use. Projects are categorized as either monitoring or research projects.

The research and monitoring projects detailed in this report are important tools for attaining sustainable management of our natural resources and maintaining ecological integrity of our protected areas. The monitoring projects are conducted to keep track of how the ecological systems around us are changing over time and examine the effectiveness of management actions. The research projects provide a better understanding of the ecology of the area and how it is affected by natural and human-related influences. Overall, they indicate an impressive amount of work that is being undertaken in Kejimkujik and the surrounding area.

Kejimkujik represents the Atlantic Upland Natural Region in Parks Canada's network of protected areas. Kejimkujik consists of 381 km^2 inland and 22 km^2 on the coast and, in combination with the Tobeatic, is the core area of the Southwest Nova Biosphere Reserve. Since its establishment, Kejimkujik has been an important centre of science for southwest Nova Scotia. In collaboration with partners, research and monitoring in the park and surrounding landscape has informed decision-makers on a number of management issues at local, regional and national scales. Kejimkujik was declared the first Ecological Monitoring and Assessment Network site in Canada (1993) and was the first in Canada to install a Smithsonian Institution Monitoring and Assessment of Biodiversity plot (1994). Kejimkujik also serves as one of five core Canadian Acid Precipitation Monitoring Network sites that monitor the long-range transport of air pollutants and is a long-term climate monitoring station for Environment Canada. In 1995, Kejimkujik was designated a national historic site (the only national park in Canada with this dual designation) highlighting the cultural significance of the area and the importance of aboriginal peoples to understanding and presenting commemorative integrity. Kejimkujik is identified by the Parks Canada Agency as a species at risk priority site where stewardship and recovery are paramount. In 2010 Kejimkujik was designated "Dark Sky Preserve" by the Royal Astronomical Society of Canada. More information about Kejimkujik can be found at www.pc.gc.ca/pn-np/ns/kejimkujik or at the Friends of Keji Cooperative Association website (www.friendsofkeji.ns.ca).

The Mersey Tobeatic Research Institute (MTRI) is a non-profit co-operative with a mission to promote sustainable use of natural resources and biodiversity conservation in the Southwest Nova Biosphere Reserve and beyond through research, education and the operation of a field station. MTRI's field station is located between Kejimkujik and Caledonia in Kempt, Queens County where it provides office work space, accommodation for researchers, space for public presentations and a site for learning. MTRI provides expertise in the community and coordinates research and monitoring projects to address the goal of sustainable resource management. MTRI also provides an important link from research to the public through an active outreach and education program. More information about the charitable co-operative is available at www.merseytobeatic.ca.



S. O'Grady, Parks Canada

Kejimkujik and Tobeatic comprise the core area of the Southwest Nova Biosphere Reserve

The Southwest Nova Biosphere Reserve (SNBR) comprises a large portion of terrestrial and coastal southwestern Nova Scotia (see map above). The United Nations Educational, Scientific and Cultural Organization (UNESCO) internationally recognizes a biosphere reserve as an area in the world that is deemed to demonstrate a "balanced relationship between humans and the biosphere." Biosphere reserves around the world fulfill the following three functions: conservation, sustainable development and capacity building. Collaborative efforts among people in the designated area promote the sustainability of local economies and communities, as well as the conservation of the ecosystems.

A biosphere reserve is also a mechanism used for regional planning and multi-sector collaboration. It offers an opportunity for the community to envision sustainability for the region and to work towards achieving it. In 1999, a group of volunteers from Queens and Annapolis counties in Nova Scotia developed a proposal for the establishment of a UNESCO Biosphere Reserve incorporating Kejimkujik and the Tobeatic as the core protected area. This group of volunteers later became incorporated as the Southwest Nova Biosphere Reserve Association (SNBRA). In September 2001, the nomination document received approval and the region of southwest Nova Scotia was designated a biosphere reserve by UNESCO.

COASTAL

M. Boucher, MTRI

Rationale

The Piping plover is a small shorebird that has been listed as an Endangered species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) since 1985. Piping plovers nest on white sandy beaches including St. Catherine's River Beach at Kejimkujik Seaside. In recent years, the number of nesting pairs of Piping plovers in the province has decreased significantly due to habitat disturbance, loss and fragmentation, predation and development of distant over-wintering grounds. The Piping plover is often referred to as a management dependent species, as sustained management actions are sometimes needed to maintain and increase population levels. Park staff have monitored plover adults and chicks within the park since 1985 to assess Piping plover population levels at the Kejimkujik Seaside (and southwest Nova) and to implement a suite of management strategies focused on protecting and sustaining plover numbers.

M. Crowley, Parks Canada

A plover chick trying out its wings at the seaside

Monitoring

PEEP LO! PIPING PLOVER MONITORING

OBJECTIVES

- To monitor the number of breeding pairs of Piping plover and their productivity (number of chicks fledged per pair).
- To monitor the extent of suitable nesting habitat for Piping plovers in Kejimkujik Seaside and restore a portion of nesting habitat on St. Catherine's River Beach.
- To note predators or signs of predators on St. Catherine's River Beach.

METHODS

- Park staff and volunteers monitored St. Catherine's River Beach frequently during Piping plover nesting season. This was done at a distance with binoculars and spotting scopes. Other birds and animals, particularly predators, were also noted.
- Nest, chick and habitat observations were recorded. Nests were located by observing territorial birds and individuals exhibiting nesting behaviours.
- After a minimum of three eggs were laid (of four in a full clutch) nests were numbered and georeferenced.
- Plover habitat was restored on one section of St. Catherine's River Beach, through removal of dense marram grass in the fall.

RESULTS

- Our stewardship team continued to play a few roles at the Kejimkujik Seaside: monitoring St. Catherine's River Beach, involving visitors and volunteers in plover monitoring and habitat restoration and working with Bird Studies Canada on other nearby beaches when possible.
- Three pairs of Piping plovers were observed nesting at St. Catherine's River Beach (two of the pairs nested twice before being successful). These nests fledged two, three and four chicks respectively. Periodically three single plovers were spotted on the beach in addition to the three pairs.
- Remote cameras were installed around the habitat management area on St. Catherine's River Beach (where one nest was located), as part of a study to help understand plover use of the restored area. Footage is still being reviewed as part of a student project at Dalhousie University.
- This year habitat restoration continued at the tip of St. Catherine's River Beach. The focus was on the main restoration

M. Crowley, Parks Canada

Monitoring plover adults and chicks.

RESULTS
Continued

site and lagoon access runways. Volunteers helped maintain and restore the site by using tools and elbow grease to remove marram grass. Monitoring continued to identify the amount of critical habitat on St. Catherine's River Beach.

- Nine volunteers contributed 86 hours to Piping plover recovery and stewardship efforts including monitoring and habitat restoration efforts.
- A training video is now on YouTube and can be viewed by searching "Piping Plover Training Video". Feedback is welcome!

YEARS OF DATA

- Ongoing project since 1985

PARTNERS

- Parks Canada
- Piping Plover Recovery Team (Eastern Canada)
- Bird Studies Canada
- Environment Canada
- Province of Nova Scotia

Parks Canada

Plover chick at the Kejimkujik Seaside

The training video can be viewed on YouTube

W. Pitts

Volunteers making a difference and having a good time restoring habitat at the Seaside

CONTACT

Megan Crowley and Duncan Smith
Parks Canada
PO Box 236
Maitland Bridge, NS B0T 1B0
Ph. (902) 682-2185
Fx. (902) 682-3367
megan.crowley@pc.gc.ca
duncan.smith@pc.gc.ca
www.pc.gc.ca

Rationale

The Nova Scotia Piping Plover Conservation Program is coordinated by Bird Studies Canada (BSC), a non-profit organization. The program's goal is to recover Endangered Piping plovers and conserve beach habitat in Nova Scotia. Atlantic Coast beaches, including Lunenburg, Queens and Shelburne counties, support the southern Nova Scotia sub-population which is believed to be reproductively isolated from other plovers in Eastern Canada. Since 1991, southern Nova Scotian plovers declined by 37% and lost 27% of their beach breeding sites. Bird Studies Canada staff coordinate dozens of volunteers and partners in plover monitoring, breeding habitat protection and stewardship on beaches outside of Kejimkujik Seaside (managed by Parks Canada).

M. Crowley, Parks Canada

Piping plover

Monitoring

NOVA SCOTIA PIPING PLOVER CONSERVATION

OBJECTIVES

- To protect beach habitat for breeding Piping plovers.
- To reduce threats to breeding plovers on beaches.
- To increase understanding and awareness among beachgoers and coastal communities about plovers and the ecological value of beaches.
- To build community support and engagement for recovery and conservation efforts.
- To strengthen partnership and collaboration for conservation and recovery within Nova Scotia, regionally and internationally.

METHODS

- Staff, volunteers and partners conducted beach surveys April to August throughout the southern Nova Scotia region to establish presence of plovers, assess threats and protect breeding habitat.
- Beachgoer education, signs and rope fencing reduced threats from human activities. Plover population, breeding success (*e.g.* nest and fledge success), recreational activities and potential predators were monitored. Using this information, threats were identified to breeding plovers, habitat protection and stewardship activities were coordinated and adapted and stewardship outcomes were tracked.

Bird Studies Canada

Plover artwork from students hanging in a storefront window in Shelburne

RESULTS

- Including Kejimujik Seaside, a total of 46 Piping plover pairs were found on 24 beaches across Nova Scotia in 2012.
- At 15 beaches in southern Nova Scotia, 32 pairs were found: four in Lunenburg County, seven in Queens County and 21 in Shelburne County. Herein, we present 2012 results for southern Nova Scotia excluding Kejimkujik Seaside (please refer to page 10 for Kejimkujik results).
- Twenty-nine pairs produced 37 fledged young, an average of 1.28 fledglings/pair - less than the 1.65 annual productivity rate target for Eastern Canada.
- Of the 47 known nests, only 30% hatched. Few nests were spared flooding during the high tides of early June. Moreover, many subsequent nest attempts were not successful.

RESULTS
Continued

- The majority of beachgoers complied with habitat protection signage: 83% beachgoers (n=545) avoided sensitive nesting areas marked with signs. However, one nest at Beach Meadows, Queens County was lost due to human and dog activity and only 53% of dogs (n= 192) were on-leash. Illegal motorized vehicle use on beaches remained low with tracks or vehicles detected on less than 5% of surveys (n=312).

YEARS OF DATA

- Ongoing project since 2006
- Bird Studies Canada initiated a multi-year recovery effort for plovers in Nova Scotia in 2006. Before 2006, monitoring and recovery efforts were coordinated by various partners, including Nova Scotia Department of Natural Resources.

PARTNERS

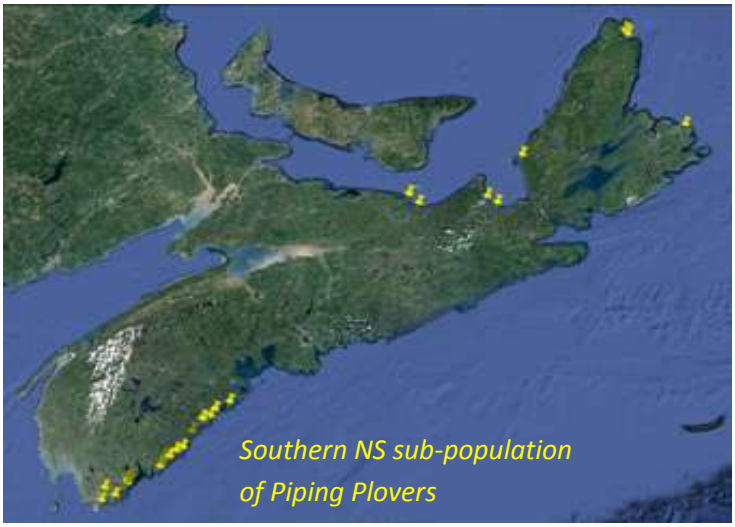
- Parks Canada
- Environment Canada's Canadian Wildlife Service
- Nova Scotia Department of Natural Resources
- Friends of Keji Cooperating Association
- Cape Sable Important Bird Area
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Canadian Wildlife Federation
- La Société Acadienne Sainte-Croix

Bird Studies Canada

Three volunteers, B. and J. Kenefick (right) and N. Gabrielian recognized at Kejimkujik "Walk of Honour" celebration

Bird Studies Canada

Volunteers and staff helped to create a berm to prevent flooding of plover nests at Louis Head Beach



S. Abbott, BSC

Location of 2012 Piping plover breeding sites in Nova Scotia

CONTACT

Sue Abbott
Program Coordinator
Bird Studies Canada
Ph. (902) 426-4055
sabbott@bsc-eoc.org
www.birdscanada.org/volunteer/nsplover

Rationale

Coastal marine systems world-wide are Threatened by invasions of non-native species. The European green crab is a highly invasive species present along the Nova Scotia coastline. Several studies have shown the Green crab to be an 'ecosystem engineer' which has significant predation impacts on local species such as soft-shell clams, blue mussels and which causes the physical destruction of eelgrass beds. This project is investigating Green crab population dynamics, relative influences on native habitats and developing a reduction and monitoring program to help address management and restoration considerations.

O. Woods and M. Symington

European green crab

Monitoring

EUROPEAN GREEN CRAB COASTAL MONITORING

OBJECTIVES

- To determine whether physical removal can be effective and sustainable in Green crab control at Kejimkujik Seaside estuaries.
- To conduct Green crab removal operations to prescribed catch per unit effort rates to control impacts on native species.
- In combination with other research and monitoring projects, assess the ecological consequences of Green crab activities in Kejimkujik Seaside ecosystems.
- To work with local interests, industry and other government departments to develop a positive use for harvested Green crabs.
- To use this information to assess management effectiveness response in restoring impaired coastal habitats such as eelgrass beds.

METHODS

- Different sampling techniques and protocols were explored to assess monitoring and removal efficiencies. Trapping was determined to be the most effective method of control and to conduct ecological integrity monitoring. Two types of traps were used: modified eel traps to provide standardized monitoring and modified shrimp (Russell) traps developed by local fishing expertise to enhance larger scale Green crab removal.
- Individual (Green crab) morphological data were recorded for all individuals captured through monitoring. All by-catch and other pertinent data were recorded throughout all sampling investigations to determine population structure, distribution and relative density characteristics.
- All crabs captured during removals were sexed and a daily sample of fifty randomly selected crabs was taken to compare sex ratios.

C. McCarthy, Parks Canada

Green crab fishers pulling traps

RESULTS

- Monitoring at St. Catherine's River Beach and a portion of Little Port Joli Estuary indicate similar densities in both estuaries where removals did not occur.
- Since 2010, close to one million Green crabs have been removed from Little Port Joli Estuary and sold or composted. Size, sex ratios, distribution and trap location efficiencies have

RESULTS
Continued

been determined. The proportion of larger males declined in areas where the greatest number of removals occurred, followed by large catches of females and smaller crabs.

- Numbers have been reduced to well below prescribed thresholds in the upper estuary and numbers remain low. Average catch per unit effort in Basin Lake was decreased by over 85%, as was average biomass per trap. Very little effort (sentinel trapping) was required to maintain low catches over the last two years.
- General knowledge was gained on more effective fishing techniques including amounts of bait to use, fishing hotspots and how often to pull traps to gain maximum efficiencies.
- Options for positive use of culled invasive crabs were investigated including use as lobster bait, fertilizer and composting.
- Native species by-catch continues to increase with no trapping mortality noted.
- Results from this project have enabled ecosystem recovery projects to enhance native species and habitats.

K.Durovitch

Visitor working with Green crab

YEARS OF DATA

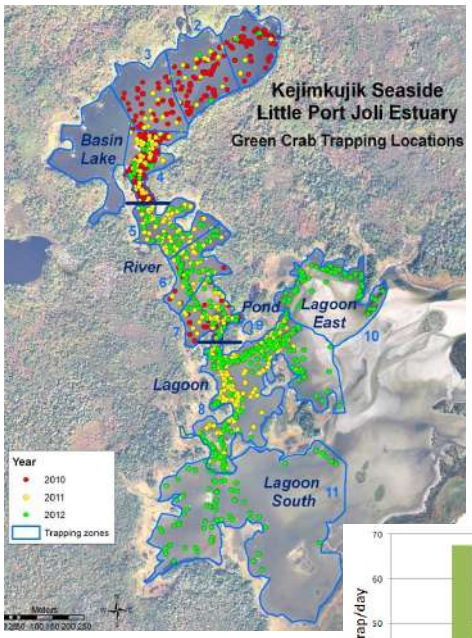
- Ongoing project since 2008

PARTNERS

- Dalhousie University
- Fisheries and Oceans Canada Gulf Region
- Fisheries and Oceans Canada - Bedford Institute of Oceanography

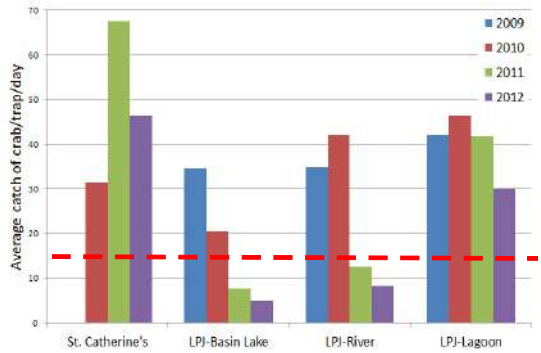
O.Woods and M.Symington

Green crab feeding on razor clam (notice fresh flesh on end nearest photographer)



S.O'Grady, Parks Canada

Map showing Green crab removal trapping locations at Little Port Joli by year (red dots: 2010, yellow: 2011, green: 2012)



Parks Canada

Comparison of Green crab reduction success at Little Port Joli Estuary with control at St. Catherine's River Estuary. The red hatch line is the targeted reduction threshold below which ecosystem recovery can be achieved

CONTACT

Chris McCarthy
Parks Canada
PO Box 236
Maitland Bridge, NS B0T 1B0
Ph. (902) 682-4100
Fx. (902) 682-3367
chris.mccarthy@pc.gc.ca
www.pc.gc.ca

Dan Kehler
Parks Canada
1869 Upper Water St.
Halifax, NS B3J 1S9
Ph. (902) 426-2797
Fx. (902) 426-2728
dan.kehler@pc.gc.ca

Rationale

Eelgrass is the dominant seagrass species in Atlantic Canada. Eelgrass habitats perform important ecological services in nearshore waters, often referred to as a 'keystone species' due to its ability to enhance biodiversity and productivity. Eelgrass beds provide nursery habitat for juvenile stages of fish and invertebrates and important feeding habitat for migrating waterfowl. The primary production of eelgrass beds and their associated epiphytic community exceeds that of many cultivated terrestrial systems, playing an important role as biological filters, sediment stabilizers, exporters of organic matter to subsidize productivity of other coastal ecosystems and as valuable carbon sinks. Declines in eelgrass can precipitate cascading ecosystem effects and a loss of valuable ecological services. Eelgrass at Kejimkujik Seaside has declined to less than 2% of its 1987 distribution.

Woods and Symington

Eelgrass

Monitoring

EELGRASS COASTAL MONITORING AND RECOVERY

OBJECTIVES

- To monitor temporal trends in eelgrass extents and condition.
- To provide insight into the causes and ecological consequences of these changes.
- To assess whether management response is effective in reversing eelgrass loss, including invasive Green crab reduction and eelgrass transplanting.

METHODS

- Suitable eelgrass habitat at St. Catherine's River and Little Port Joli estuaries is identified annually by canoe to determine the presence of eelgrass beds. The extent of each discrete bed is mapped by a swim survey using mask and snorkel. The surveyor carries a GPS unit with a track function to record locations for later mapping and area determinations.
- The Seagrass Net Monitoring Protocol is used to measure condition including morphology, grazing, epiphyte load, wasting disease and water quality variables.
- Four transplant methods were piloted: 1) Transplanting Eelgrass Remotely with Frame System (TREFS), 2) Site selected, Anchored with Fe (SAFE) using steel washers, 3) Buoy Deployed Seeding (BuDS) and 4)Bamboo Staple in sand.

C. McCarthy, Parks Canada

Close-up of eelgrass transplants (TERFS technique on left and SAFE technique on the right)

RESULTS

- After reaching less than 2% of its 1987 distribution by 2010, eelgrass decline has been reversed coincident with effective control of Green crabs at Little Port Joli Estuary. Continual increase in eelgrass in 2011 and 2012 has resulted in the restoration of 20% of the original distribution at Little Port Joli. Eelgrass continues to be absent from St. Catherine's River Estuary where Green crab are not fished, 11 years after its effective disappearance.
- Volunteers helped the park conduct the first eelgrass transplant trials on the East Coast of Canada. Four methodologies were tested with encouraging results. Three of the four trial plots showed excellent results with a greater than 50% survivorship. The fourth trial plot was located near high densities of Green crab resulting in a 98% loss.
- The SAFE methodology using 5/8" steel washer technique proved to be relatively cost effective and produced the best survivorship to date.

RESULTS
Continued

- The TREFS (grid) technique produced similarly good results but initial costs were marginally greater than the SAFE technique.
- The BuDS technique tested seeding success with reproductive shoots and results will not be known until the spring of 2013.
- Future monitoring will continue to assess the success of Green crab mitigations on eelgrass recovery and future plantings will be continued with the SAFE technique.

YEARS OF DATA

- Ongoing project since 1987

PARTNERS

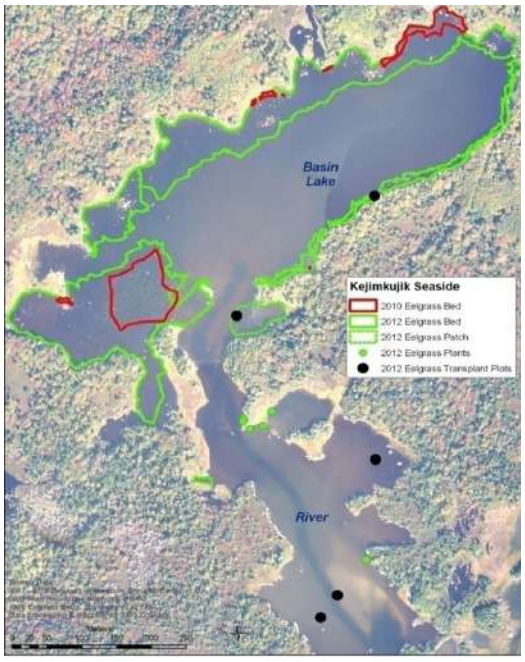
- Parks Canada
- School for Resource and Environmental Studies, Dalhousie University
- Fisheries and Oceans Canada Gulf Region and Bedford Institute of Oceanography
- Harrison Lewis Marine Centre

O.Woods

Surveyor conducting eelgrass condition surveys

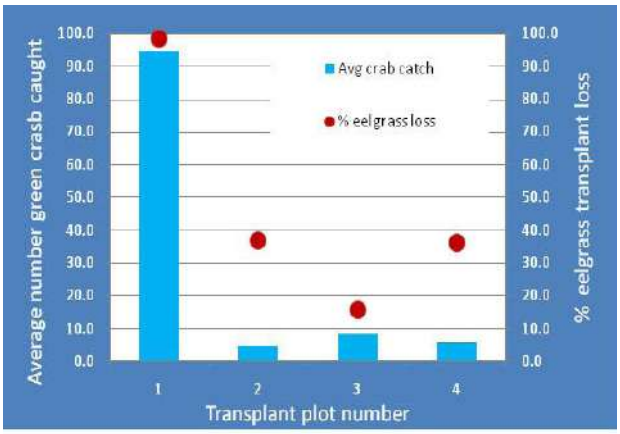
O.Woods

Lobster in eelgrass



S. O'Grady, Parks Canada

Eelgrass distribution at Little Port Joli Estuary (2010 & 2012) where plots 1-5 are locations of piloted transplants



Parks Canada

Eelgrass transplant survival relative to green crab catch per unit effort

CONTACT

Chris McCarthy
Parks Canda
PO Box 236
Maitland Bridge, NS B0T 1B0
Ph. (902) 682-4100
Fx. (902) 682-3367
chris.mccarthy@pc.gc.ca
www.pc.gc.ca

Dan Kehler
Parks Canada
1869 Upper Water St.
Halifax, NS B3J 1S9
Ph. (902) 426-2797
Fx. (902) 426-2728
dan.kehler@pc.gc.ca

Rationale

In 1968, a bridge was constructed narrowing the flow to the upper estuary at Little Port Joli Basin Kejimkujik Seaside. It was formerly a 40 m channel and the bridgeworks limited the flow between the cribwork to 5.8 m. The bridge was replaced in 1987 by Parks Canada with pressure treated timbers which have reached a stage of decay and in recent years, the approaches have been breached, destabilizing the soilworks. It has been established that the old road and bridge ramparts and cribwork are restricting the tidal flow into the northern reaches of the estuary. Based on heat-budget box models of the flushing and available temperature records, ecological integrity is compromised.

C. McCarthy, Parks Canada

Pre-removal photo of bridge from south side

Monitoring

LITTLE PORT JOLI ESTUARY HYDROLOGICAL

OBJECTIVES

- To enhance water exchange so that tides rise and fall simultaneously in the inner and outer lagoon and enhance of inner lagoon flushing.
- To reduce the temperature differential between the upper and lower lagoon.
- To change water properties to better reflect the oceanic processes and those of the outer lagoon so that they are less influenced by local within-lagoon processes.
- Improve water clarity by decreasing the deposition and retention of fine sediments.

METHODS

- Two excavators were used to remove the bridgeworks. For safety and efficiency, the restoration work was closely timed with the tide cycles. The rocks and sod dug from the bridge approaches were returned to two former borrow pits that were used to build the bridge approaches. Remaining larger rocks were used to line the embankment edges to mitigate erosion.
- At high tide, two excavators worked together to back off the stringer and decking of the west crib to facilitate the removal of the boulders filling the west crib. The stringers and decking were gently deposited on the ground on the west side.
- Once emptied, the west crib was removed in one piece at low tide.
- Once the two excavators were on the east shore, the stringers and decking were lifted and pulled onto the east shore where they were reduced and transported to a safe disposal site.
- Underwater pressure sensors were deployed to measure tidal height. A continuous sea level record was obtained from October 6 2012 to December 8 2012 at 15 min intervals.

C. McCarthy, Parks Canada

Excavators moving the bridge

RESULTS

- Tidal height time series were compared with a period two years before bridge removal for both the inner and outer lagoon.
- Before the bridge removal, tides in the inner lagoon lagged those of the outer lagoon. For diurnal tides the lag was 2.06

RESULTS
Continued

hrs and for the semi-diurnal tides it was 1.52 hrs.

- After the bridge removal, tidal records in the inner and outer lagoon after bridge removal were nearly identical to one another in terms of magnitude of the tidal height.
- The sea level data show that after removal of the bridgewalks there is no evidence of hydraulic control and its associated amplitude and phase signature. The tides in the inner and outer lagoon now vary almost synchronously. Monitoring will continue to track water quality and temperature differential.

YEARS OF DATA

- Single year project

PARTNERS

- Parks Canada
- Dalhousie University
- Fisheries and Oceans Canada Small Craft Harbours
- Fisheries and Oceans Canada Bedford Institute of Oceanography

C. McCarthy, Parks Canada

Little Port Joli Bridge location, Kejimkujik Seaside

C. McCarthy, Parks Canada

New bridge dimensions showing the restricted flow through the narrowed channel

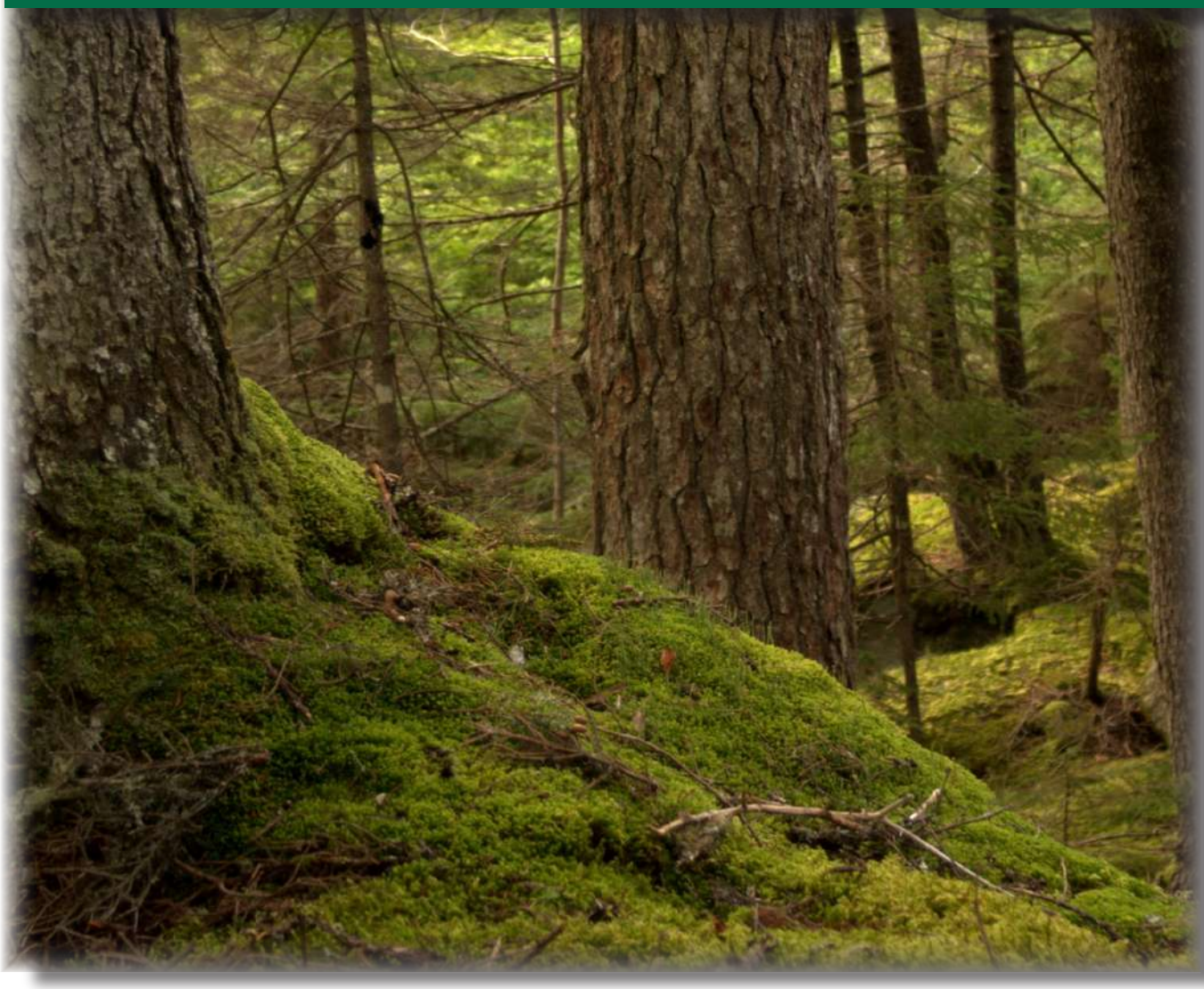
C. McCarthy, Parks Canada

Aerial photos from 1965 and 1976 showing older bridge span with posts and new shorter bridge with earthen approaches completed in 1968

CONTACT

Chris McCarthy
Parks Canada
PO Box 236
Maitland Bridge, NS B0T 1B0
Ph. (902) 682-4100
Fx. (902) 682-3367
chris.mccarthy@pc.gc.ca
www.pc.gc.ca

FOREST



A. Belliveau, MTRI

Rationale

Reduction of suitable habitat is the greatest threat to forest landbirds in their breeding ranges. The Olive-sided flycatcher, Canada warbler and Rusty blackbird have experienced steep population declines of up to 90% over the past half-century. In order to conserve these federally listed species at risk, improvements to networks of protected areas and conservation activities on managed landscapes are needed. Areas for conservation can be targeted once available habitat has been identified. This project uses species distribution modeling techniques to quantify the spatial extent of available habitat for these species at risk, as individual species and groups of species. Habitat maps for each model type will be used to assess the contribution of protected and managed lands to available habitat, which can be used to target conservation efforts.

A. Westwood

Olive-sided flycatcher

Monitoring

MODELING HABITAT FOR LANDBIRDS AT RISK

OBJECTIVES

- To use fine scale vegetation information and coarse scale GIS data to compare habitat between occupied sites in managed and protected landscapes for each of three avian species at risk: the Rusty blackbird, Olive-sided flycatcher and Canada warbler.
- To model and map habitat suitability for individual landbird species and groups of species in Nova Scotia using varying combinations of fine and coarse scale variables and determine models of best fit.

METHODS

- In winter 2012, preliminary habitat suitability index models were used to select survey locations.
- From April to June 2012, 36 locations were surveyed. A point count was used to record all bird species present and presence of species at risk was assessed using playbacks of conspecific vocalizations.
- From June to August 2012, 60 known locations of landbird species at risk were surveyed to assess vegetation cover and structure. Habitat was assessed for forest ecosystem classification and quantified by amount of deciduous, coniferous, shrub and vegetation cover in different forest layers, abundance of snags and various ground features, including wetness.
- In fall 2012, habitat analysis for the Rusty blackbird was completed.

A. Westwood

Field technician surveying tree canopy cover using a densiometer

RESULTS

- Of the 108 playback plots in 36 sites surveyed, Olive-sided flycatchers, Canada warblers and Rusty blackbirds were found in 26, seven and eight plots, respectively.
- Analysis indicates that habitats occupied by Rusty blackbirds in protected and managed lands do not differ in forest structure, forest ecosystem classification or vegetation composition. This is likely due to the high heterogeneity of habitats in Nova Scotia.
- Results will be used in the following ways in the future:

  1. Create species distribution models predicting species occurrence at fine and coarse spatial scales for individual species and groups of species.

RESULTS
Continued

2. Field test species distribution models constructed through playbacks in areas of high predicted habitat suitability.

3. Evaluate and compare the efficacy of species distribution models for individual species and groups of species for different variable types.

- Use the models to quantify available suitable habitat in managed and protected landscapes and make management recommendations.

YEARS OF DATA

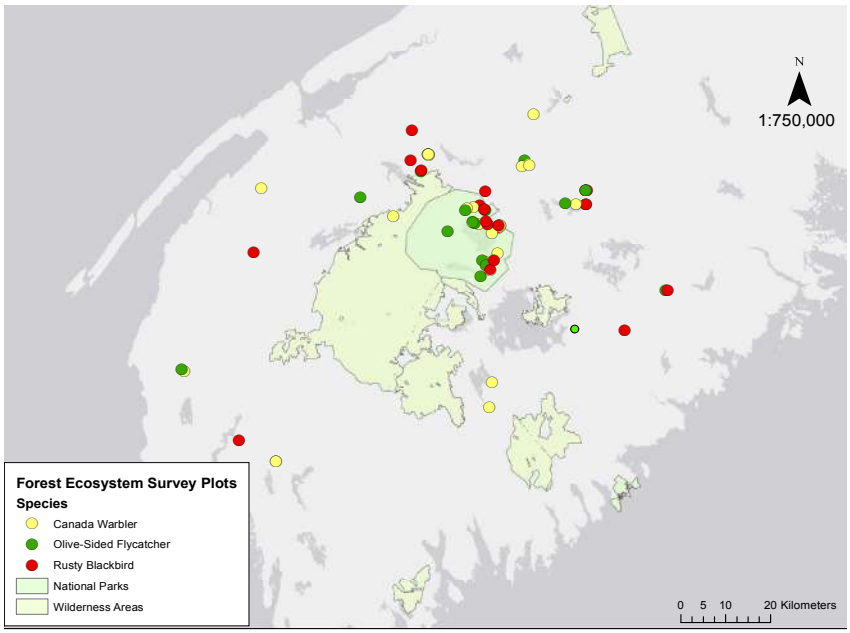
- Year 1 of a 4 year project

PARTNERS

- Mersey Tobeatic Research Institute
- Parks Canada
- Nova Scotia Habitat Conservation Fund
- Nova Scotia Strategic Cooperative Education Incentive
- Science Horizons Youth Internship Program
- Resolute Forest Products Limited
- Dalhousie University
- Natural Science and Engineering Research Council of Canada

A. Westwood

Pair of Olive-sided flycatchers perched atop black spruce in a clearcut



Dalhousie University

Known locations of Olive-sided flycatcher, Canada warbler and Rusty blackbird in Nova Scotia surveyed for forest ecosystem and vegetation characteristics.

CONTACT

Alana Westwood and Cindy Staicer
Department of Biology
Dalhousie University, PO Box 15000,
Halifax, NS B3H 4R2
Ph. (902) 818-6062
a.westwood@dal.ca

Rationale

In 2002, an outbreak of the native Pale-winged gray moth began defoliating Eastern hemlock stands in Kejimkujik. The first area to be affected was a long-term forest bird study plot, sampled since 1997. In 2003, defoliation began to spread to other hemlock-dominated areas of the park. Many of these stands had forest bird surveys in two or more years since 2003. Vegetation data and defoliation estimates were collected in 2004 and 2006. By 2012, the vegetation in hemlock stands in the park had been variously impacted, some areas more, some less. The purpose of the 2012 study was to resample the birds in hemlock stands and quantify the changes in forest characteristics. We expected to find that changes in bird populations were related to changes in vegetation due to the defoliation. Results are presented for three hemlock stands that differed in time since defoliation began.

Black-throated green warbler

Research

EFFECTS OF HEMLOCK DEFOLIATION ON FOREST BIRDS

OBJECTIVES

- To determine the abundance of forest bird species in hemlock stands in Kejimkujik.
- To quantify forest characteristics expected to reflect the degree and subsequent effects of defoliation.
- To relate the changes in forest bird abundance to changes in forest vegetation due to Pale-winged gray defoliation.

METHODS

- Point counts were used to survey birds in three stands in Kejimkujik. Each stand had five to ten point count stations. Two visits were made to each point between late May and early July and all birds heard or seen in a 10 min period were recorded.
- Vegetation measurements were made along 50 m transects established in the four cardinal directions around each point count station.
- The diameter, height and amount of defoliation of the nearest hemlock tree were measured at 10 m intervals along transects.
- Percent cover of foliage was recorded for coniferous and deciduous tree canopy, shrub layer and ground cover along transects.

D. Crossland examines defoliation in a group of young hemlock trees

RESULTS

- Hemlock stands affected by the recent defoliated events had experienced the largest changes in hemlock foliage. The Canning Road Field plot lost all of its hemlock understory and half of its main hemlock canopy. Indian Point and Big Dam plots retained their canopy but lost most of their hemlock understory and suppressed trees.
- All three plots experienced a shift in hemlock size classes. Most of the intermediate or suppressed trees had been lost; many of those were dead or dying in 2005.
- Herbaceous ground cover increased in two of the three plots, due to decreases in hemlock foliage and more light reaching the ground.
- Bird species that decreased included Bay-breasted warbler, Black-throated green warbler and Blackburnian warbler,

RESULTS
Continued

species that feed and nest in hemlock canopies in Kejimkujik.

- Swainson's thrush, a species that nests in low conifers, also declined in the two plots that lost most of their low hemlock foliage.
- Generalist species, such as Hermit thrush, Blue-headed vireo, Yellow-rumped warbler and Black-capped chickadee, remained stable.
- Bird species that increased included Least flycatcher and Eastern wood pewee, species that feed on flying insects, like moths. These birds were uncommon in hemlock stands before the moth outbreak.

YEARS OF DATA

- 1997 - 2012

PARTNERS

- Mersey Tobeatic Research Institute
- Parks Canada
- Dalhousie University

C. Staicer

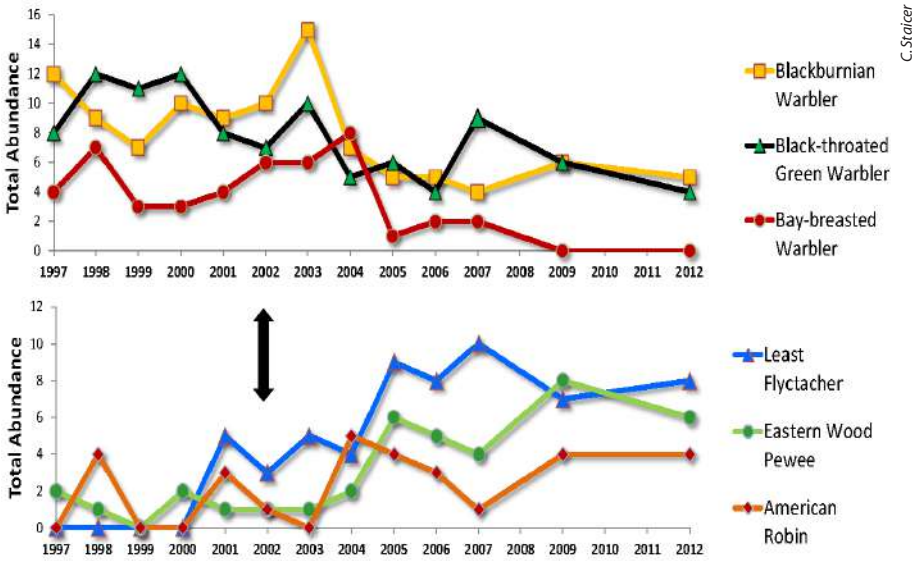
Big Dam site in Kejimkujik

C. Staicer

Indian Point forest plot in Kejimkujik

C. Staicer

Canning Field Road site in Kejimkujik was the earliest and most heavily defoliated site



C. Staicer

Bird trends for the Canning Field Road plot, the most negatively affected by defoliation. Arrow indicates year the Pale-winged gray outbreak began

CONTACT

Cindy Staicer
Biology Department,
Dalhousie University
PO Box 15000, Halifax NS B3H 4R2
Ph. (902) 494-3533
Fx. (902) 494-3736
cindy.staicer@dal.ca
http://biology.dal.ca/People/faculty/staicer/staicer.htm

Rationale

Christmas Bird Counts have been carried out annually for over a century. They have been conducted at several locations in Nova Scotia over the last 50 years. Currently, within Nova Scotia, approximately 35 Christmas Bird Counts are conducted every year. The counts occur on one day between mid-December and early January (hence the name Christmas Bird Count) within the same set area. The bird counts document early winter birds and can be compared from year-to-year and area-to-area. The Nova Scotia Bird Society and Audobon Society maintain a master record of all counts within the province and annually report the counts with notes on the unique results of that year.

M. Boucher, MTRI

Black capped chickadee

Monitoring

CALEDONIA CHRISTMAS BIRD COUNT

OBJECTIVES

- To document early winter birds during an ongoing annual survey.
- To record sufficient data so that the results may be compared from year-to-year and count-to-count.
- To engage interested volunteer members of the public to complete the annual count.
- To publicize the results to inform and interest the local public in the bird communities of the Caledonia area.

METHODS

- Annually, a one day Christmas Bird Count has been held between specific dates determined by the Audubon Society between mid-December and early January.
- The count was held on December 16 2012 from midnight to midnight.
- The count has consistently been held in the same area: a circle of 24 km diameter centered where a brook flows northward out of Donnellan Lake in West Caledonia.
- The coordinator organized volunteers to cover different areas so the maximum number of habitats could be searched and the most species located while preventing repeated counting of the same birds in the same areas.
- The bird species and their numbers were recorded.
- The time spent in the woods and at bird feeders, distances traveled, methods of travel and numbers of people involved were recorded to compare the effort by observers.

A. Belliveau, MTRI

A male Pileated woodpecker

RESULTS

- The 2012 count noted 36 bird species and 1352 total birds.
- There were 36 observers who participated this year.
- The total number of kilometres walked (in comparison to last year's count) significantly increased from 60 km in 2011 to 81 km in 2012.
- Numbers of observers in the field, at feeders and total hours volunteered have declined over the past few years, decreasing at least in part because of an aging group of volunteers. However, this year extra effort was put into recruiting new volunteers and the number of observers in the field increased

RESULTS
Continued

from 15 in 2011 to 26 in 2012.

- This year there were five Purple finches, one Grey jay and 12 snow buntings, among other birds noted. No Northern cardinals or Redpolls were reported during the count. The species that had the highest number this year were Black capped chickadees with a count of 508.

YEARS OF DATA

- Ongoing project since 1991

PARTNERS

- Nova Scotia Bird Society
- Mersey Tobeatic Research Institute

M. Boucher, MTRI

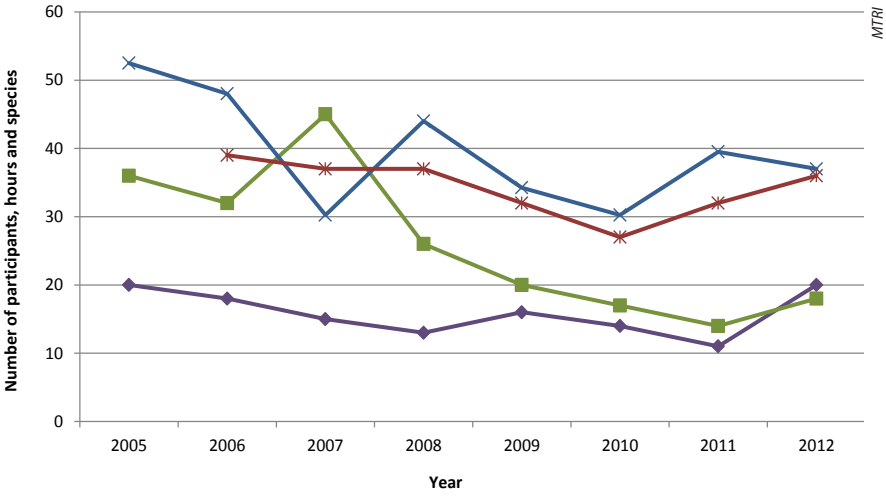
Red crossbills at the top of a White pine

A. Belliveau, MTRI

Black cappped chickadee and American goldfinch

A. Belliveau, MTRI

Female Downy woodpecker



The green line represents number of field parties at feeders, the purple line is the number of parties in the field, the blue line shows the total party hours and the red line shows the total species over the years

CONTACTS

Amanda Lavers
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
amanda.lavers@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

Nocturnal owls are surveyed across Canada as indicators of forest ecosystem health. As top predators in the food chain, they are vulnerable to habitat disturbance. Barred owls require large hardwood trees which have cavities suitable for their nests. Additionally, they are sensitive to forest cover and composition changes associated with forest harvesting and human developments. Owls are not easy to monitor due to their secretive, nocturnal activities. Bird Studies Canada coordinates nocturnal surveys in all three Maritime provinces. Locally, two official routes have been conducted annually since 2002 while a third, unofficial route, was established in 2005. These surveys document relative owl counts and note changes over time.

M. Boucher, MTRI

Barred owl

Monitoring

NOCTURNAL OWL SURVEY

OBJECTIVES

- To carry out an annual survey of nocturnal owl populations on established routes.
- To compare local owl populations within Nova Scotia, within the Maritimes and within Canada.

METHODS

- At night, volunteer surveyors drove a designated route making ten stops each at least 1.6 km apart. At each stop they broadcasted recordings of owl calls prepared by Bird Studies Canada and recorded the number and species of owls heard or seen.
- Route 40 begins on highway Route 8, eight km north of the Mersey River Bridge in Maitland Bridge and continues northward to South Milford.
- Route 41 begins at the entrance to Kejimkujik and ends near the Gold Mines trail.
- The Devonshire/Rossignol Route follows these roads towards the Mersey River.

M. Elderkin

Saw-whet owl

RESULTS

- Over the years, Barred, Saw-whet, Great horned and Long-eared owls have been detected.
- Route 40, surveyed on April 17 2012, by Peter and Lorraine Hope detected three Barred owls.
- The Route 41 surveyed by Chris McCarthy on April 20 2012 detected three Barred owls and one Great horned owl.
- The Devonshire/Rossignol Route, surveyed by Peter Hope May 3 2012, detected three Barred owls and one Great horned owl.

YEARS OF DATA

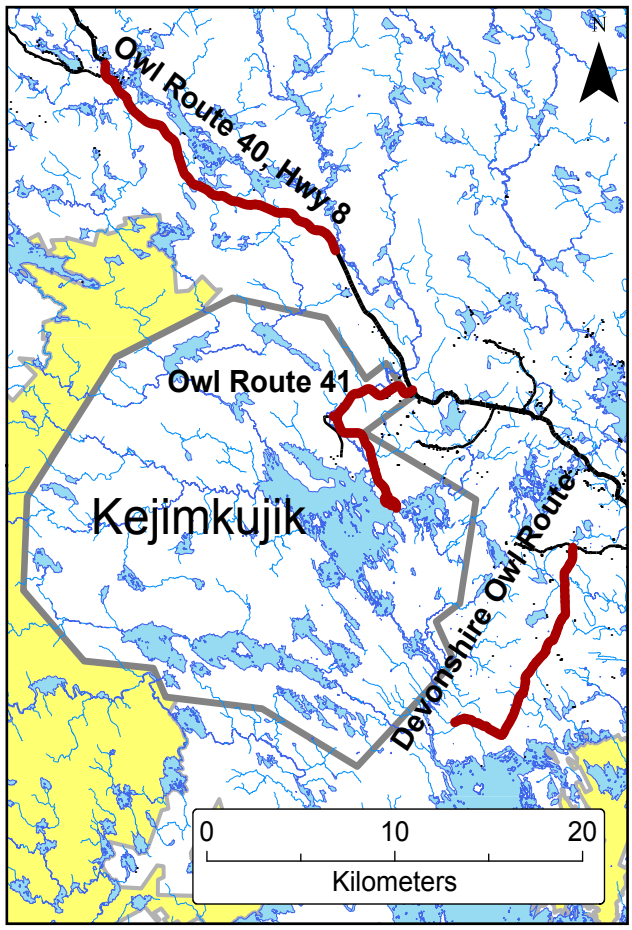
- Ongoing project since 2002

PARTNERS

- Parks Canada
- Bird Studies Canada
- Mersey Tobeatic Research Institute

M. Boucher, MTRI

Barred owl in Kejimkujik



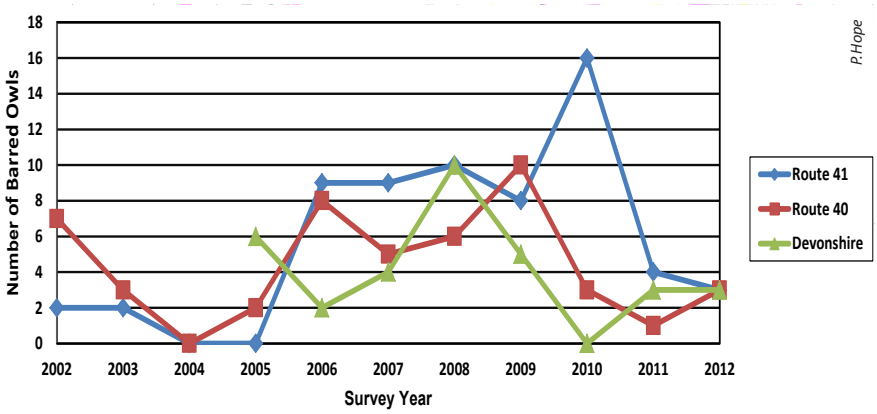
A. Belliveau, MTRI

Owl survey routes are indicated in red

CONTACTS

Peter Hope
PO Box 923
South Brookfield
NS B0T 1X0
Ph. (902) 682-2512
peterhope@ns.sympatico.ca

Chris McCarthy
Park Ecologist
Kejimkujik
Maitland Bridge
NS B0T 1B0
Ph. (902) 682-4100
Fx. (902) 682-3367
chris.mccarthy@pc.gc.ca
www.pc.gc.ca



P. Hope

Number of Barred owls detected on three survey routes. The Highway 8 (Route 40) and Kejimkujik (Route 41) routes have been surveyed since 2002 and the Devonshire/Rossignol Route has been surveyed since 2005

Rationale

Aerial insectivorous bird populations have been in sharp decline for several decades in North America. The Chimney swift was listed as Threatened in 2007 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and under the Species at Risk Act (SARA) in 2008. In Nova Scotia several well known roost sites have been monitored for many years by a number of dedicated volunteers. In 2010 multiple stakeholders came together, along with experts from Quebec, Ontario and Manitoba, to identify gaps and needs for Chimney swift recovery in the Maritime Provinces and bring current monitoring in line with other Canadian programs. The result was the Maritime Swiftwatch program initiated by Bird Studies Canada. This project aims to systematically monitor population levels at known roost sites, to learn more about nesting ecology of Chimney swifts and increase awareness of Chimney Swifts.

A. Pray-Leslie, MTRI

Chimney swifts

Monitoring

CHIMNEY SWIFT MONITORING IN SNBR

OBJECTIVES

- To conduct counts at known roost sites on standardized dates and other dates during migration and nesting seasons.
- To introduce new volunteers to Chimney swift monitoring to expand the base of available volunteers.
- To develop and test urban habitat inventory methods.

METHODS

- Chimney swifts were counted as they enter roost sites at dusk using visual and video counts.
- Roost sites for nesting birds were monitored.
- Incidental sightings of Common nighthawks were recorded.
- Inventory for chimney habitat was conducted through systematic searching and classification of chimneys.

RESULTS

- MTRI staff and volunteers conducted four casual surveys at the McGowan Lake roost and six out of eight standardized surveys for a total of ten counts at the McGowan Lake roost site.
- Counts occurred from May 13 to August 6 2012.
- Counts at McGowan Lake ranged from 98 Chimney swifts on May 27 2012 to 9 on August 6 and averaged 56 birds over ten counts. This is a considerable decrease from 2011 which had a range from 14 to 162 and averaged 80 birds.
- Birds were seen entering a chimney of a private residence in West Caledonia.

A. Pray-Leslie, MTRI

Field workers monitoring a Chimney swift roost

YEARS OF DATA

- Ongoing project since 2011

PARTNERS

- Bird Studies Canada
- Blomidon Naturalist Society
- Ecology Action Center
- Mersey Tobeatic Research Institute
- Nova Scotia Power

M. Crowley, Parks Canada

Dalhousie ornithology class monitoring swifts at the McGowan site

A. Pray-Leslie, MTRI

McGowan Lake roost site

CONTACT

Brad Toms
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
brad.toms@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

The Forest Health Section within the Forest Protection Division of the Department of Natural Resources monitors and assesses insect and disease populations and damage and provides technical advice and management options to forest stakeholders. In 2004, an aerial damage survey detected defoliation and mortality caused by the Jack pine budworm, a native insect of Jack pine stands, in mature stands of White pine throughout the Southwest Nova Biosphere Reserve. Because this was the first record of this defoliating pest causing damage to the forests of Nova Scotia, it generated concern among forest managers. The reason for the concern is that in Nova Scotia the Jack pine budworm is feeding specifically on mature White pine rather than its usual host, Jack pine, which is its preferred host in other regions of Canada and the United States.

Forest Health NSDNR

Light feeding damage to White pine

Monitoring

JACK PINE BUDWORM POPULATION AND DAMAGE ASSESSMENTS

OBJECTIVES

Aerial Surveys:

- To observe and record locations of defoliation, determine the size (ha) of the outbreak and the severity of the damage.

Ground Surveys:

- To place up to fifty pheromone traps baited with lures in mature and over-mature stands of White pine to collect male moths to detect building populations.
- To collect branch samples to determine overwintering larval (L2 second instar larval stage) population levels.

METHODS

Aerial Survey:

- Using one helicopter, two observers flew the entire province at an altitude of 600 m (approximate) along flight lines spaced 10 km apart.
- Locations of defoliation or mortality were delineated using a digitizing tablet and/or a personal computer using ArcPad software.
- Damage severity was also recorded for each polygon using a severity rating of light, moderate or severe defoliation or mortality.

Ground Surveys:

- Using ArcGIS software, forest stands containing a major component of mature to old growth White pine trees were selected that provided the habitat required to support an outbreak population of Jack pine budworm.
- At each of these sites one Multi-Pher® pheromone trap containing a lure to attract the male moths were placed during late June or early July, just before the peak period of moth emergence and flight activity.
- One 60 cm mid-upper crown branch section was collected from each of three trees at the sample location and brought to the Nova Scotia Department of Natural Resources lab for further processing. Each branch section was processed through a 1% sodium hydroxide (NaOH) wash to remove the second instar larvae from their hibernaculum and then identified and counted.

Forest Health, NSDNR

Adult moth (top), L2 larvae (bottom)

RESULTS

Forest Health, NSDNR

L2 extraction wash procedure

Aerial Survey:

- No new defoliation or dead trees were detected in 2012 while conducting this annual survey. However, while placing the pheromone traps in July, very light defoliation was observed while flying low level at approximately 300 feet altitude indicating the possible beginning of a new outbreak. Based on that observation we decided to collect three L2 samples around the perimeter of the area.

Ground Surveys:

- Forty-nine Multi-Pher® pheromone traps/lures were placed in mature and old growth White pine stands during June 2012 and were picked up in late fall.
- Thirty-two traps contained 0 moths; seven traps contained 1 moth; two traps contained 2 moths; two traps contained 4 moths; one trap contained 5 moths; and one trap contained 18 moths. Four traps were missing.
- Three locations were assessed for overwintering L2 larvae (see map). At JPBWpt1, 84 larvae per square meter of bark surface were found. At JPBWpt2, 0 larvae were found and at JPBWpt144, 50 larvae per square meter of bark surface were found.

YEARS OF DATA

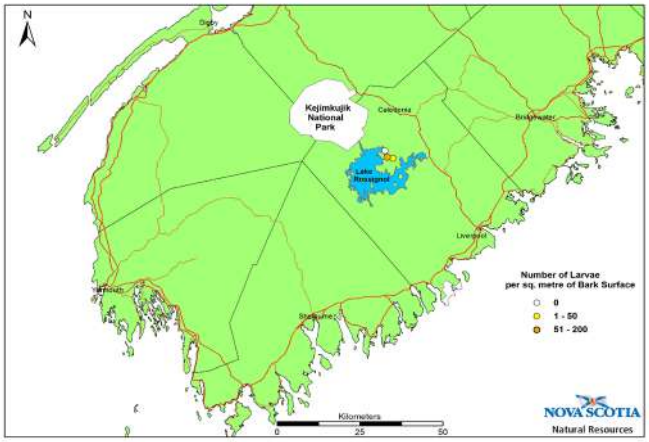
- Ongoing project since 2004

PARTNERS

- Nova Scotia Department of Natural Resources and Aviation Services

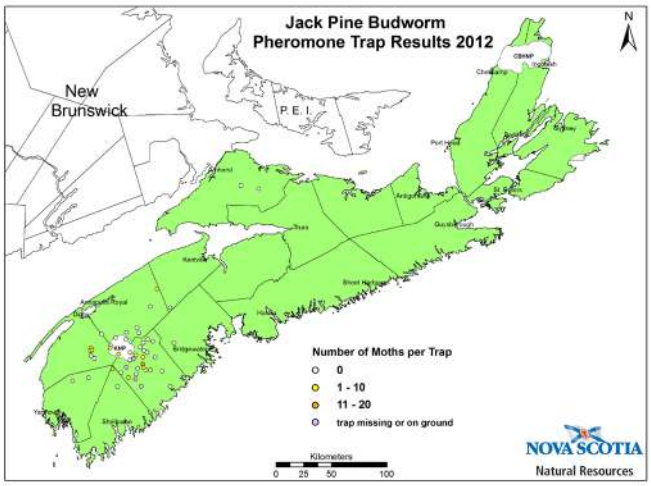
Forest Health, NSDNR

Multi-Pher® trap



Forest Health, NSDNR

Overwintering L2 larvae results



Forest Health, NSDNR

Pheromone trap catch results

CONTACT

Jeff Ogden and Mike LeBlanc
Nova Scotia Department of Natural Resources
PO Box 130
Shubenacadie, NS B0N 2H0
Ph. (902) 758-7213
Fx. (902) 758-3210
ogdenjb@gov.ns.ca
leblanma@gov.ns.ca
www.gov.ns.ca/natr/forestprotection/foresthealth

Rationale

The Brown spruce longhorn beetle, an introduced wood boring pest, is native to north and central Europe and Japan, where it uses stressed and dying conifers as hosts, most notably the Norway spruce. In 1999, the beetle was detected in Point Pleasant Park, Halifax, Nova Scotia and subsequent investigations confirmed that beetles collected in the park as early as 1990 were Brown spruce longhorn beetle. Studies conducted by the Canadian Forest Service since 1999 indicate that the wood-boring beetle is killing healthy spruce trees by feeding on the cambium and phloem and eventually girdling the tree. Brown spruce longhorn beetle is considered to be a pest of quarantine significance in Canada.


R. Neville

Brown spruce longhorn beetle

Monitoring

BROWN SPRUCE LONGHORN BEETLE SURVEY

OBJECTIVES

- To determine if the brown spruce longhorn beetle has spread beyond its known distribution in Nova Scotia.

METHODS

- Five trapping sites were selected in Kejimkujik.
- The intercept panel traps were baited with a combination of two ultra-high-release host-volatile lures and a Brown spruce longhorn beetle pheromone lure developed by the Canadian Forest Service.
- Sites were selected in spruce forests in close proximity to campgrounds and other locations that see high numbers of people. Traps were checked biweekly.

RESULTS

- There were four submissions with 18 samples sent to the Canadian Food Inspection Agency (CFIA) Entomology lab for identification.
- There were no detections for brown spruce longhorn beetle in Kejimkujik in 2012.

YEARS OF DATA

- Ongoing project since 2007

PARTNERS

- Parks Canada
- Nova Scotia Department of Natural Resources
- Natural Resources Canada - Canadian Forest Service


R. Neville

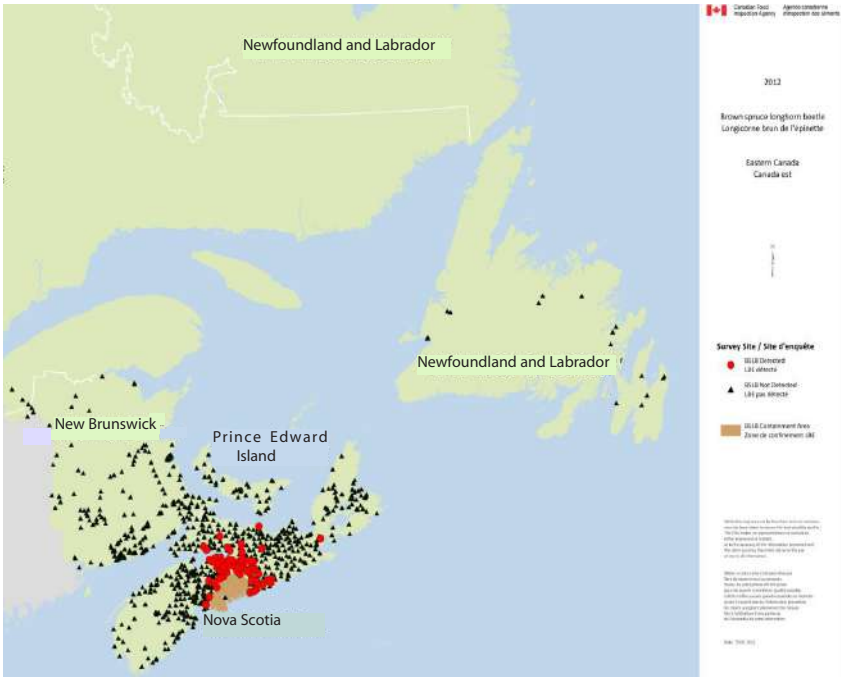
Burrow of a Brown spruce long-horn beetle

R. Neville

Intercept panel trap

S. Soppow

Brown spruce longhorn beetle from a ventral view



R. Neville

Brown spruce longhorn beetle sites throughout Atlantic Canada

CONTACT

Ronald Neville
Canadian Food Inspection Agency
1992 Agency Drive, Darmouth, NS
Ph. (902) 426-4469
Fx. (902) 426-4844
ron.neville@inspection.gc.ca
www.inspection.gc.ca

Rationale

Boreal felt lichen and other rare lichens that inhabit coastal forests in Nova Scotia are at risk because of air pollution and forestry. Boreal felt lichen and other rare cyanolichens are difficult to detect and as a result the knowledge of their ranges and distributions is incomplete. Little is known about which sources of air pollution pose the greatest threats and at what levels. A GIS habitat algorithm was developed by the Nova Scotia government and has allowed the forest industry to use precaution when harvesting in potentially sensitive areas. This project has fostered partnership with industry to search for Boreal felt lichen. Since the algorithm was developed knowledge of Boreal felt lichen populations has increased greatly. The continuation of this long term data set will be crucial to conserving Nova Scotia populations of Boreal felt lichen.

B. Toms, MTRI

Juvenile Boreal felt lichen

Monitoring

BOREAL FELT LICHEN MONITORING IN NOVA SCOTIA

OBJECTIVES

- To find and protect Boreal felt lichen and other at risk lichen sites in Nova Scotia.
- To improve predictive ability of a GIS habitat algorithm to increase the likelihood of finding Boreal felt lichen.
- To increase knowledge of habitat characteristics and severity of threats at Boreal felt lichen sites over time.
- To raise the profile of rare lichens in Nova Scotia

METHODS

- Sites predicted by GIS as likely habitat were searched for Boreal felt lichen.
- Known sites were permanently marked for long term monitoring.
- Data were collected on habitat parameters including: tree species, tree heights, tree diameters, tree ages, crown-closure, slope, aspect, drainage, ground cover and other parameters.
- When new Boreal felt lichen sites were found the provincial government and relevant stakeholders were notified. Any losses or habitat destruction were also reported.

B. Toms, MTRI

Adult Boreal felt lichen

RESULTS

- Thirty-three sites and 74 trees with Boreal felt lichen were discovered from 2005 to 2010 through this project and during the same time 11 of those sites and 20 of those trees with Boreal felt lichen were lost.
- In 2012, eight new sites were found with 33 new trees containing Boreal felt lichen while 12 trees containing Boreal felt lichen at eight sites were lost due to natural mortality.
- Seventeen trees with Boreal felt lichen were found in Halifax County, nine in Richmond County, six in Guysborough County and one in Shelburne County.
- Habitat parameters were collected at new sites. Sites were monitored annually.
- Forest industry employees were taken out to a Boreal felt lichen site and on searches for Boreal felt lichen to learn about

RESULTS
Continued

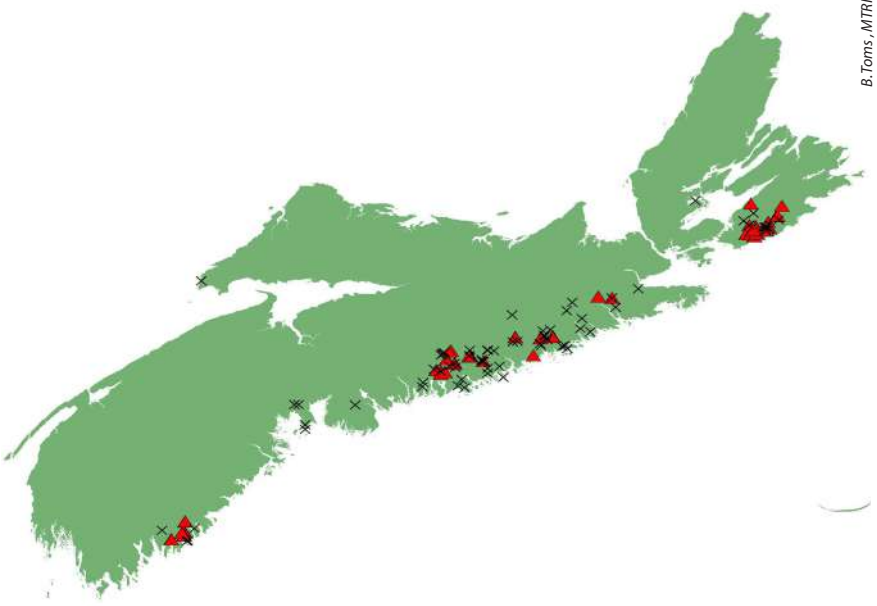
the habitat and participated in a one day lichen workshop at MTRI.

YEARS OF DATA

- Ongoing project since 2007

PARTNERS

- Government of Canada's Habitat Stewardship Program for Species at Risk
- New Page Corporation
- Nova Scotia Department of Environment
- Nova Scotia Department of Natural Resources
- Mersey Tobeatic Research Institute
- Mountain Equipment Co-op
- Resolute Forest Products



B.Toms , MTRI

Map showing the location of Boreal felt lichen (red triangles) and historic location of Boreal felt lichen (X)

CONTACTS

Brad Toms
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
brad.toms@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

Since the decline of the Mainland moose in the province, the White-tailed deer, a naturalized species, became one of the major herbivores affecting Kejimkujik forest ecosystems. Selective browsing of deer on certain species of herbaceous plants, shrubs and trees can exert extensive influences on forest community composition and structure. Significant increases in deer populations may result in a reduction of some forest plant components (*e.g.* sugar maple and yellow birch) through over-browsing. Alternatively, a decrease in local White-tailed deer abundance could result in changes in the predator trophic structure since deer are important prey for top predators, such as coyote and bobcat. White-tailed deer is also a game species and changes in deer populations can provide information about hunting pressure outside the park and the effectiveness of enforcement at Kejimkujik.

R. and B. Baird

White tailed deer in Kejimkujik

Monitoring

WHITE-TAILED DEER ABUNDANCE

OBJECTIVES

- To monitor and assess changes in the population of White-tailed deer at Kejimkujik.
- To determine if the mean number of White-tailed deer observed per day at Kejimkujik (as assessed by the roadside population) is within the range of natural variation (*e.g.* between 1.39-5.89, as determined through analysis of data between 1987-2007) and if it has increased or decreased over time.

METHODS

- White-tailed deer have been monitored at Kejimkujik since 1976 through an annual roadside count, which was conducted each day in October along the Main Parkway and locations within Jeremy's Bay Campground. The number, age class and sex of observed deer were recorded.
- The sampling framework for this project represents only the roadside population of White-tailed deer at Kejimkujik.
- White-tailed deer roadside count data between 1987 and 2012 were analyzed to detect trends over time. A linear model was used to assess whether the slope of the temporal variable was significantly different from zero. The period from 1987 to present is presumed to reflect a stable population level for this region in the current conditions and was used for the assessment period for trend analysis.
- The status of White-tailed deer at Kejimkujik was also examined by comparing recent data to established thresholds. Thresholds for White-tailed deer abundance at Kejimkujik were developed based on statistical variability in the yearly mean of deer counted per day in the roadside survey at Kejimkujik between 1987 and 2007. To assess status, the linear model from the trend assessment was used to generate a point estimate (with associated error) of the measure for the most recent year, which was then compared to the established thresholds.

D. Poulliot, Parks Canada

R. Brunt conducting a deer survey

RESULTS

- The current status of White-tailed deer at Kejimkujik remains good with a stable trend, meaning that White-tailed deer abundance is at a level that is considered to be within the

RESULTS
Continued

suitable range of abundance. Populations are believed to be low enough to not heavily impact forest ecosystem structure but high enough to support top-predator populations in the region.

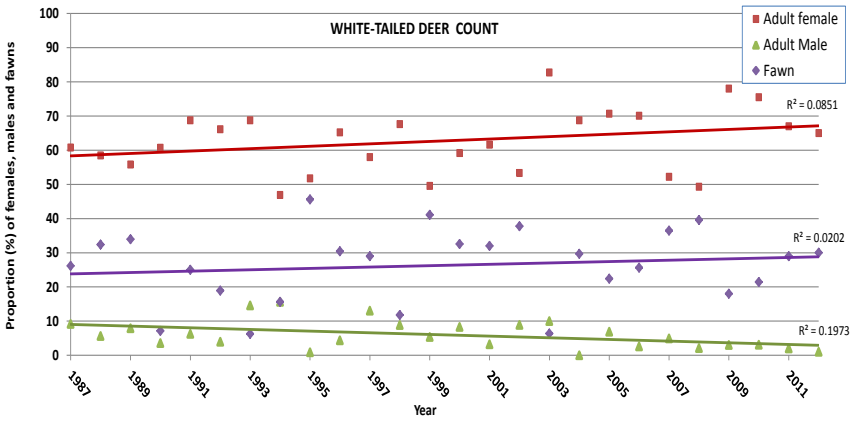
- Detailed research is recommended to better understand the carrying capacity of White-tailed deer at Kejimkujik to improve monitoring thresholds and inform future management needs.
- The proportions of adult female, adult male and fawn during 1987 to 2012 appear to indicate that the three categories remained stable over time. None of the simple regressions done on untransformed data between time (year) and the percent of adult female, male and fawn were significant.

YEARS OF DATA

- Ongoing project since 1976

PARTNERS

- Parks Canada
- Nova Scotia Department of Natural Resources



Packs Canada

Proportion of adult females, males and fawns from the total number of White-tailed deer counted during the survey each year, from 1987 to 2012 (Red: female, green: males, purple: fawns)

R. and B. Baird

A buck browsing along the roadside in Kejimkujik

CONTACTS

Daniel Pouliot and Donna Crossland
Parks Canada
PO Box 236 Maitland Bridge
NS B0T 1B0
Ph. (902) 682-2293
Fx. (902) 682-3367
daniel.pouliot@pc.gc.ca
donna.crossland@pc.gc.ca
www.pc.gc.ca

Rationale

Glossy buckthorn is an aggressive non-native shrub that can form dense colonies and exclude native plants. Glossy buckthorn is well established throughout the Southwest Nova Biosphere Reserve, including Kejimkujik and local communities, such as Maitland Bridge and Caledonia. The replacement of native plant species by non-native Glossy buckthorn can alter ecosystem biodiversity. In essence, Glossy buckthorn can reduce native biodiversity and alter natural forest succession. Glossy buckthorn has the ability to invade pristine areas located considerable distances from the original parent populations. Management of this plant is a priority in Kejimkujik.

K. Rowter, Parks Canada

Glossy buckthorn in full fruit growing within the riparian zone of Cannon Brook found on August 2011

Monitoring

GLOSSY BUCKTHORN ERADICATION AND MANAGEMENT

OBJECTIVES

- To effectively eradicate all mature, seed-producing Glossy buckthorn plants as their locations become known.
- To carry out effective monitoring in areas where Glossy buckthorn was eradicated to ensure exhaustion of the seed bank.
- Educate and engage the public on the ecological impacts of Glossy buckthorn, its identification and how to employ the most effective means of control.

METHODS

- Kejimkujik has adopted a protocol to manage Glossy buckthorn.
- Young Glossy buckthorn saplings and seedlings were hand-pulled wherever they were detected or at minimum, recorded in a database for eradication in the near future.
- Mature and reproductive plants will be eradicated by mechanically severing the main stem, followed by a carefully applied chemical control to prevent regrowth. Staff have been trained and certified for safe application of herbicides.
- A combination of mechanical and chemical control treatments on mature and reproductive Glossy buckthorn will be carried out to determine the best methods to reliably and effectively remove the invasive plant from park lands, while minimizing expenditures, time, labour and quantity of glyphosate required to prevent regrowth.
- During December 2012, the first application of glyphosate herbicide was experimentally applied to mature Glossy buckthorn plants using a 'cut-stump' treatment application. Plants were labelled with GPS locations and treatment codes. The surfaces of freshly cut stumps were treated with one of two concentrations of glyphosate.
- A database of all Glossy buckthorn locations was maintained to log new occurrences of the plant, track eradication treatments and to conduct follow-up monitoring.

Parks Canada

K. Rowter documenting the location of a new Glossy buckthorn occurrence on Cannon Brook

RESULTS

- During the past two years (2011 and 2012), 23 and 19 new occurrences, respectively, of Glossy buckthorn were located, many of them growing in remote locations, such as the Liberty Lake Trail and Cannon Brook.
- During December 2012, the first chemical control application was experimentally applied to mature Glossy buckthorn plants using a 'cut-stump' treatment application. Plants were labelled with GPS locations and treatment codes. The surfaces of cut stumps were treated with one of two concentrations of glyphosate.
- The efficacy of herbicide treatments will be verified during 2013 and additional treatments will be carried out.

YEARS OF DATA

- Ongoing since 2008

PARTNERS

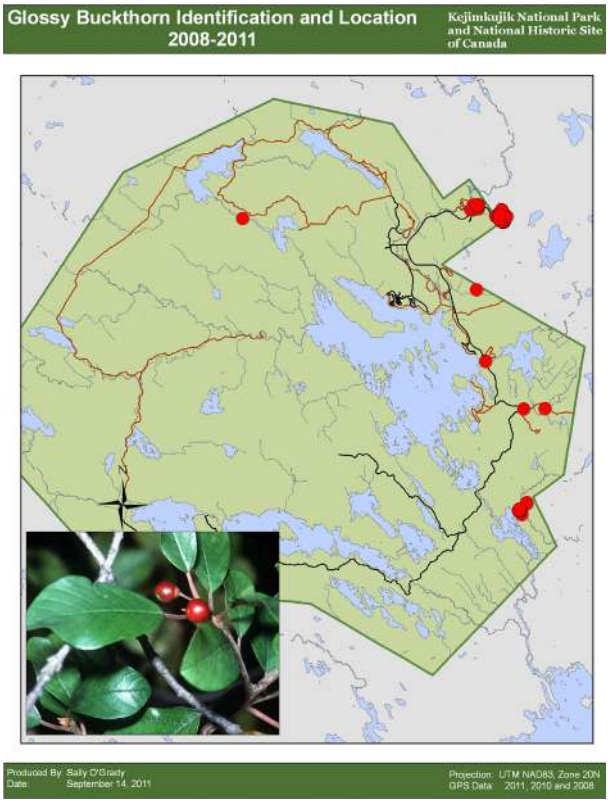
- Parks Canada

Parks Canada

K. Rowter examining Glossy buckthorn on Cannon Brook

K. Rowter, Parks Canada

Glossy buckthorn on Channel Lake Stillwater found on October 10, 2011



S. O'Grady, Parks Canada

Preliminary results from the Glossy Buckthorn survey in Kejimkujik

CONTACTS

Daniel Pouliot and Donna Crossland
Parks Canada
PO Box 236 Maitland Bridge
NS B0T 1B0
Ph. (902) 682-2293
Fx. (902) 682-3367
daniel.pouliot@pc.gc.ca
donna.crossland@pc.gc.ca
www.pc.gc.ca

Rationale

Plethodontid salamanders lack lungs and breathe through their glandular skin and the roof of their mouth, which must remain moist for respiration; they are vulnerable to desiccation and soil contaminants. Plethodontids can reach high densities in many forest habitats and play an important role in ecosystem food webs and detrital dynamics. They are useful indicator species of forest ecosystems due to their life history traits. They are completely terrestrial and occupy a small home range. They generally have long life spans (ten plus years), high annual rates of survivorship and low birth rates, resulting in stable population sizes under normal conditions. Thus a change in population is more likely to be an indication of some stress to a forest ecosystem rather than simply due to shifts in home range. In Nova Scotia there are only two native plethodontid salamanders: the Four-toed salamander (rare) and the Eastern red-backed salamander (common). Salamanders are monitored as one component of the integrated forest plots designed to assess and monitor the state of forest ecosystems at Kejimkujik and detect changes over time.

Red-backed salamanders

Monitoring

PLETHODONTID SALAMANDER MONITORING

OBJECTIVES

- To monitor plethodontid salamander abundance in mixed and hemlock forest ecosystems of Kejimkujik.

METHODS

- Salamander abundance was assessed in six long-term integrated forest plots that were established in 2003 in mixed and hemlock forest ecosystems using a stratified random sampling design.
- Within these plots, salamander abundance was assessed once per week for four weeks in mid-September to mid-October each year.
- At each plot, the number of salamanders observed under 40 thick wooden boards (Artificial Cover Objects) was counted and recorded. Though the monitoring focus was placed on Red-backed salamanders, all other salamander species were recorded when present.

RESULTS

- Red-backed salamander abundance appears to be stable in hemlock and mixed forests at Kejimkujik over the last seven years.
- These results suggest that stressors such as climate change, acid rain and land use change currently do not significantly influence salamander abundance in forest ecosystems at Kejimkujik.

Red-backed salamander found under an artificial cover board

YEARS OF DATA

- Ongoing project since 2003

PARTNERS

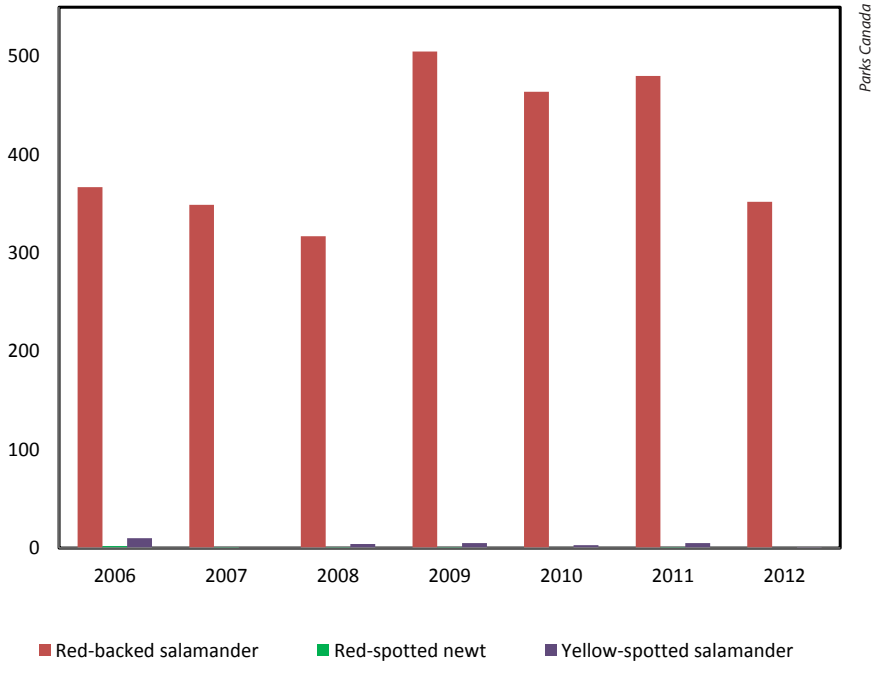
- Parks Canada
- Ecological Monitoring and Assessment Network (EMAN)
- Dalhousie University

Parks Canada

Red spotted newt

Parks Canada

Yellow spotted salamander



Parks Canada

Total salamanders recorded in hemlock and mixed wood stands in Kejimkujik during 2006-2012 (Red-backed salamanders are represented by the red bars, Red-spotted newts are green and Yellow-spotted salamanders are purple)

CONTACTS

Donna Crossland and Daniel Pouliot
Parks Canada
PO Box 236 Maitland Bridge
NS B0T 1B0
Ph. (902) 682-2293
Fx. (902) 682-3367
donna.crossland@pc.gc.ca
daniel.pouliot@pc.gc.ca
www.pc.gc.ca

Rationale

Red oak trees play a significant role in the Acadian Forest, providing both food and shelter for a diversity of wildlife. Monitoring Red oak plots in Kejimkujik over the past few years has shown poor levels of regeneration. Some of the contributing factors to the disturbance of Red oaks in the Acadian forest likely include past forestry practices and suppression of forest fires. Other contributing factors that may have altered Red oak regeneration and distribution also include browsing by White-tailed deer, acorn predation and stress from defoliators. The purpose of this work is to assess the health of mixedwood stands with Red oak and to determine appropriate sites for Red oak regeneration experiments both inside and outside Kejimkujik. These proposed experiments will help build a better understanding of management techniques to be used in Kejimkujik and other parts of the Acadian forest region.

A. Belliveau, MTRI

Red oak leaf

Research

RED OAK REGENERATION IN MIXEDWOOD STANDS

OBJECTIVES

- To collect data to determine appropriate sites for Red oak regeneration experiments both inside and outside Kejimkujik.
- To set up and monitor White-tailed deer exclosures that protect hardwood seedlings and saplings from browsing.
- To monitor hardwood, especially Red oak, regeneration over a 10-year period within permanently marked transects and deer exclosures and determine the impact White-tailed deer have on Red oak regeneration.
- To assess the damage inflicted on mature Red oaks by the Oak leaf shredder and Oak leaf roller.
- To monitor Red oak recruitment in previously determined areas by completing vegetation transects and Forest Ecosystem Classification plots.

METHODS

- Researchers were trained to complete Forest Ecosystem Classification vegetation and soil plots. This involved digging soil pits, completing species inventories for 10 by 10 m transects and estimating canopy cover by each tree species.
- Researchers were trained to complete belt transects of 150 by 2 m covering a total of 300 m² to quantify Red oak regeneration and competition and rare vascular plant species, both in control sites and treatment (prescribed burn) sites.
- Red oak defoliation was estimated visually in belt transects.
- Three deer exclosures measuring 2 m by 2 m were erected in the centre of randomly selected quadrats within each permanently marked site.

RESULTS

- Forest Ecosystem Classification was used in combination with logistical considerations to determine five permanent transect and exclosure sites inside Kejimkujik and four sites outside the park.
- A total of ten transects were permanently marked at five sites inside Kejimkujik.
- Thirty White-tailed deer exclosures have been erected at seven

A. Belliveau, MTRI

Cancer root, a rare vascular plant of Red oak forests

RESULTS
Continued

different sites, three inside Kejimkujik and four outside.

- Preliminary analysis of pre and post-burn data has demonstrated the prescribed burn area is succeeding forward as a Red maple and Witch hazel uplands forest and that White pine seedlings and saplings are significantly reduced.
- Data from transects showed that mature Red oaks experienced on average 39% defoliation, while over 40% of seedlings were browsed by deer.

YEARS OF DATA

- Year 7 of an ongoing project

PARTNERS

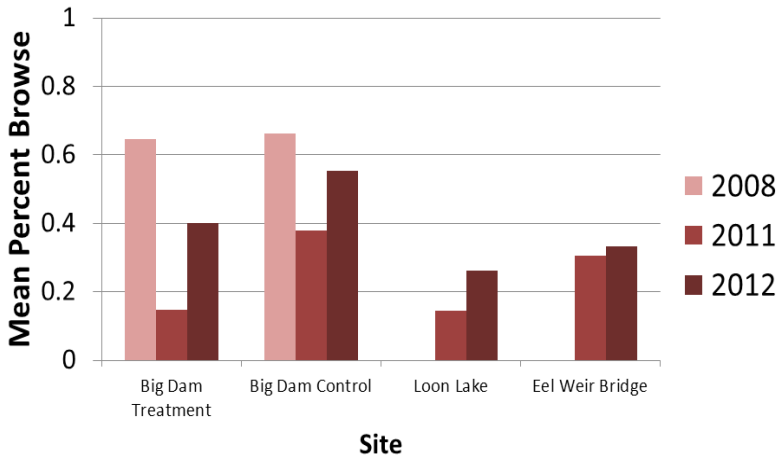
- Mersey Tobeatic Research Institute
- Parks Canada
- Nova Scotia Community College
- Nova Scotia Department of Natural Resources
- Nova Scotia Economic Development
- Service Canada

A. Belliveau, MTRI

White-tailed deer

A. Belliveau, MTRI

Post burn at Big Dam Lake



A. Belliveau, MTRI

Mean percent deer browse of Red oak seedlings less than 2 m

CONTACTS

Alain Belliveau
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Pierre Martel
Parks Canada
PO Box 236 Maitland Bridge
NS B0T 1B0
Ph. (902) 682-2798
Fx. (902) 682-3367
pierre.martel@pc.gc.ca
www.pc.gc.ca

Rationale

Old climax Acadian forest types are some of the most Threatened ecological features in the province because they contain high volumes of high-value softwood and hardwood timber that is the primary target of the forest industry. In southwest Nova Scotia, woodlands formerly owned by Bowater and recently purchased by the provincial government may encompass significant areas of old climax Acadian forests. These land holdings have been managed for intensive, industrial forestry over many years and are characterized by a dense network of forestry roads, extensive old and recent clearcuts and young regenerating forests. However, given the significant finds of old forests in this area in a preliminary study by MTRI in 2010, there is good potential for finding old forests within the Medway and Rossignol districts, an area representing over 120,000 hectares. The purpose of this research is to identify areas of high conservation value on former Bowater lands to guide conservation efforts and land securement decisions.

Volunteer coring old hemlock tree

Research

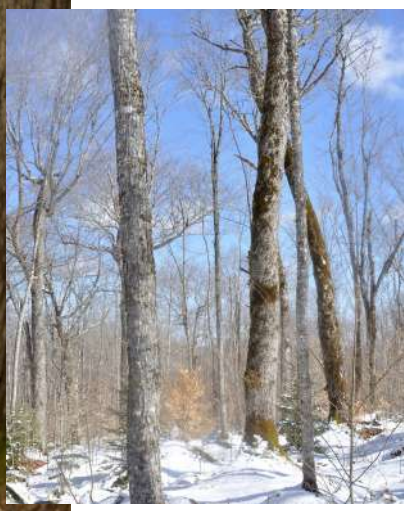
OLD FORESTS IN THE MEDWAY AND ROSSIGNOL DISTRICTS

OBJECTIVES

- To collect and assemble geographic information pertinent to old forest stands.
- To spatially define forest types within these districts and identify potentially old forests.
- To collect field data for selected forest stands to assess their conservation value within the landscape.
- To provide all data in the form of maps, georeferenced spreadsheets and photos of all stands assessed to the Crown Share Land Legacy Trust Trustees, land trusts and other land securement decision-makers.

METHODS

- Using GIS, older climax Acadian forests were identified by targeting shade-tolerant coniferous, deciduous and mixedwood forests and also climax forest patches that may be younger but contain significant components of large legacy trees.
- A subset of highest-priority patches for field-truthing according to the GIS and advice from the Crown Share Land Legacy Trust Scientific Advisory Committee were selected.
- Forest stands were assessed on the ground using a rapid reconnaissance level methodology which captured species composition, structure, age, diameter, height, crown closure, regeneration, deadwood, ground cover, evidence of human disturbance, drainage and landform.
- High resolution photographs were taken at each stand and maps created with geographic points and tracks.
- Results were reported to the Crown Share Land Legacy Trust Trustees.



Old tolerant hardwood climax forest

RESULTS

- GIS mapping suggested that some old climax Acadian forest in the Medway and Rossignol districts still remain and that approximately ten areas are showing higher-than-average concentrations of old forest polygons, which will be targeted for ground-truthing.
- Two of these areas have been surveyed, with several stands of old climax Acadian forests identified in both areas.

RESULTS
Continued

- Preliminary results confirm the presence of previously unrecorded old climax Acadian forests.

YEARS OF DATA

- Single year project

PARTNERS

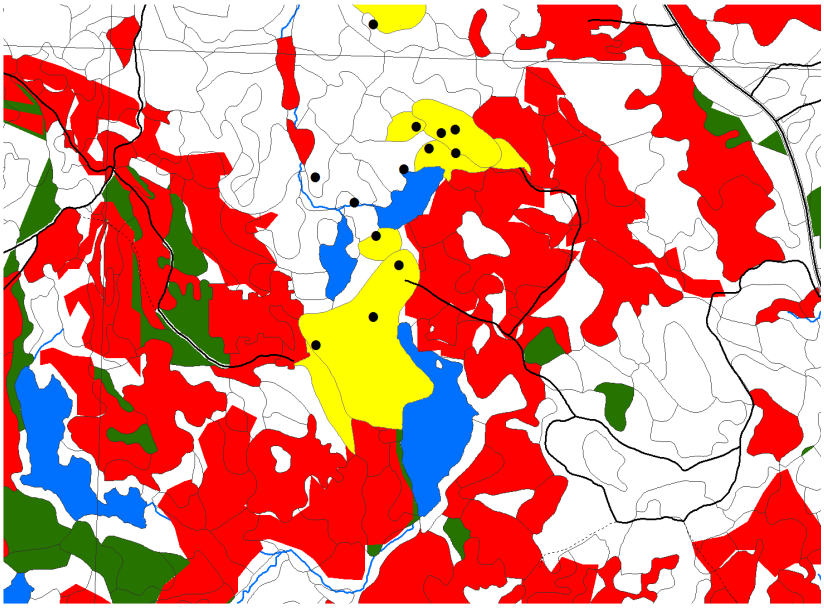
- Mersey Tobeatic Research Institute
- Crown Share Land Legacy Trust Scientific Advisory Committee
- Nova Scotia Department of Natural Resources
- Nova Scotia Department of Environment

A. Belliveau, MTRI

Hemlock tree with a DBH greater than 85 cm

A. Belliveau, MTRI

Rings from hemlock core sample



A. Belliveau, MTRI

Example of GIS analysis near Pike Lakes, Annapolis County, with dots (survey waypoints), red polygons (recent clearcuts), green polygons (high potential old forests) and yellow polygons (confirmed old forests)

CONTACTS

Alain Belliveau
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

Transitions between plant communities on the landscape have become a focus of ecological research due to their relatively high diversity and sensitivity to global climate change. However, little is known about how vegetation changes across natural landscape boundaries such as the forested edges around lakes. Boundary structure affects flows of energy, material and organisms across such transitions. Determination of the effective width of these transitions will contribute towards mapping the extent of transition zones on the landscape that may have greater biodiversity and different habitat features that are important for wildlife conservation. Understanding the structure and composition of the transitions around old hemlock forest stands is particularly important given their significance for conservation.

K. Harper, Dalhousie

A lakeshore edge of an old-growth hemlock forest

Research

VEGETATION OF OLD-GROWTH FOREST LAKE EDGES

OBJECTIVES

- To estimate the distance of edge influence (edge width) for forest structure, understory composition and tree growth at lakeshore edges of old growth forest.
- To compare patterns of changes in vegetation structure and individual species across lakeshore forest edges of old and mature spruce forest stands.
- To determine if understory and structural diversity are greater at the edge compared to the adjacent old forest.

METHODS

- Transects were set up across five lakeshore forest edges in old growth hemlock forests in southwest Nova Scotia with sampling points at 0, 5, 15, 25, 40, 60, 100, 140 and 180 m from the lakeshore edge.
- At each sampling point forest structure characteristics were measured, including canopy cover, live and dead tree density.
- Three trees were cored at each sampling point to measure tree ring width to estimate tree growth rates.
- Contiguous 1 x 1 m quadrats 0 to 60 m and across 5 m spans at 100, 140 and 180 m were used to estimate cover of saplings and understory species.
- Similar data were collected at lakeshore edges in mature spruce forest in 2010.
- Analysis focused on comparing data at each edge distance with the reference data (at 100, 140 and 180 m) using randomization tests. Later, spatial pattern analysis will be used to compare patterns across the transitions.

A. Naylor

K. Harper coring a large hemlock tree in old-growth forest

RESULTS

- More small trees were found with fewer well decayed logs, fewer saplings and greater shrub cover within 5 m of lakeshore edges of old-growth forest compared to interior forest.
- Distance of edge influence extended further (50 to 55 m) for greater leaf litter cover and lower moss cover.
- Patterns of individual species abundances varied across the transition zone.

RESULTS
Continued

- The lakeshore transition zone exhibited more differences in structure in old growth hemlock forests compared to mature spruce forests which did not have significantly different structure compared to interior forest.
- More tree and shrub species were found up to 25 and 5 m, respectively, from the lakeshore edge compared to interior forest, but there were fewer moss and lichen species right at the edge.
- Maximum age was lower and tree growth rate was higher at the edge compared to interior forest; however, trends were not significant.
- These lakeshore edges exhibited some unique features on the landscape such as higher woody plant diversity that suggest these transition zones could be important habitat features and may contribute to the conservation value of these old-growth hemlock forests.

YEARS OF DATA

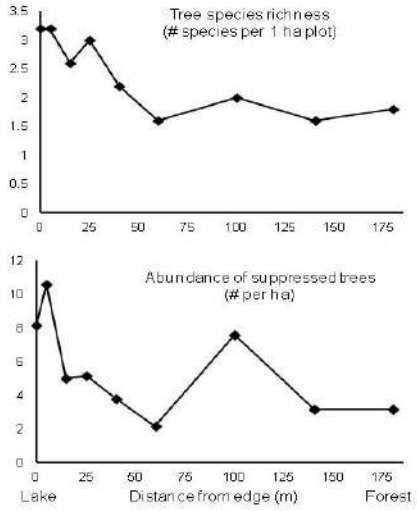
- Single year of the project

PARTNERS

- Natural Sciences and Engineering Research Council of Canada

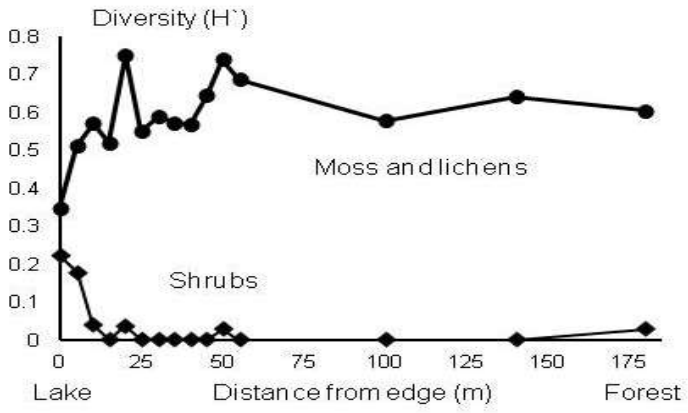
K. Harper

C. Angelids and A. Naylor estimating cover in a quadrat in interior old-growth hemlock forest



K. Harper

Average tree species richness and abundance of suppressed (short) trees from the lakeshore forest edge into interior old-growth hemlock forest. Tree species richness is highest at the edge while suppressed tree density peaks in abundance at 5 m from the edge.



K. Harper

Average diversity (estimated using the Shannon index) of shrubs, as well as of moss and lichens combined from the lakeshore forest edge into interior old-growth hemlock forest. Shrub diversity is highest while diversity of moss and lichens is lowest at the edge.

CONTACTS

Karen Harper
School for Resource and Environmental Studies, Dalhousie University
6100 University Avenue, Suite 5010,
Halifax, NS B3H 4R2
Ph. (902) 494-6355
Fx. (902) 494-3728
karen.harper@dal.ca
http://myweb.dal.ca/kr987908

Rationale

Rockrose is an herbaceous perennial plant listed as Endangered by the province's Endangered Species Act. The largest population in Nova Scotia is found in the Kingston sand barrens of Kings County. This study was conducted on two small populations in Queens County in two different habitats. One is located on the shore at Maplesue Point of Ponhook Lake and the other is along and near the roadside on Chapel Hill Road, Greenfield. The study was initiated in order to gather information on the life cycle of Rockrose and to determine if there are morphological differences between the plants at these two sites. Over the years, data collected will help determine if these populations are stable and provide information applicable for conservation management.

D.LaRue, MTRI

Flowering plant at Chapel Hill site

Research

ROCKROSE IN QUEENS COUNTY

OBJECTIVES

- To determine the rate of growth and basic morphological characteristics of Rockrose plants at the Queens County sites.
- To record basic environmental characteristics of each site, including presence of pollinators.
- To determine if morphological differences between the sites are due to environmental plasticity.
- Over the years, to determine if these two populations are stable, expanding or diminishing.
- To determine if new seedlings are being produced at the two sites.
- To increase knowledge of Rockrose population dynamics.

METHODS

- Each site was visited every two or three weeks throughout the growing season.
- Site characteristics such as soil type, companion vegetation, percent cover, sun or shade were noted.
- The length of each stem was measured until it reached maximum height for the season.
- The onset of flowering for both the showy insect fertilized chasmogamous flowers and the self fertile cleistogamous flowers were noted for each stem.
- The appearance of seed capsules and when they opened, for both types of flowers were noted.
- The onset of or lack of branching of each stem was noted.
- At each visit, the presence of pollinators (by group) was noted.

D.LaRue, MTRI

Measuring percent cover of several rock-rose plants at Maplesue Point

RESULTS

- The Ponhook Lake site had sandy soil with cobble as the primary cover.
- The Chapel Hill site had a sandy loam soil with a cover of lichens, mosses, other herbaceous and groundcover shrubs.
- Rockrose plants at the Ponhook Lake site were taller, had more stems per plant, produced more of both types of flowers

RESULTS
Continued

sooner with more flowers setting seed and produced more branches, than those at Chapel Hill.

- Several plants of a single stem reached 4 to 7 cm by the end of May and grew no taller; however, they produced cleistogamous flowers at the Ponhook Lake site.

YEARS OF DATA

- Year 1 of an ongoing project

PARTNERS

- Mersey Tobeatic Research Institute

D. LaRue, MTRI

Rockrose in bloom

D. LaRue, MTRI

Searching and counting at the Chapel Hill site

D. LaRue, MTRI

Large multi-stemmed plant in full sun at Maplesue Point

CONTACTS

Diane LaRue
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
laruedi@gmail.com
www.merseytobeatic.ca

FRESHWATER

M. Boucher, MTRI

Rationale

The Atlantic Coastal Plain Flora (ACPF) is a group of plants that exist mainly on lakeshores and wetland habitats in Nova Scotia. Their populations are largely disjunct from other ACPF populations in Canada and several species have been listed under Species At Risk Act. In 2010 MTRI, in partnership with the ACPF Recovery Team, Nova Scotia Nature Trust and Parks Canada initiated a project to collect baseline data for the Species at Risk Act listed ACPF populations in southwest Nova Scotia, establish monitoring protocols and increase stewardship opportunities for landowners who live with ACPF.

A. Belliveau, MTRI

Buttonbush in bloom

Monitoring

ATLANTIC COASTAL PLAIN FLORA STEWARDS IN COTTAGE COUNTRY

OBJECTIVES

- To monitor populations of Endangered, Threatened and Special Concern ACPF on 32 high priority lakes identified in the ACPF recovery strategy.
- To monitor water quality to detect threats to the low nutrient environment of ACPF.
- To engage landowners on the 32 high priority lakes.
- To collect habitat information on lakes where botanical surveys are conducted.

METHODS

- Populations of priority ACPF species were counted and georeferenced along lake shores.
- Shoreline habitat was documented through georeferenced photos and habitat parameter data.
- Landowners were engaged through door to door visits and public events.
- Landowners were directly involved in a variety of recovery activities.
- Water sampling was conducted in 13 high priority lakes.

A. Belliveau, MTRI

Researcher looking at Water-pennywort

RESULTS

- Complete surveys took place on 12 lakes: Gold, Western, Harpers, Kempt Snare, Louis, Belliveau, Moosehorn, Cameron, Beartrap, Mill, Pretty Mary and Mudflat lake.
- Partial surveys took place on six lakes: Molega, Ponhook, Great Pubnico, Raynards (now complete), Kejimkujik and Fancy lake (now complete). These lakes were too large to complete in a single year.
- Landowners at seven lakes were contacted and four public events were held. Fifty volunteers contributed 580 hours to the project.

YEARS OF DATA

- Year 3 of a 5 year project

PARTNERS

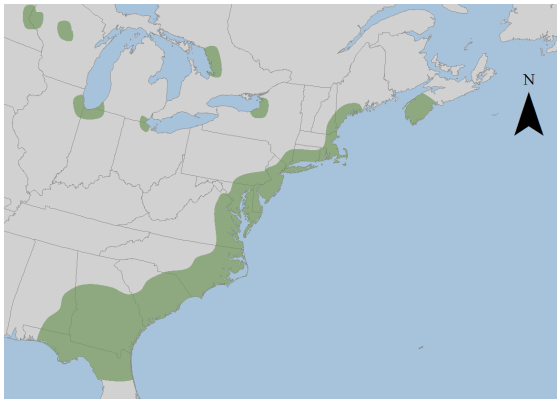
- Parks Canada
- Atlantic Canada Conservation Data Centre
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Dalhousie University
- Nova Scotia Environment
- Sage Environmental Fund
- Nova Scotia Nature Trust
- Tusket River Environmental Protections Association
- RBC Blue Water Fund
- Fern Hill Institute for Plant Conservation

A. Belliveau, MTRI

Small swollen bladderwort

P. Hudson

Bontanists, researchers and volunteers assisting with ACPF surveys



A. Belliveau, MTRI

North American distribution of ACPF species

A. Belliveau, MTRI

Volunteer on Belliveau Lake surveying for ACPF

A. Belliveau, MTRI

Curly grass fern

A. Belliveau, MTRI

Golden crest

CONTACTS

Brad Toms
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

In 2011, The Nova Scotia Nature Trust, MTRI and Kejimkujik came together to create an Atlantic Coastal Plain Flora (ACPF) Volunteer Plant Monitoring Program. This program offers various volunteer opportunities to individuals or groups interested in helping with ACPF conservation and recovery efforts, in support of the ACPF Recovery Team's work. The Volunteer Plant Monitoring Program evolved from the Rare Plant Monitoring Program run by the Nova Scotia Nature Trust since 2000. The updated, collaborative plant monitoring program was designed to involve interested, conservation minded individuals and groups in community based science to collect information on the populations and habitats of particular species of ACPF on an annual basis. The data collected by monitors contribute to the growing understanding of ACPF, especially at risk ACPF, in Nova Scotia. They also contribute to the stewardship of Nova Scotia Nature Trust's protected properties in southwest Nova Scotia.

J. Sollows, TREPA

Plymouth gentian at Gillian Lake, C.R.K. Allen Nature Reserve

Monitoring

ACPF VOLUNTEER PLANT MONITORING

OBJECTIVES

- Collect data on presence of ACPF species and changes in their populations along lakeshores in southwest Nova Scotia.
- Document threats along the shorelines of lakes that are a high priority for recovery action.
- Engage volunteers in a meaningful monitoring program that contributes directly to the conservation of ACPF species.

METHODS

- Two ACPF identification and monitoring training events were offered by staff from Nova Scotia Nature Trust, MTRI and Kejimkujik.
- Volunteers were assigned to one or more sites known to have ACPF. Permission was received from landowners for monitors to work on their properties.
- Between July and September, volunteers estimated the abundance of particular at risk or rare ACPF along the shoreline or in the wetland.
- At one spot at each site volunteers measured water level to calculate the area of exposed shoreline.
- At each site volunteers collected data on the quality of habitat, noting occurrences of disturbance (evidence of all terrain vehicle use, shoreline alterations, etc.) or other potential impacts (*e.g.* invasive plants).
- Volunteers completed data sheets and submitted them to the Nova Scotia Nature Trust.

H. and D. Clapp

Carolina redroot at Nova Scotia Nature Trust Cameron Lake Conservation Lands

RESULTS

- Sixteen volunteers worked individually or in teams to monitor at risk ACPF along the shorelines of lakes, rivers and in wetlands in southwest Nova Scotia and contributed over 100 hours of volunteer time.
- Sixteen ACPF sites were monitored. These sites occurred on the Medway River and the following lakes: Ponhook, Molega, Cameron, Gillfillan, Fancy, Snare and Moody.
- Data were recorded on the following species: Redroot, Goldencrest, Buttonbush, Northeastern bladderwort, Long's bulrush, Brookside alder, Purple bladderwort, Virginia marsh St. John's wort, Southern bog clubmoss, Yellow eyed grass,

RESULTS
Continued

Pipewort, Grassleaf rush, Swamp milkweed, Blunt manna grass, Golden pert, Screwstem, Virginia meadow beauty, Phragmites and Coastal plain joe pye weed.

- Data were recorded on the following activities (or occurrences) potentially affecting habitat quality: all terrain vehicle (tracks and drivers), animal grazing and increased algae and grass.

YEARS OF DATA

- Ongoing project since 1999

PARTNERS

- Nova Scotia Nature Trust
- Mersey Tobeatic Research Institute
- Parks Canada
- Atlantic Coastal Plain Flora Recovery Team
- Nova Scotia Department of Environment
- Nova Scotia Department of Natural Resources
- Atlantic Canada Conservation Data Centre
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Nova Scotia Habitat Conservation Fund
- Municipality of the District of Shelburne
- Municipality of the District of Lunenburg

NSNT

Cover of the ACPF plant monitoring protocol

NSNT

ACPF volunteer plant monitor training on Ponhook lake

CONTACTS

Cristi Frittaion
Nova Scotia Nature Trust
2085 Maitland St
Halifax, NS B3K 2Z8
Ph. (902) 425-5263
Fx. (902) 429-5263
cristi@nsnt.ca
www.nsnt.ca

Rationale

Atlantic Coastal Plain Flora (ACPF) is a group of plants found along the low lying land of the Atlantic coastal plain. Many of these ACPF species are at risk. These plants are typically poor competitors against other plants and therefore they often thrive in the areas where other plants are not able to grow quickly. These areas are typically along lake shorelines with a high degree of winter ice scour, where flooding is common and in areas with low water nutrient levels (oligotrophic). Although ACPF can be found near water with moderate (mesotrophic) or even high (eutrophic) nutrient levels, increased lake nutrient levels have been identified as a significant threat to ACPF species.

Cameron Lake

Monitoring

WATER QUALITY IN ATLANTIC COASTAL PLAIN FLORA HABITAT

OBJECTIVES

- To sample water quality from a representative subset of 15 of the high priority lakes identified in the ACPF recovery strategy.
- To involve and recruit volunteers to monitor lake water quality.
- To contribute to existing water quality data sets from high priority ACPF lakes.
- To present results to community members to raise awareness about the importance of lake water quality and ACPF.

METHODS

- Water samples and on site measurements of water quality data were collected at the deepest point of each lake four times annually (May, July, August and October).
- The Carlsons trophic status index was calculated for each sampling site.
- Water quality sampling training workshops were held for interested community members and volunteers in locations near both Medway and Tusket watersheds.
- Community information sessions were held in late fall to update interested people on the results of the project to date and temporal trends.

Volunteers K. Cirtwill and M. Howard at Cameron Lake getting ready for water quality sampling

RESULTS

- Two water quality sampling training workshops were held, one in the Tusket area (Carleton) and one in the Medway area (Kempt).
- Twelve high priority lakes with a total of 15 sites were sampled four times each in May, July, August and October.
- With data averaged over all four sampling periods, nine sites were found to be oligotrophic, five mesotrophic and one eutrophic based on the Carlsons trophic status index.
- Between 2010 and 2012, the Carlsons trophic status index increased for one site, stayed the same for two sites and decreased for seven sites. Five of the sites had not been previously assessed.
- Two information sessions were held after the sampling periods (in Carleton and Kempt) to disseminate the results of

RESULTS
Continued

the project, collect feedback and answer questions about water chemistry trends.

YEARS OF DATA

- Year 3 of a 5 year project

PARTNERS

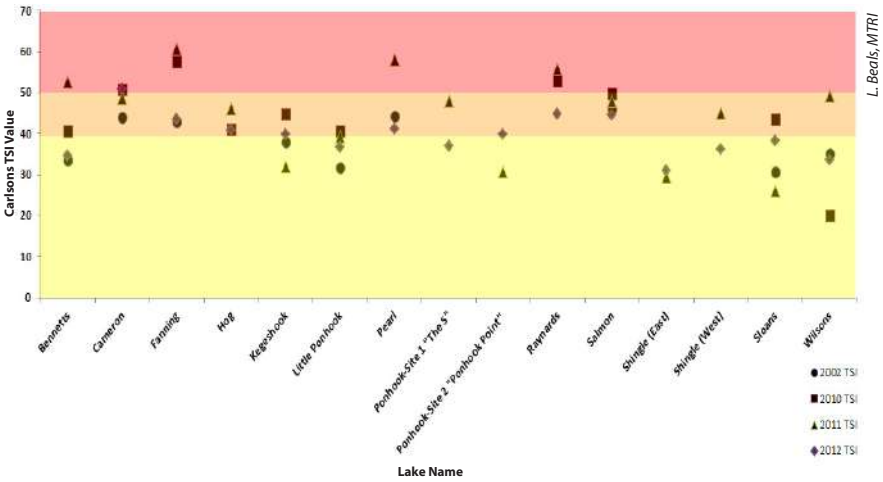
- Royal Bank of Canada Blue Water Fund
- Parks Canada
- Mersey Tobeatic Research Institute
- Atlantic Coastal Plain Flora Recovery Team
- Tusket River Environmental Protection Agency
- TD Friends of the Environment Foundation
- Acadia University
- Government of Canada's Habitat Stewardship Program for Species at Risk

B. Keoghoe, MTRI

M. Boucher rinsing sample bottles on Little Ponhook

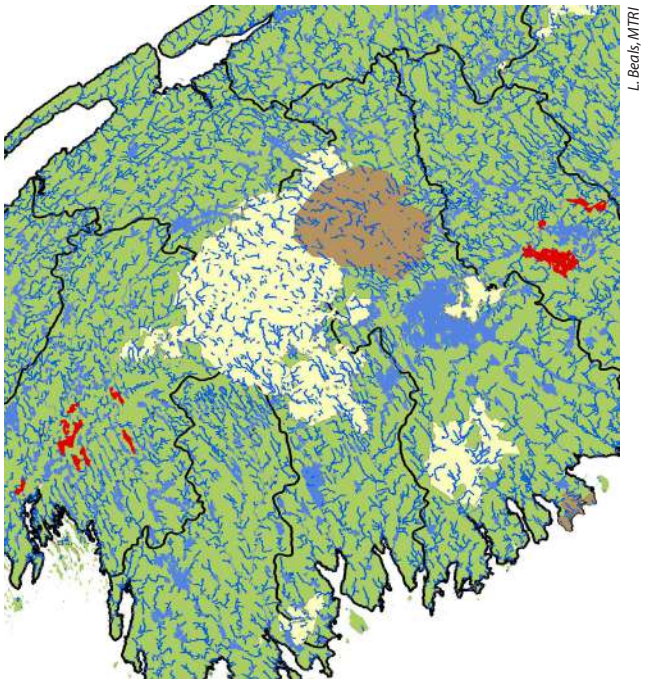
M. Boucher, MTRI

J. Craft getting ready to head out onto Shingle Lake East



L. Beals, MTRI

Comparison of 2002, 2010, 2011 and 2012 Carlsons TSI values for sample sites where colour bars denote oligotrophic status ranging from 0-39 (yellow), mesotrophic status from 40-49 (orange) and eutrophic status from 50-69 (pink)



L. Beals, MTRI

Location of sampled lakes in the Tusket and Medway watersheds of southwestern Nova Scotia

CONTACTS

Lindsey Beals
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

The American eel is a fascinating creature that has been listed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Its life begins in the Sargasso Sea, a large area of the Atlantic Ocean east of Bermuda that is surrounded by major ocean currents. Tiny eel larvae turn into glass eels and make their way up the coast all the way to Nova Scotia and beyond. The American eel is found in seven National Parks in Atlantic Canada. A multi park project was initiated with Parks Canada and partners to try and learn more about the American eel in Atlantic parks. In Kejimkujik, eel potting began in 2011 to learn more about population size and distribution of adult eels in the mainland park.

M. Crowley, Parks Canada

American eel

Monitoring

AMERICAN EEL MONITORING IN KEJIMKUJIK

OBJECTIVES

- To learn about population size and distribution of the American eel in Kejimkujik.
- To involve volunteers and researchers in helping to monitor this fascinating species at risk.
- To raise awareness about the American eel, including the cultural significance of this species.

METHODS

- Use live traps (or "eel pots") to monitor adult eels in Kejimkujik.
- Invite park visitors, volunteers and researchers to take part in this hands-on, memorable experience.
- Educate the public about the eel during public outreach, events and interpretation.

RESULTS

- In 2012, 15 lakes were potted for eels. Presence and absence studies were conducted on Pebbleloggich, Peskowesk, Beverskin, Peskowa, Hilchemakaar, Lower Silver, Upper Silver, Back, Cobrielle, Mountain, Cranberry, Mill Bay and Puzzle lakes. Presence and absence studies and pit tagging were conducted on George and Loon lakes. In total, 133 eels were caught and 20 eels were recaptured (recapture could only be verified on Loon and George Lake).
- Volunteers were able to contribute to this project by checking and re-baiting pots and measuring and weighing any eels captured. Twelve volunteers contributed 90 hours of their time toward this project.
- "The Mysterious American Eel" interpretation paddle was offered weekly in the summer and led by Park Interpreter Donna Morris and Eel Researcher Kay Forwood. In total 65 park visitors went on seven paddles, learned about the eel and helped pull traps.
- The Dalhousie Field School also came out and helped for an afternoon of eel potting and a film crew captured images of the eel project to display in the new visitor center at Cave and Basin National Historic Site in Banff.

M. Crowley, Parks Canada

Volunteers discovering an eel in the pot

RESULTS
Continued

- An eel education kit was created by Nicole Daigle from Kouchibouguac National Park and distributed for use in education and outreach.
- An American eel banner is under development to be designed and printed for each Atlantic park involved with eel work.

YEARS OF DATA

- Ongoing project since 2011

PARTNERS

- Parks Canada
- Department of Fisheries and Ocean
- The Confederacy of Mainland Mi'kmaw
- Université de Moncton
- Aboriginal communities across Atlantic Canada

Parks Canada

Draft American eel banner

D. Morris

Park visitors learning to love the American eel

S. Pitts

Volunteer and Researcher measuring an eel

CONTACTS

Megan Crowley
Parks Canada
PO Box 236,
Maitland Bridge, NS BOT 1B0
Ph. (902) 682-2185
Fx. (902) 682-3367
megan.crowley@pc.gc.ca
www.pc.gc.ca

Rationale

The fish ladder at Harmony Lake was is serious disrepair when it was identified by Department of Fisheries and Oceans and others as needing remediation or removal. Removal was not an option for many lake owners and so a plan developed to engage volunteers in the design and reconstruction of the fish ladder. The planning work began in 2011 with on the ground work taking place during the low water period of late summer 2012. The relevance of this project was at least three-fold: to provide fish passage and meet federal legislation; to ensure and improve aquatic connectivity for mobile aquatic species, mainly fish; and to engage partners and build capacity through learning and hands-on work. Each partner held one of these outcomes as its primary goal and all parties co-operated to ensure that all goals were met. This project is an example of stewardship collaboration that has achieved excellent results and should lead to future ecosystem connectivity, local capacity and stronger partnerships going forward.

Harmony fish ladder's outer wall completely excavated

Research

HARMONY LAKE FISH LADDER RESTORATION

OBJECTIVES

- To improve aquatic connectivity at a fish ladder on Harmony Lake.
- To build capacity and strengthen the partnerships between local people, organizations and agencies.
- To provide applied and service learning for Nova Scotia Community College students in the Natural Resource Environmental Technology program at Lunenburg campus.

METHODS

- The success of the fishway project began with strong and consistent partnership with local landowners, Nova Scotia Community College, Adopt-a-stream and Department of Fisheries and Oceans.
- Planning for the project included multiple iterations of the design, thorough materials and equipment lists, environmental and safety contingency plans and a communication plan.
- Collaboration among partners was aided by ongoing updates on the project and a ready group of volunteers engaged in the hands on component of the work.
- In general, a project management approach helped align all of the moving pieces involved in the undertaking and clearly set out timelines for critical items.
- Throughout the project, hazard identification and safety awareness were priorities, especially where work crews numbered near two dozen on some days and two different crews were involved over the month of construction.

Nova Scotia Community College students cutting lumber for the Harmony fish ladder

RESULTS

- The successful reconstruction of the Harmony fish ladder was completed to restore aquatic connectivity for this part of the upper Medway watershed.
- A potential conflict was resolved with collaboration.
- This project provided significant learning for students, volunteers and employees of the agencies involved.
- There will be future opportunities for monitoring and maintenance of the structure to ensure connectivity is maintained.

YEARS OF DATA

- Ongoing program since 2012

PARTNERS

- Nova Scotia Adopt-A-Stream
- Nova Scotia Community College
- Harmony Lake Landowners Association
- Department of Fisheries and Oceans

R. Swain

Students working on the floor of the fish ladder

R. Swain

Continuing construction of the fish ladder

R. Swain

Working on an inner wall of the ladder

R. Swain

Harmony fish ladder functioning in the late winter

CONTACTS

Leif Helmer
Nova Scotia Community College
Natural Resource and
Environmental Technology
75 High Street
Bridgewater, NS B4V 1V8
Ph. (902) 543-0869
leif.helmer@nscc.ca

Rationale

The study of Kejimkujik Brook trout provides on-going information adding to the depth of knowledge available on this species allowing an opportunity for the implementation of proper and effective management strategies aimed at the preservation of an abundant trout population in balance with its aquatic environment. The Brook Trout Tagging Program has been active since the early 1980's and as such can be regarded as the park's longest-running fish management program. This program has yielded many valuable and interesting insights into the growth rates, movements and use of critical habitat by Brook trout, both within Kejimkujik boundaries and outside within the extensive Mersey River watershed. Tagged trout that are recaptured can provide data and information on trout growth (weight and length), movement patterns and habitat use. As well as providing valuable scientific information, the program offers an excellent chance for park visitors to become more engaged, which has been a key component of strategies to provide enhanced visitor experience and augment park use.

Brook trout in the Corbett – Baird Measuring Device

Monitoring

BROOK TROUT TAGGING PROGRAM

OBJECTIVES

- To investigate Brook trout growth rates.
- To determine Brook trout movements and travel patterns.
- To establish seasonal critical habitat use of Brook trout.

METHODS

- A tagging program designed to investigate and collect scientific information on trout growth rates, movements and habitat use within Kejimkujik was carried out in April to November 2012 by 17 volunteers (experienced fly fishers) and four park staff using an established protocol.
- Captured trout were placed in holding bins at stream side and then carefully measured. Measurements were collected by using a spring type Pesola scale (weight) and a length measuring device known as the Corbett-Baird Measuring Tube (developed in Kejimkujik). Information was recorded on prepared data sheets.
- Small monel metal tags with a four digit identification number were affixed to the operculum (gill cover) using special pliers. Most often tags were applied to the right side gill cover. Trout were handled and processed with minimal negative impacts and released immediately.
- Although some trout were tagged in remote park locations, the majority of work was centered on more accessible park sites including the Eel Weir (Mersey River), Peskowesk Brook, Mill Falls and Rogers Brook.
- All trout were captured using fly fishing equipment and barbless hooks (with hook barb pinched down) which minimized harmful impacts and has proven an effective method of successfully catching, marking and releasing fish for scientific purposes.

Volunteer R. Baird fishing at Rogers Brook

RESULTS

- In 2012, there were 713 Brook trout tagged throughout Kejimkujik. Volunteers dedicated 1,333 hrs and provided virtually all of the necessary equipment and fishing license, transportation and monetary expenses. This is the highest number of trout tags ever applied in any one year. Moreover, trout were tagged in more park locations than ever before. The

RESULTS
Continued

increased efforts were made to improve coverage and an understanding of trout movements from a greater diversity of sites.

- There were 101 recaptures recorded by program coordinators in 2012. One trout was captured four times, two different Brook trout were captured three times and numerous fish were captured twice. Three trout tagged at Rogers Brook in 2011 had dispersed and were captured in other park locations during spring 2012; one at the J-Line bridge, one near Dark Island (Kejimkujik Lake) and the other at the Eel Weir in the Mersey River.
- In previous years, trout tagged in Kejimkujik under this program have traveled upwards of 90 kms in one year (extending from the upper Mersey River to lower Lake Rossignol) to find cool, oxygenated summer refugia.
- The tagging program provided volunteer fly fishers with the opportunity to share conservation messages with park visitors and other anglers.

YEARS OF DATA

- Ongoing program since 1984

PARTNERS

- Parks Canada

R. Baird

Trout management volunteer R. Sanford of Bear River East and Resource Conservation staff member R. Brunt with processed brook trout in Peskowesk Brook

R. Brunt

Tagging workshop for volunteers and staff, April 2012

CONTACTS

Donna Crossland and Daniel Pouliot
Parks Canada
PO Box 236
Maitland Bridge, NS BOT 1BO
Ph (902) 682-2770
Fax (902) 682-3367
donna.crossland@pc.gc.ca
daniel.pouliot@pc.gc.ca

Rationale

Aquatic connectivity within and between watersheds has been identified as critically important for the survival of Brook trout and other fish species. Barriers to fish passage, such as dams, poorly designed culverts or modifications to the natural stream bed, can significantly reduce the ability of fish to thrive within the watershed. Such obstacles to movement can limit accessibility to suitable spawning, feeding, overwintering and summer habitats. Limited access to essential habitats greatly reduces the ability of a stream network to support healthy and abundant fish populations. Fragmentation is therefore considered to be a significant threat to the integrity of freshwater ecosystems. Aquatic habitat fragmentation could be responsible for the extirpation of species, such as the Atlantic salmon in the Mersey watershed. To help restore connectivity for Brook trout in the Mersey watershed, crossings on the fish bearing streams were located in and around Kejimkujik and prioritised for remediation actions. This is the final year of this project, restoring all prioritised barriers associated with roads and trails that were impeding fish movement within park tributaries, marking a significant amelioration to fish habitat.

Stream restoration on Pine Marten Road

Monitoring

AQUATIC CONNECTIVITY

OBJECTIVES

- To identify culverts and fords within the park boundary that were blocking fish passage in park streams and rivers.
- To restore problematic crossings following the best practices available for stream bed alteration.

METHODS

- Culverts and other types of stream crossings were inventoried for potential barriers to fish passage during 2008 and 2009 within the park boundary. Ten priority sites were identified among the 178 crossings identified.
- Fish bearing streams with defective crossings or barriers were assessed for fish passability using abiotic factors such as culvert diameter, slope and the extent of culvert embedment in the substrate or stream. A passability score was generated to rank the impacts of each barrier on fish habitat.
- Calculations of connectivity gain for each individual passage were completed.
- Environmental assessments and a work plan in collaboration with Department of Fisheries and Oceans were completed prior to project implementation.
- Restoration work was carried out according to all environmental laws and Nova Scotia Watercourse Alteration Certification.
- Work was carried out with education and public awareness elements, involving non-governmental organizations, volunteers, park visitors and children from three local schools.
- Specific restoration methods involved working with culverts, either replacing them with bridges or new, larger or better-installed culverts to avoid flooding, suspended (perched culverts), sedimentation and other potential impacts to aquatic and wetland ecosystems.
- Effectiveness monitoring was carried out by measuring key trout habitat characteristics (sedimentation, temperature, pH, conductivity and oxygen) using a YSI multi-parameter sonde unit.

Parks Canada

Stream restoration on Pine Marten Road

RESULTS

- Ten of the priority sites have been fully restored and post-restoration monitoring is showing reestablishment of

RESULTS
Continued

Parks Canada

Bridge construction on Canning Field Road to restore a tributary of Rogers Brook

healthy stream flow and fish movement. The trend for this measure is increasing.

- Final connectivity score for Kejimkujik was 97.75% (up from the initial score of 93.20%). Individual connectivity score gain varied from 0.06% to 2.13%.
- Aquatic conductivity was restored during 2009 to 2012 at the following locations: Square Camp Brook, Peskowesk Road; Rogers Brook, power line access trail; Rogers Brook, Parkway; Flowing Waters Brook on Flowing Waters Trail; Ben lake outflow, Luxton Road; Flowing Waters Brook, Big Dam Road; Coyote Brook near Mill Falls; Rogers Brook, Pine Marten Road; Canning Brook, Canning Field Road; Cobrielle Brook north branch. Restoration of the above locations included replacing the defective or perched culverts, building bridges, restoring stream beds and installing a fish ladder, depending on the assessment of the locations.
- Two workshops on culvert passability assessment and fish habitat survey and restoration were delivered.
- Some educational material was completed on stream restoration, including a best practices guide for culvert installation and maintenance and a new interpretive panel that explains fish habitat (at Flowing Waters Trail).

YEARS OF DATA

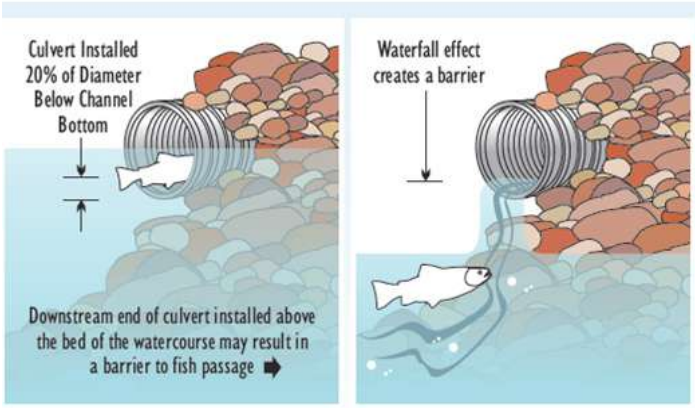
- Year 3 of a 3 year project

PARTNERS

- Fisheries and Oceans Canada
- Parks Canada
- Mersey Tobeatic Research Institute
- Saint Mary's University
- Nova Scotia Adopt a Stream
- Clean Annapolis River Project

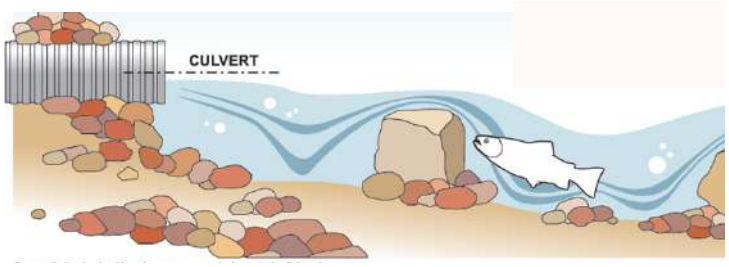
Parks Canada

Perched culvert on the Canning Field Road



Parks Canada

On the left is a culvert that is properly installed while the right shows a culvert that is perched



Parks Canada

Energy dissipation boulders decrease water velocity and give fish a place to rest

CONTACTS

Daniel Pouliot
Kejimkujik
PO Box 236,
Maitland Bridge, NS B0T 1B0
Ph. (902) 682-4003
Fx. (902) 682-3367
daniel.pouliot@pc.gc.ca

Rationale

Common loons face multiple stressors in their environment that affect their health, reproduction and survival. Our past research at Kejimkujik found a link between poor loon reproduction and high mercury levels. Acidic lakes with high mercury levels in fish and loons produced fewer loon chicks on average. As part of a national study of mercury levels in Common loons, we captured adult loons and their chicks on lakes in Kejimkujik and vicinity. Our plan was to monitor mercury levels in Common loons at selected sites across Canada and track any trends in those mercury levels over time. The intent is to link the mercury levels in the loons with mercury levels measured in yellow perch (which loons eat) in the same lakes and with loon productivity, as measured by our research partners. This was the final year of this national study of mercury and Common loons.

Downy loon chick

Monitoring

MONITORING MERCURY IN COMMON LOONS

OBJECTIVES

- To monitor the mercury levels in adult loons and their chicks in Kejimkujik and vicinity.
- To monitor any changes in mercury levels over time.
- To track mercury levels in loons along with any changes in loon reproductive success, fish mercury levels and deposition of mercury air pollution.

METHODS

- Common loon adults and chicks were captured at night in late July 2012.
- Captured loons were banded with a unique combination of coloured leg bands, measured, blood and feather samples were taken for mercury analysis and then the birds were released unharmed.
- Blood and feather samples were sent to the National Wildlife Research Centre in Ottawa, along with other loon samples from across Canada, for mercury analysis.
- Blood samples were also sent to Calvin College, Michigan for a study of immune function in loons in relation to their mercury levels.

RESULTS

- In 2012, seven adult loons were captured within Kejimkujik and no adults loons were captured outside the park.
- Also captured were 11 loon chicks, six within Kejimkujik and five outside Kejimkujik.
- Chemical analyses will be received from the laboratories in early 2013.

A. Pray-Leslie holding a Common loon chick

YEARS OF DATA

- Year 3 of a 3 year project

PARTNERS

- Environment Canada
- BioDiversity Research Institute (Maine, USA)
- Mersey Tobeatic Research Institute
- Calvin College (Michigan, USA)
- University of New Brunswick
- Parks Canada

Environment Canada

C. Persico and G. Ragnauld collecting a blood sample from a large loon chick

Environment Canada

A. Lavers looking at a banded loon chick at Charlotte Lake

CONTACTS

Neil Burgess
Wildlife & Landscape Service
Environment Canada
6 Bruce Street
Mount Pearl, NL
Ph. (709) 772-4143
Fx. (709) 772-5097
neil.burgess@ec.gc.ca
www.ec.gc.ca

Rationale

The Common loon is a highly visible water bird inhabiting many of the lakes within the Southwest Nova Biosphere Reserve. It is an icon of wilderness and people are captivated by its beauty and haunting call. Concerns have been raised about the health of loons after a study by the Canadian Wildlife Service found very high blood mercury concentrations in Kejimkujik loons. These levels have been associated with impaired reproduction and altered breeding behavior in some areas. LoonWatch began on 16 lakes within Kejimkujik in 1996. In 2006, the program was expanded to the greater landscape through MTRI, where volunteers are trained to observe and record loon activity and breeding success on their assigned lake throughout the summer using a national protocol developed by Bird Studies Canada. These two program components will provide a picture of how well loon populations are doing in the region.

K. Rowter, Parks Canada

Adult loon sitting on nest at Channel Lake

Monitoring

THE KEJIMKUJIK-MERSEY LOONWATCH PROGRAM

OBJECTIVES

- To observe Common loon abundance and breeding success on lakes within Kejimkujik and in the Southwest Nova Biosphere Reserve with a focus on the Mersey and Medway watersheds.
- To determine status and trends in loon abundance, lake use and reproductive potential of resident birds.
- To monitor water quality on lakes being observed by Loon Watchers outside Kejimkujik.

METHODS

Outside Kejimkujik:

- Lakeside dwellers and cottagers with an interest in loons were recruited and provided with information about loons and the monitoring protocol.
- Trained volunteers were used to survey lakes in June for loon pairs, in July for newly hatched chicks and in August for surviving young.
- MTRI staff visited many of these lakes, canoed to the deepest part and measured water quality at one meter intervals, recording temperature, conductivity, dissolved oxygen and pH.
- Volunteer data were collected and compiled, then shared with Bird Studies Canada.

Inside Kejimkujik:

- LoonWatch used trained volunteers in a coordinated effort to simultaneously survey study lakes within a three hour observation period, in late May and during the third week of August.
- Loon monitoring combined data gathered from intensive LoonWatch days involving many volunteers, plus public observations and repeated surveys by Kejimkujik staff.
- MTRI and Environment Canada were also conducting more intensive work to better understand population dynamics and relative mercury levels in loons in the region (page 68 and 72).

C. Merry

LoonWatcher K. Merry getting ready to head out on Peskawa Lake

RESULTS

M. Boucher, MTRI

Adult loon on Kejimkujik Lake in the early fall

- In 2012, the two LoonWatch programs had over 50 volunteers monitoring loons on at least 40 lakes in the Southwest Nova Biosphere Reserve and about the same number of volunteers monitoring loons on 15 lakes inside Kejimkujik.
- Nineteen loon chicks were recorded by LoonWatchers on ten lakes outside Kejimkujik. Some lakes that had chicks were Charolette, Cameron, First Christopher and Minard lakes. Eleven of these chicks were observed as large chicks that had a good chance of survival.
- The surface pH of volunteer lakes ranged from 3.98-6.62.
- The average recorded productivity rate for loons in Kejimkujik since 1988 is 0.2 chicks/territorial pair; this year it was 0.6 chicks per territorial pair.
- In Kejimkujik a total of 16 loon chicks were observed on ten territories and 14 of them were observed to have been large enough to likely fledged.
- The total rainfall in 2012 was 224.8 mm, much lower than the 30 year average (see table below). Minimum, maximum and average monthly temperatures in June and July were similar to previous years however were approximately two degrees higher in August 2012.

YEARS OF DATA

- Ongoing project since 1996 (Kejimkujik) and 2006 (Mersey LoonWatch)

PARTNERS

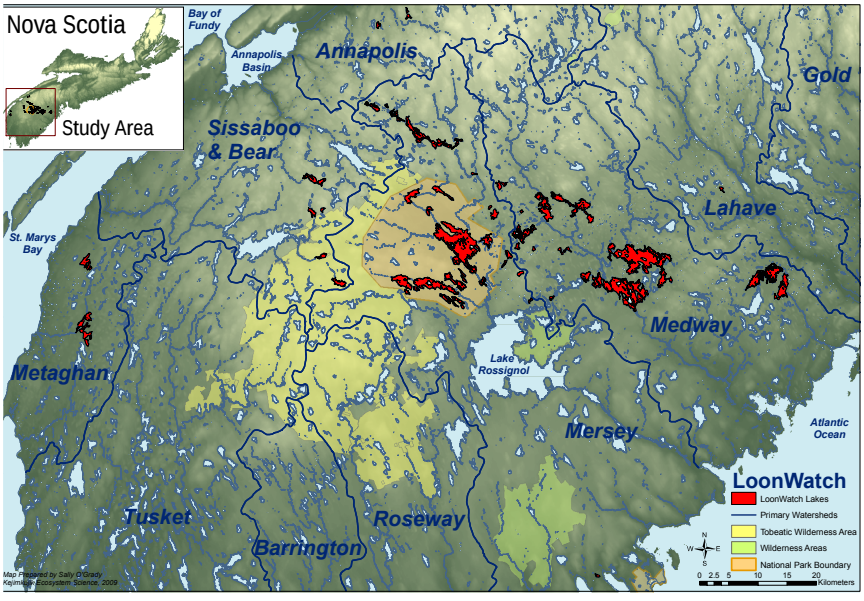
- Parks Canada
- Mersey Tobeatic Research Institute
- Bird Studies Canada
- Environment Canada

C. Merry

Adult loons at the east end of Peskawa Lake

Year	1971-2000 (Avgs)	2010	2011	2012
June	96.2 mm	97.8 mm	127 mm	82 mm
July	103.6 mm	137 mm	71.6 mm	80.2 mm
August	87 mm	89 mm	137.6 mm	62.6 mm
Total (June-Aug)	286.8 mm	323.8 mm	336.2 mm	224.8 mm

Rainfall amounts in Nova Scotia showing 2012 with reduced rainfall amounts when compared to other years, Environment Canada's National Climate Data and Information Archive



S. O'Grady, Parks Canada

Map showing locations of LoonWatch Lakes in the Southwest Nova Biosphere Reserve with Kejimkujik shaded in brown and Tobeatic in yellow

CONTACTS

Amanda Lavers and Wendy Whynot
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Donna Crossland
Kejimkujik
PO Box 236
Maitland Bridge, NS B0T 1B0
Ph. (902) 682-2293
Fx. (902) 682-3367
donna.crossland@pc.gc.ca
www.pc.gc.ca

Rationale

The Common loon is widely used as an indicator of the health of lake ecosystems. The number of chicks that each territorial pair is able to raise was monitored on 35 study lakes within Kejimkujik and the surrounding region; this is a measure of the loon's reproductive success or productivity. Loon productivity is adversely affected by such factors as acid rain, structural and recreational development of lake shorelines, disturbance by boaters, water level fluctuations, predators and mercury pollution. The Canadian Wildlife Service monitored loon productivity in Kejimkujik from 1988 until 1997. Loon productivity was found to be limited by mercury levels in the loons and the fish they consumed. Some lakes in Kejimkujik had high mercury levels in fish and low loon productivity and vice versa. The Canadian Wildlife Service resumed monitoring fish mercury levels in 2006 and Common loon productivity in 2007.

A. Pray-Leslie, MTRI

Common loon preening

Monitoring

MONITORING COMMON LOON PRODUCTIVITY

OBJECTIVES

- Monitor the number of territorial Common loon pairs and loon chicks on 35 study lakes.
- Monitor the number of Common mergansers and chicks on each of the study lakes.
- Provide data on loon productivity for each study lake and relate it to environmental factors, human disturbance and mercury pollution.

METHODS

- Twenty-four lakes within Kejimkujik and 11 lakes nearby were surveyed for Common loons and Common mergansers at least three times from June until September 2012 by trained researchers.
- Surveys included observations of adult loons, nests, eggs and chicks as well as Common mergansers and their chicks.
- When loons or mergansers were located, the time, date, weather, a GPS location of where the loon or merganser was first seen and behaviour were recorded.
- Maps were made of the GPS sightings and territories.
- Survey results were summarized in a database and productivity was calculated for each territorial loon pair.

MTRI

Loon nest with eggs on Puzzle Lake

RESULTS

- Forty territorial pairs of loons were observed and 32 of these were breeding pairs (nesting or with chick).
- Common mergansers were observed on nine of the 35 study lakes.
- There were a total of 27 nests located however some nests were undetected.
- Of the nests that were located for the 32 breeding territories, 64% successfully hatched chicks, 24% of eggs were suspected to have been predated at the egg or downy chick stage, 4% were suspected to have been abandoned or unfertilized (found rotten), 4% were suspected to have been flooded and no nests were suspected to have been stranded by dropping

RESULTS
Continued

water levels during the incubation period.

- A total of 41 downy chicks were observed on the 40 territories, 24 of which were observed as large chicks in August or September and likely fledged.
- According to these observations, Common loon productivity for 2012 was significantly higher than in the previous five years at 0.60 chicks per territorial pair.

YEARS OF DATA

- Year 6 of a 6 year project

PARTNERS

- Environment Canada
- Parks Canada
- Mersey Tobeatic Research Institute
- TD Friends of the Environment Foundation
- Mountain Equipment Co-op
- Nova Scotia Economic Development

MTRI

Common loon nest on Little Tupper Lake

MTRI

Adult loon with chicks hitching a ride

CONTACTS

Lindsey Beals
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Neil Burgess
Wildlife & Landscape Service
Environment Canada
6 Bruce Street
Mount Pearl, NL
Ph. (709) 772-4143
Fx. (709) 772-5097
neil.burgess@ec.gc.ca

Rationale

Western Nova Scotia has some of the most acidic freshwaters in North America due to factors including location downwind of major emission sources and resistant geology offering little acid buffering capacity. Local Atlantic salmon populations are in serious decline. Some of the biggest threats to these populations are from 1) chronic acidification, 2) high aluminum levels, 3) low calcium levels and 4) low pH levels. We currently do not know the frequency of occurrence and patterns of episodic acidification threats in western Nova Scotia. Since the 1990s, freshwaters in western Nova Scotia have shown no improvement in pH or acid neutralization capacity and are not predicted to improve for decades. Catchment liming, where neutralizing compounds are added to catchments, has been identified as one of the most promising mitigation options to rehabilitate Atlantic salmon populations but it has not yet been tested in Nova Scotia.

S. Sterling

Maria Brook

Research

CATCHMENT LIMING EXPERIMENT

OBJECTIVES

- To determine how a typical small Nova Scotia catchment responds to catchment liming.
- To deploy real-time monitoring systems that can capture temporal variability and extremes in stream water chemistry.
- To improve our understanding of whether catchment liming can help rehabilitate Atlantic salmon populations in Nova Scotia by improving stream chemistry to target levels and reduce the severity and occurrence of toxic episodic events.

METHODS

- A before and after control and impact study design was used to test the effectiveness of the study catchment liming, at an experimental 50 ha forested watershed near New Ross in southwestern Nova Scotia. The study focused on three response variables including pH, calcium and aluminum.
- Continuous climate, water flow and stream chemistry measurements were made at a control stream station and a treatment stream station.
- Bi-weekly transect measurements were collected through the liming zone.
- Bi-weekly grab samples for full water analysis were taken at two control and four treatment sites downstream of the catchment liming.
- A first installment of 30 tons of fine-grained calcium carbonate was applied to soils in May 2012, as a proof of concept in the first phase of application.
- A larger second application of calcium carbonate is planned for May 2013.

S. Sterling

Volunteers from New Germany Rural High School, Dalhousie University and Bluenose Coastal Action Foundation on the first day of catchment liming in Maria Brook, May 2012

RESULTS

S. Sterling

Sampling the water chemistry during winter conditions, February 2012

- The study found pre-treatment water chemistry conditions that were toxic to Atlantic salmon including pH values less than 5.5 and as low as 4.1 for long periods of time, calcium levels lower than 2 mg/L and ionic aluminum levels approximately ten times greater than the recommended levels for protection of aquatic life by the European Inland Fisheries Advisory Commission.
- The study found an improvement in pH and conductivity in transects following liming.
- While every major rainstorm produced an acidic episode since monitoring began, the application of limestone thus far has reduced the duration and intensity of the acid episode, when comparing the control versus treatment sites.
- More lime is needed. The second phase of lime application will take place in May 2013.

YEARS OF DATA

- Ongoing project since 2010

PARTNERS

- Bluenose Coastal Action Foundation
- Nova Scotia Salmon Association
- Donner Canadian Foundation
- Dalhousie University
- Natural Sciences and Engineering Research Council
- New Germany Rural High School

S. Sterling

Volunteers from New Germany Rural High School and Dalhousie University applying lime to the soil of Maria Brook, May 2012

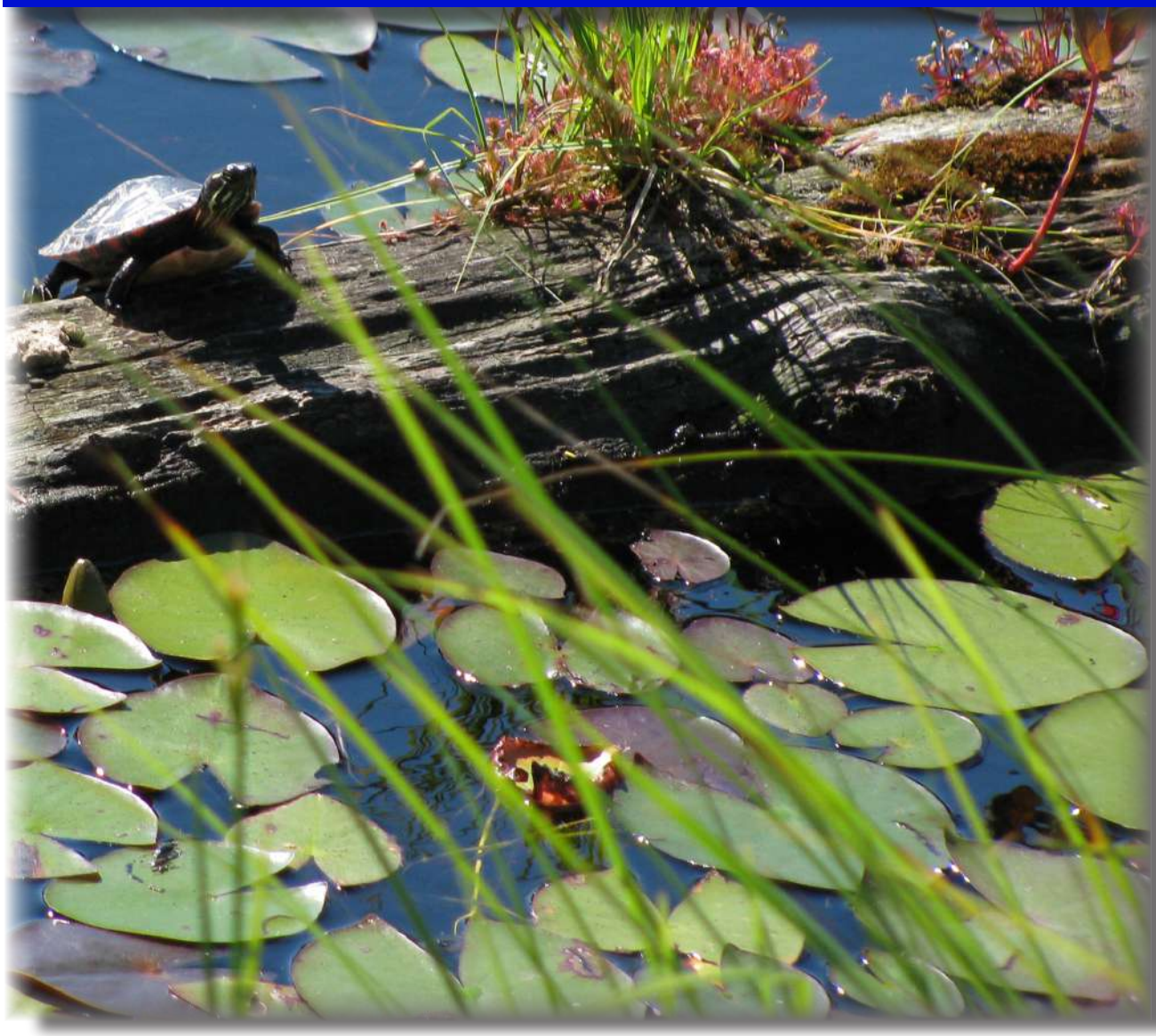
S. Sterling

Soils of Maria Brook catchment immediately following limestone application

CONTACTS

Shannon Sterling
Dalhousie University
1355 Oxford St., Rm 827
Ph. (902) 494-7741
Shannon.sterling@dal.ca
http://myweb.dal.ca/sh732360/Sterling_Lab_Site/Welcome.html

WETLANDS



M. Boucher, MTRI

M. Boucher, MTRI

Rationale

Atlantic Coastal Plain Flora (ACPF) is a unique group of unrelated plants that are mainly found along lake and rivershores, wetlands and saltmarshes in southwest Nova Scotia. Almost half of these species are listed as 'at risk' or 'sensitive' by the Nova Scotia General Status Ranks and some are globally rare. There are over 90 species of ACPF in Nova Scotia, including the Water-pennywort. Water-pennywort is a small plant with rounded, lobed green leaves. The leaves float like a lily pad in deep water and stand erect in shallow water or above the water line. This special plant is only found on a few lakes in all of Canada. It is listed as Threatened by the Species at Risk Act and Endangered by the Nova Scotia Endangered Species Act. The population in Kejimkujik is monitored annually by park staff and volunteers to assess its distribution and abundance. In 2012, for the second year, the shoreline of Kejimkujik Lake was also surveyed in August by expert botanists as a part of a larger project.

M. Crowley, Parks Canada

Water-pennywort

Monitoring

WATER-PENNYWORT AND ACPF SURVEYS IN KEJIMKUJIK

OBJECTIVES

- Monitor Water-pennywort population abundance and density on Kejimkujik Lake.
- Assess water levels, stem height and percent damage within Water-pennywort stands.
- Survey Kejimkujik Lake to look for the establishment of new stands and for other rare ACPF.

METHODS

- Water-pennywort surveys were conducted annually on Kejimkujik and George lakes within Kejimkujik. Surveys were conducted on known populations in both shoreline and aquatic habitats.
- Extensive surveys were conducted every few years to search for new stands.
- Population abundance, density, stem height, water depth and percent damage of individual Water-pennywort stands were assessed by systematic transect surveys in early August. Stand surface area was also measured. Survey results were compared to historic data in order to determine population size fluctuations.
- Extensive shoreline surveys were also undertaken for ACPF species listed as red and yellow by Nova Scotia Department of Natural Resources General Status Ranks for the second year in a row by expert botanists at Atlantic Canada Conservation Data Centre and MTRI. This survey complements the shoreline atlasing being done by MTRI for their Habitat Stewardship Program ACPF Project (see page 54) because Kejimkujik Lake is listed as one of the 36 high priority lakes in the ACPF Recovery Strategy.

K. Durovich

Parks Canada staff and volunteer monitoring Water-pennywort

RESULTS

- Park staff and volunteers monitored Water-pennywort at six sites in Kejimkujik on August 13 to 15 2012. Water lake levels were extremely low in August and consequently many flowering plants were observed for the first time since 2008.
- Water-pennywort stand area and ramet density per stand fluctuate between years; however the Kejimkujik population appears to be stable.

RESULTS
Continued

- Part of the shoreline and islands of Kejimkujik Lake were surveyed for ACPF on August 8 and 9 2012 by botanists, Parks Canada staff and volunteers.
- Many plants were recorded and maps showing the locations of rare species will be prepared.
- In addition to the three locations of Long's bulrush discovered in 2011, a fourth location was located on Kejimkujik Lake in Fairy Bay in 2012. No new locations of Water-pennywort were observed.

YEARS OF DATA

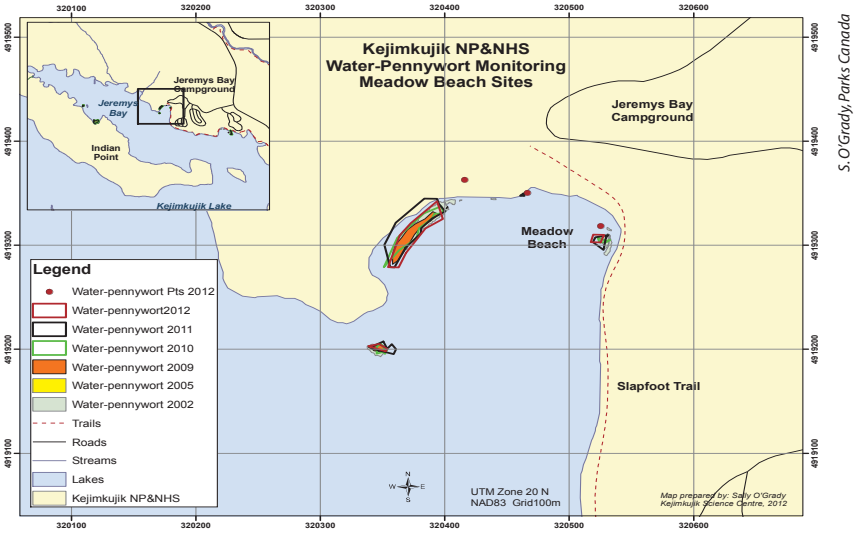
- Ongoing project since 1999; initial population estimates for Water-pennywort were conducted in 1983.

PARTNERS

- Parks Canada
- Atlantic Coastal Plain Flora Recovery Team
- Mersey Tobeatic Research Institute

M. Crowley, Parks Canada

Volunteer N. MacInnis and botanist A. Belliveau looking closely for Curly grass fern



S. O'Grady, Parks Canada

Water-pennywort stands at Meadow Beach from 2002-2012. The occupied area has been relatively stable over time

Stand Name	2007	2008	2009	2010	2011	2012
Merrymakedge Beach	1677	1360	1275	2710	2474	1964
Meadow Beach	466	606	434	555	1451	925
Jim Charles	254	544	313	414	357	276
Jeremy's Bay (Indian Point)	3161	3590	3282	3573	3787	3430
George Lake	145	159	32	247	52	134
Petroglyphs	851	1334	796	1700	1356	1488

Estimated aerial extent (m^2) of Water-pennywort stands at Kejimkujik

CONTACTS

Megan Crowley
Parks Canada
PO Box 236, Maitland Bridge,
NS B0T 1B0
Ph. (902) 682-2185
Fx. (902) 682-3367
megan.crowley@pc.gc.ca

www.speciesatrisk.ca/coastalplainflora
www.pc.gc.ca

Rationale

Blanding's turtles in Nova Scotia exist in three small populations on the Mersey and Medway watersheds and have been listed as Endangered under both the federal Species at Risk Act and the Nova Scotia Endangered Species Act. One of the concerns for this long lived (80+ years), slow maturing (20+ years) species is the lack of young adults in the population. Raccoons are the primary nest predators and their populations may be unusually high in human inhabited areas (*e.g.* campgrounds and communities). Rates of predation of unprotected nests are variable but can reach 100%. An annual volunteer based nest protection program was established in Kejimkujik and later expanded to populations outside the park to engage the public in helping to protect and care for Blanding's turtle nests.

J. McNeil, MTRI

A Blanding's turtle hatchling

Research

BLANDING'S TURTLE NEST PROTECTION

OBJECTIVES

- Protect Blanding's turtle nests from predation to improve recruitment into the populations.
- Collect eggs from selected nests in Kejimkujik for laboratory incubation.
- Provide an opportunity for volunteers to engage in species at risk recovery.
- Collect long term data on female survivorship, clutch size, hatching success and site fidelity.

METHODS

Nest Protection (late May/June)

- Known nesting sites were monitored on a nightly basis during nesting season. Surveys began in early evening and continued until approximately 10 pm if no turtles were seen or until the last turtle had left the site.
- A few turtles were radio tracked to locate new nesting sites.
- Volunteers watched females go through the nesting process and recorded data on turtle identification, behaviour, movements, weather, timing of activities and clutch size.
- Once a nest was completed and the female had left the site, volunteers covered the nest with a wire mesh cage and secured it with large rocks to protect the nest from predation.
- Eggs from 12 randomly selected nests in Kejimkujik were collected and transported to Oaklawn Farm Zoo for incubation.

Hatchling emergence (August/September)

- Nests were monitored periodically until the first hatchlings emerged and then were monitored daily by volunteers and researchers who marked, measured, weighed and released hatchlings turtles at the nest site.
- Hatchlings from Kejimkujik were brought into the lab to undergo 'fitness testing' and released the following day. A subset of hatchlings in Kejimkujik were radio tracked to determine their overwintering locations.

J. McNeil, MTRI

A Blanding's turtle burying her eggs at McGowan Lake

RESULTS

Nest Protection (late May/June)

- Nests were laid from June 1 to June 26 2012.
- Fifty-one Blanding's turtle nests were located: 12 nests from Kejimkujik were collected for incubation at Oaklawn Farm Zoo and the remaining nests were covered to protect them from predation.
- More than 75 volunteers contributed over 2000 hours of effort to locate and protect these nests.
- Volunteers found a new nesting site near a newly discovered concentration of turtles in the Upper Medway watershed.

Hatchling emergence (August/September)

- Hatchlings began emerging on August 20 at McGowan Lake, the earliest emergence on record in Nova Scotia!
- The 39 wild nests produced 299 hatchlings, representing 79% hatching success.
- The 12 nests incubated at Oaklawn Farm Zoo produced 125 hatchlings, a 95% hatching success.
- Volunteers radio tracked 27 hatchlings from Kejimkujik following their release. Overwintering sites were located for ten of these hatchlings.

YEARS OF DATA

- Ongoing project since 1989 (Kejimkujik), 2000 (McGowan Lake) and 2002 (Plesant River)

PARTNERS

- Parks Canada
- Mersey Tobeatic Research Institute
- Acadia University
- Friends of Keji Cooporating Association
- Oaklawn Farm Zoo
- Blanding's Turtle Recovery Team
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Mountain Equipment Co-op

CONTACTS

Jeffie McNeil
Mersey Tobeatic Research Institute
BOX 215, Kempt, NS B0T 1B0
902- 682-2371
902-682-2760
jeffie.mcneil@merseytobeatic.ca

Duncan Smith
Parks Canada
PO Box 236, Maitland Bridge
NS B0T 1B0
Ph. (902) 682-2770
Fx. (902) 682-3367
duncan.smith@pc.gc.ca
www.speciesatrisk.ca/blandings
www.friendsofkeji.ns.ca
www.pc.gc.ca

M.Crowley, Parks Canada

Volunteers measuring and releasing newly hatched Blanding's turtles from their protective nest enclosure

Rationale

Blanding's turtles in Nova Scotia have been listed as Endangered under both the federal Species at Risk Act and the Nova Scotia Endangered Species Act. Although much is known about the species' ecology, there is still very little known about hatchling and juvenile habitat use in the first few years of life. One of the concerns for this long lived (80+ years), slow maturing (20+ years) species is the lack of young adults in the population. To augment the population, Kejimkujik has been working with Acadia University, Oaklawn Farm Zoo and the Blanding's Turtle Recovery Team to headstart turtles. Typically, this involves a two year captive rearing program; research has suggested that incubation only (no rearing) may significantly increase survivorship of hatchlings. This year eggs were collected to incubate, followed by a release; many hatchlings were tracked, both wild born and incubated, in an attempt to fill habitat knowledge gaps.

J. McNeil, Parks Canada

Bob the Blanding`s turtle in McGowan Lake

Research

BLANDING'S TURTLE HATCHLING TRACKING

OBJECTIVES

- To collect Blanding's turtle eggs (from Kejimkujik nests) for incubation and immediate release.
- To identify hatchling habitat use and movements to help fill knowledge gaps, by tracking hatchlings to overwintering sites.
- To provide an opportunity for volunteers to engage in species at risk recovery.

METHODS

Egg Collection and Incubation

- Known Blanding's turtle nesting sites were monitored on a nightly basis during nesting season as part of the nest monitoring program.
- A total of 132 eggs from 12 nests were collected and transported to Oaklawn Farm Zoo for incubation at two different temperatures (27.5 and 29.5 degrees).

Hatchling Tracking

- Uncollected Blanding's turtle nests were monitored daily in late summer and early fall for natural emergence of hatchlings, as part of the nest monitoring program.
- Sites were selected for hatchling tracking based on the number of nests (potential hatchlings) and the number of hatchlings tracked at each location in the past (focus was on new sites).
- Select hatchlings, both wild born and incubated, that weighed more than 9.5 g were outfitted with tiny radio transmitter devices (0.8 g) and released onsite.
- Radioed hatchlings were tracked every three days by volunteers and/or researchers.
- Tracking ended when the turtle was lost, or settled for the winter which was determined by cold temperatures and lack of movement over several tracking periods.
- An enclosure was placed over the hatchling, if possible, to help with locating it in the spring to recommence tracking.

Parks Canada

Volunteers placing a cover over a Blanding's turtle nest

RESULTS

Parks Canada

J. Neish deploys a turtle exclosure in mid November

Egg Collection and Incubation

- A total of 125 Blanding's turtle hatchlings emerged from the incubated eggs and were released within two months of hatching.
- Incubated hatchlings were released in the same location as they were collected.

Hatchling Tracking

- A total of 51 hatchling radios were deployed and 27 hatchlings tracked (almost an even split of wild born and incubated) at seven nest sites.
- Fifty-one radios were used to track 27 turtles, as radio life is only 30 days and many turtles were tracked longer than that.
- Tracking began August 5 and finished November 16 2012.
- Hatchlings used a wide variety of habitats but spent much time in moist sphagnum in forest stands.
- Daily movement ranged from zero to more than 100 m in two to three days.
- A total of ten hatchlings were protected using wire enclosures, in hopes of recommencing tracking in the spring.

YEARS OF DATA

- Year 1 of an ongoing project

PARTNERS

- Nova Scotia Blanding's Turtle Recovery Team
- Parks Canada
- Acadia University
- Friends of Keji Cooperating Association
- Mersey Tobeatic Research Institute
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Oaklawn Farm Zoo

D. Smith, Parks Canada

Biologist and volunteers locating a radioed Blanding's turtle hatchling

CONTACTS

Duncan Smith
Parks Canada
PO Box 236, Maitland Bridge
NS B0T 1B0
Ph. (902) 682-2770
duncan.smith@pc.gc.ca
www.pc.gc.ca

Norm Green
Friends of Keji Cooperating Association
50 Pinetree Cresent
Hammonds Plains, NS
ngreen@accesswave.ca
www.speciesatrisk.ca/blandings
www.friendsofkeji.ns.ca

Rationale

With over 150 two year old headstarted Blanding's turtles being reintroduced into Kejimkujik in 2011 and 2012, significant insight into the movement patterns and growth rates of both headstarted and wild turtles could be achieved. Headstarting is a somewhat controversial conservation project which is being implemented on a growing number of turtle species; the lack of long-term studies on the success of these programs is evident. This research project was a small piece of the overall assessment of the headstarting program in Nova Scotia. The main goal of this study was to radio track a group of headstart Blanding's turtles to determine their movement and growth after their reintroduction to the wild. To add depth to the project, movement and growth of headstarted turtles were compared to that of wild juvenile turtles found in the same area.

J. McNeil, MTRI

Release of headstarted Blanding's turtle

Research

RADIO TRACKING HEADSTARTED BLANDING'S TURTLES

OBJECTIVES

- To determine a difference between the post release growth rate of headstarted Blanding's turtles and the growth rate of wild juvenile turtles.
- To determine a difference in the movement patterns of the newly released headstarted Blanding's turtles and the juvenile Blanding's turtles.
- To determine if incubation temperatures have an effect on habitat use and growth of headstarted Blanding's turtles.

METHODS

- The research was conducted at the Atkins Brook/ West River area located in the northwestern area of Kejimkujik. This area is an important nesting and feeding area for the Blanding's turtles.
- Radio telemetry was used to track three groups of turtles; headstarts from 2009 (three years old in 2012), headstarts from 2010 (two years old in 2012) and wild juveniles (two to seven years old in 2012). For statistical analysis, wild juveniles were divided into two groups: three years and five to seven years.
- Turtles were affixed with a radio transmitter weighing less than 5% of a turtle's body mass using quick set epoxy.
- Turtles were tracked once a week from July to September 2011 and from May to November 2012. Data collected during radio tracking included: air and water temperature, GPS location, a detailed habitat description, turtle activity, position and perch. Weather data were also collected and included: cloud cover, precipitation and wind speed.
- Measurements that were taken during the first week of every month included: carapace length and width, plastron length and width and weight.
- A statistical analysis was conducted using statistical package R.

N. d'Entremont

J. Neish radio tracking headstarted turtles at Atkins Brook, Kejimkujik

RESULTS

- Preliminary analysis shows no difference in the growth or movement between the 2009 headstarts, 2010 headstarts and the wild juveniles (three years).

RESULTS
Continued

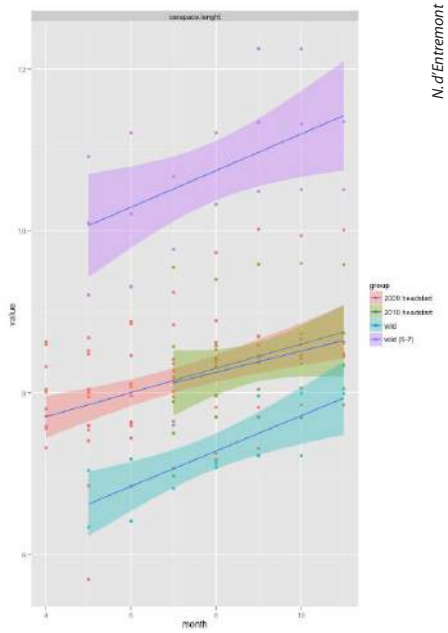
- Some differences in growth rates were found with the wild (five to seven years) group. These findings were expected as these turtles are larger and older than the three other groups.

YEARS OF DATA

- Year 2 of a 2 year project

PARTNERS

- Acadia University
- Parks Canada
- Friends of Keji Cooperating Association



N. d'Entremont

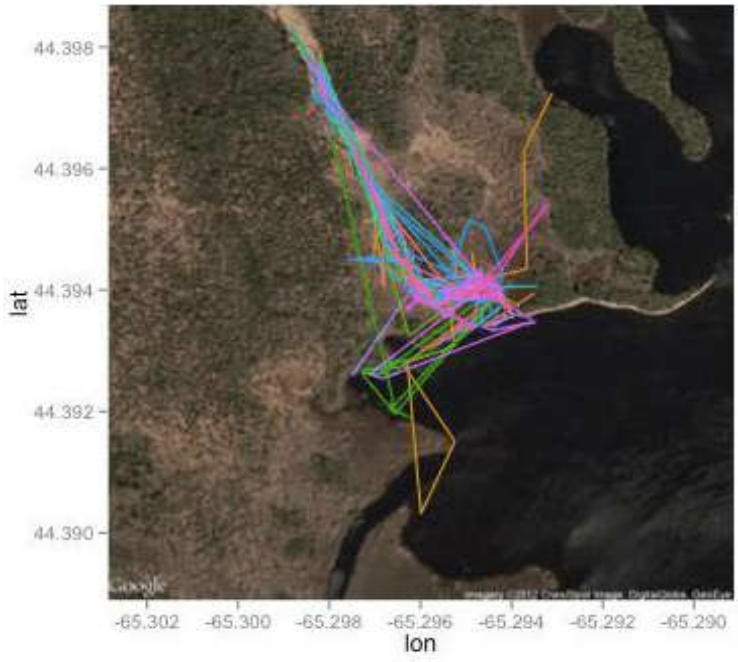
Growth curves based on carapace length of the four research groups of Blanding's turtles. No differences were found in growth rates

A. Highfield

N. d'Entremont radio tracking headstarted Blanding's turtles at Atkins Brook, Kejimkujik

N. d'Entremont

A three year old headstarted Blanding's turtle with radio transmitter



Google Maps

Individual movement of juvenile Blanding's turtles (headstarted and wild) during the 2012 field season

CONTACTS

Nicole d'Entremont and
Steve Mockford
Acadia University
Biology Department
Ph. (902) 585-1469
Fx. (902) 585-1059
nicoledenise84@gmail.com
stephen.mockford@acadiau.ca

Rationale

Eastern ribbonsnakes must find suitable underground sites to avoid freezing winter temperatures. However, it is not known if these sites typically occur within wetlands, at their edges or in adjacent terrestrial habitats. Knowing the characteristics of overwintering sites and their distance from the snake's summer wetlands is crucial for critical habitat identification, identifying threats and developing management plans for this species, which is listed as Threatened both federally and provincially. In winter 2009, the first known ribbonsnake overwintering area in a terrestrial habitat was identified in Nova Scotia and this site has been monitored annually since its discovery to document long-term use, number of snakes and site fidelity. Efforts continue to locate additional overwintering sites through systematic surveys of upland areas adjacent to known concentrations of ribbonsnakes.

J. McNeil, MTRI

Eastern ribbonsnake

Research

EASTERN RIBBONSNAKE OVERWINTERING HABITATS

OBJECTIVES

- Monitor the one known Eastern ribbonsnake overwintering site to document site use, snake abundance and site fidelity.
- Conduct surveys around known concentration sties in spring and fall to potential additional overwintering sites.

METHODS

- Systematic surveys were conducted in spring and fall at terrestrial sites surrounding known occupied wetlands. Sites where snakes are found were revisited regularly to estimate the number of snakes using the site and the period of occupancy. Surrounding wetlands were visited occasionally during the active season to mark snakes and determine the time of movement.
- Surveys were conducted visually by experienced biologists and trained volunteers and were aided by dogs trained to identify ribbonsnakes by scent. Fall surveys were also aided by students from Dalhousie University and visits from a Bridgetown High School class.
- Detailed data were recorded on search effort, weather conditions, geographic coordinates, habitat characteristics, snake behaviour and morphology.
- Attempts were made to capture all ribbonsnakes found. Snakes were individually marked by ventral scale clipping. Snakes were measured, weighed, photographed and released at the capture site.

RESULTS

- Surveys took place from mid March to mid April and again from mid September through late November. Surveys occurred at 21 sites around four water bodies that were known to contain ribbonsnakes.
- Habitats surveyed included eight primarily wooded sites, eight wetlands and five sites dominated by human made features (*e.g.* roadways, gravel pits, lawns).
- Nine ribbonsnakes were found at the known overwintering site at Grafton Lake in 2012; four individuals in spring, four in fall and one in both spring and fall.

M. Crowley

B. Toms recording ribbonsnake data at Eel Lake

RESULTS
Continued

- Several late October and early November Eastern ribbonsnake sightings were recorded at a woodland/wetland boundary on the north end of Grafton Lake, suggesting another possible overwintering site in this area. There were six sightings in this zone during the warm spell on November 12 and 13. Many of these snake sightings were young of the year, although a couple of large snakes were also observed.

YEARS OF DATA

- Ongoing since 2009

PARTNERS

- Mountain Equipment Co-op
- Canadian Wildlife Federation
- Government of Canada's Habitat Stewardship Program for Species at Risk
- Mersey Tobeatic Research Institute
- Acadia University
- Parks Canada
- Dalhousie University

J. McNeil, MTRI

Volunteers and canine searching for hibernaculums of overwintering Eastern ribbonsnakes

J. McNeil, MTRI

A ribbonsnake out on a warm fall day

CONTACTS

Jeffie McNeil and Brad Toms
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
jeffie.mcneil@merseytobeatic.ca
brad.toms@merseytobeatic.ca
www.speciesatrisk.ca/ribbonsnake
www.merseytobeatic.ca

Rationale

The eastern end of Tupper Lake in Queens County was identified under the province's initiative to create protected areas on 12% of the land base and was also of interest to some MTRI members who provided a donation to research wildlife in the area. This area of Tupper Lake has relatively few property owners compared to the western end and is not facing development pressure. The area contains several large wetlands, approximately 13 km of undisturbed shoreline including several islands and unique upland rock barrens. The lake shoreline was surveyed by botanists from the Atlantic Canada Conservation Data Centre (ACCDC) in 2008 and some live trapping was done for Blanding's turtles by MTRI volunteers and staff in 2003 and 2010 but several areas around the lake remained unexplored. Due to the variety of habitats within the area there was a high chance of finding new locations for several rare species.

C. Staicer

Eastern ribbonsnake caught on Tupper Lake

Research

INVESTIGATION OF BIODIVERSITY ON TUPPER LAKE

OBJECTIVES

- Investigate the Tupper Lake study area for rare plants.
- Document any invasive plant species.
- Determine whether landbird species at risk were using the study area.
- Conduct live trapping for turtles in appropriate habitat and visual searches for Eastern ribbonsnakes.

METHODS

- Bird surveys occurred between late May and early July. Audio callbacks were played through a loudspeaker and a Wildlife Acoustics SM-2 digital recorder was deployed to detect birds not heard during visits.
- Live turtle trapping was conducted July 24-28 using hoop traps baited with sardines. Traps were set for three to five days and were checked daily by trained staff and volunteers in accordance with the standards developed by the Blanding's Turtle Recovery Team. Search areas were selected based on the proximity of sighting reports and the presence of suitable habitat identified from aerial photographs or ground surveys.
- Ribbonsnake visual surveys were conducted in June and July. Selected wetlands were surveyed on foot and from canoe. Researchers also kept an eye out for ribbonsnakes during other activities.

C. Staicer

Data collection on a Tupper Lake Brook

RESULTS

- Michaux's dwarf birch (S2 - Sensitive) was found in a wetland on the northwest side of the lake. This plant is rare in southwest Nova Scotia and was previously known in southwestern Nova Scotia from Brier Island, Molega Lake and Shingle Lake. Mountain sandwort (S2 - Sensitive) was found in abundance (tens of thousands) on the barrens to the north and west of Tupper Lake and is currently one of the most prolific sites known for this species in Nova Scotia. Southern twayblade (S3-S4) was also found in a treed wetland just west of the northern lakeshore wetlands.
- Over 40 bird species were detected including five rare species. Common nighthawk, Chimney swift, Olive-sided flycatcher and Canada warbler occurred in treed wetlands in two areas: along the forested edges of a large treed swamp/bog on the

RESULTS
Continued

A. Belliveau, MTRI

Michaux's dwarf birch

north side of the lake and 2.5 km directly to the west, an uplands barrens site with a few treed bogs. Rusty blackbird, which was recorded in 2010, was found 2 km to the east and 3.6 km to the northeast of Tupper Lake in 2012. Rusty blackbirds likely use Halfway Brook to forage.

- Eastern ribbonsnakes, which are Threatened in Nova Scotia, were found in wetlands along two brooks on the west side of the lake. Three ribbonsnakes were found during 11 person hours of visual surveys and an additional three were sighted during turtle trapping efforts. The relatively high number of sightings over a short period of time suggests that a significant concentration of ribbonsnakes may occur in this area.
- Painted turtles (33 captures) and Snapping turtles (three captures) were the only turtles caught during trapping sessions in two brooks (42 trap nights).

YEARS OF DATA

- Single year study

PARTNERS

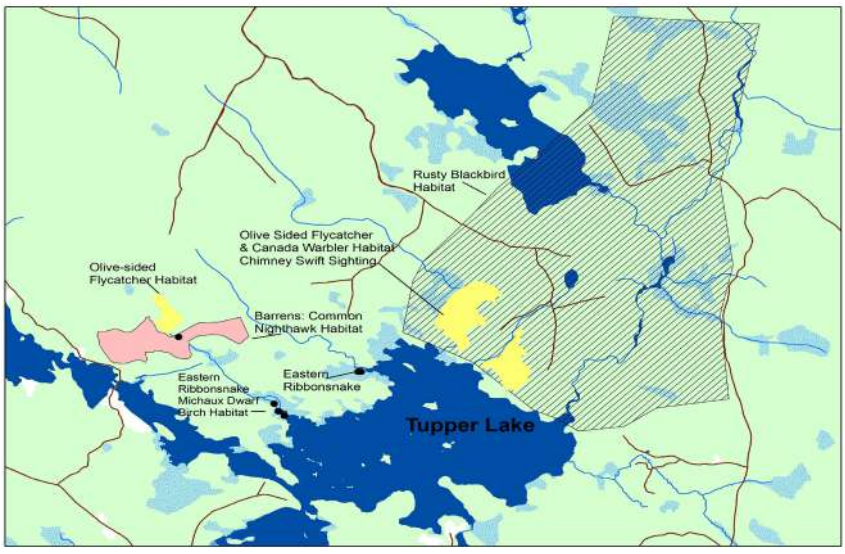
- Private donors
- Dalhousie University
- Mersey Tobeatic Research Institute

C. Pepper

Canada warbler sighted at Tupper Lake

C. Staicer

The open rocky barrens north of Tupper Lake is habitat for the Common nighthawk and the conifer-dominated treed bog (visible in background) is habitat for the Olive-sided flycatcher



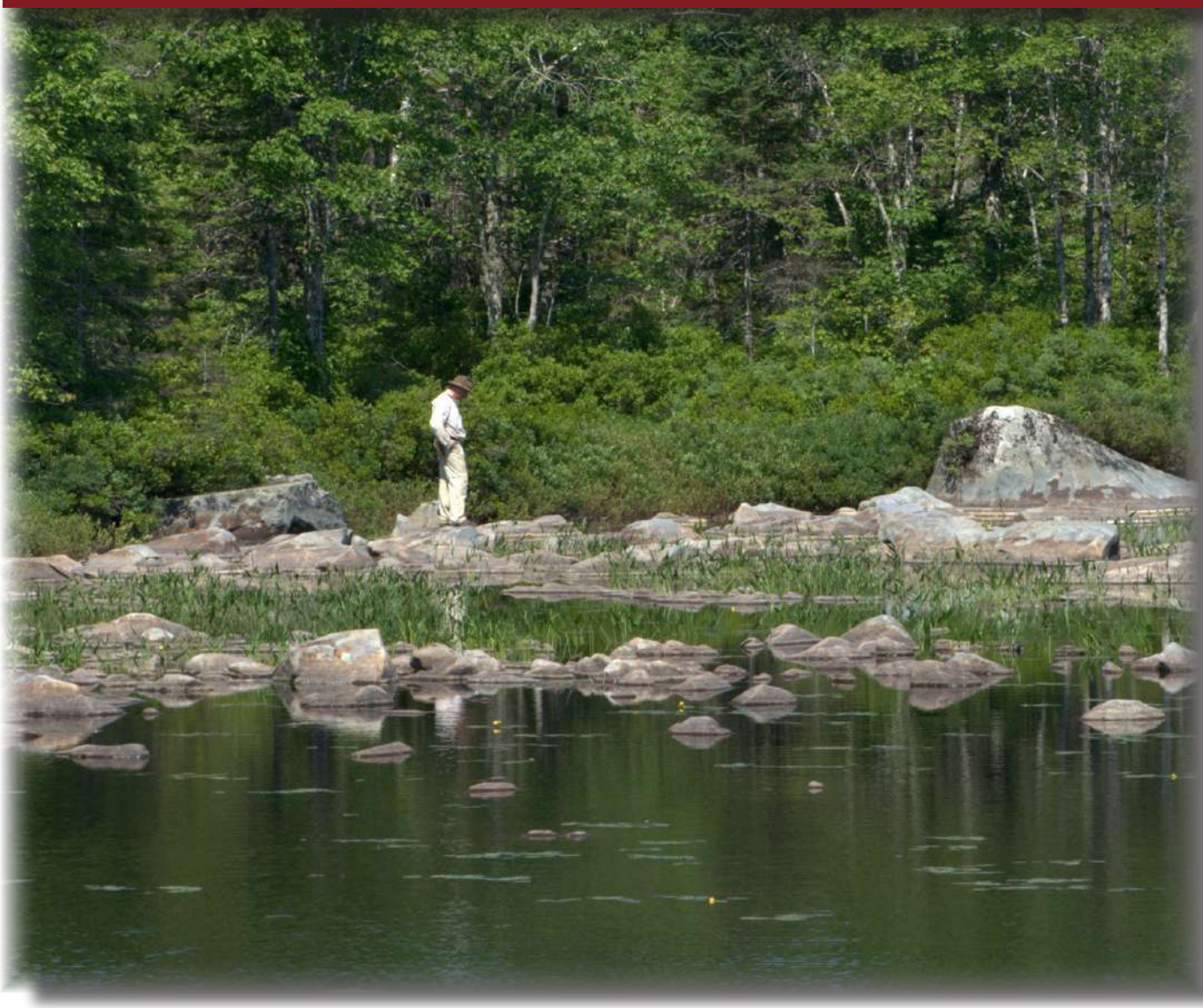
MTRI

Map of species at risk recorded at the eastern end of Tupper Lake

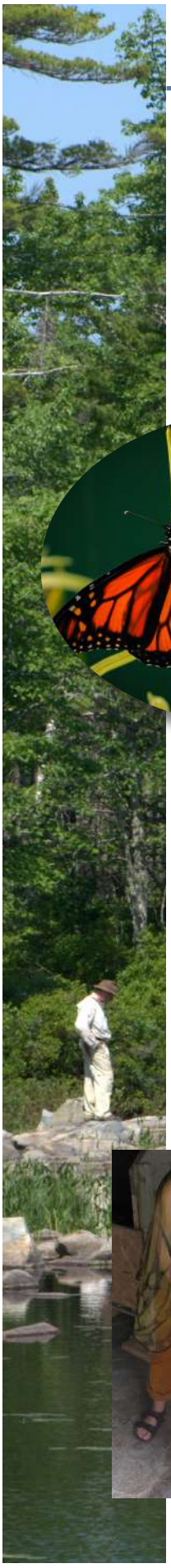
CONTACTS

Brad Toms
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
brad.toms@merseytobeatic.ca
www.merseytobeatic.ca

HUMAN DIMENSIONS



A. Belliveau, MTRI



Rationale

The Monarch butterfly is a magical species that captivates a wide audience due to its amazing life history and long distance migration. It is designated as a species of Special Concern under the federal Species at Risk Act, which means it is at risk of becoming Endangered if the threats to its population are not reversed. The Monarch is impacted by habitat loss, chemical and pesticide use and storms throughout its range. The milkweed plant is key habitat for the Monarch because the females only lay their eggs on milkweed and caterpillars only eat their leaves (no milkweed = no Monarchs). The education, motivation and empowerment of individuals and communities to help this species are key to the recovery process.

W. Pitts

Two Monarch butterflies, recently emerged from their chrysalis, drying their wings in the morning sun at the butterfly garden in Kejimkujik

Research

MONARCH BUTTERFLY STEWARDSHIP IN SNBR

OBJECTIVES

- To bring awareness of the Monarch butterfly to park visitors and residents of the SNBR and promote the Butterfly Club, which encourage landowners to create butterfly habitat by planting chemical-free butterfly gardens.
- To partner with communities to help plant butterfly gardens in the SNBR.
- To provide educational opportunities and first-hand experiences to witness the magical transformations of this species through an interactive display at the Kejimkujik Visitor Center.
- To bring educational and teaching opportunities to the maritimes.

METHODS

- Outreach events including public talks, Butterfly Club, socials, presentations, garden planting and interpretive signs were planned to spread the word and increase awareness of the Butterfly Club and how to help the Monarch.
- Butterfly Club kits were sold in a number of ways at farmer's markets across Nova Scotia in the summer and By the Mersey Gift Shop in Kejimkujik.
- Butterfly and caterpillar costumes and life stage models helped to facilitate learning experiences.

M. Crowley, Parks Canada

B. Keoghoe helping with "Pin the Monarch on the Milkweed" at a Butterfly Social in late July

RESULTS

- Butterfly talks were delivered in the SNBR to interested groups and communities.
- Over 1000 Butterfly Club kits have been sold to date, representing the creation of 1000 additional butterfly habitats for the Monarch. This spring 1000 additional Butterfly Club kits were printed and packaged.
- The second "Butterfly Social" was held at the Art of Germany Bed and Breakfast in partnership with Kejimkujik and MTRI. It was filled with food, games, face painting and fun. Children and adults alike enjoyed searching for and finding eggs and caterpillars on the large milkweed patch at the Bed and Breakfast.

RESULTS
Continued

- Many caterpillars were reared at the interactive display in the Kejimkujik Visitor Center to the excitement of onlookers.
- "Like" the Butterfly Club on Facebook! Members can share their stories and pictures and obtain butterfly information. Visit www.facebook.com/MonarchButterflyClub

YEARS OF DATA

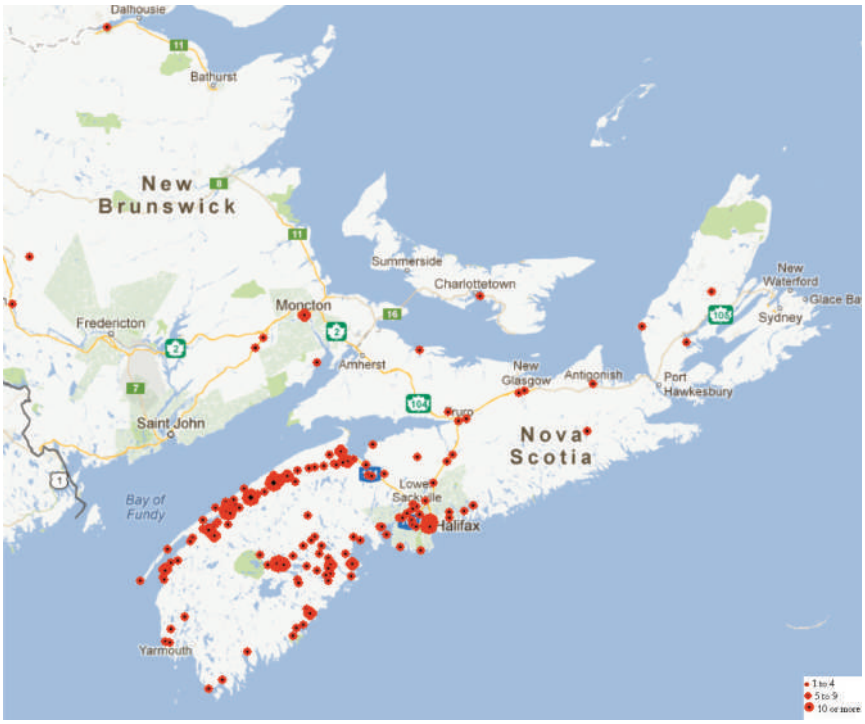
- Ongoing project since 2008

PARTNERS

- Parks Canada
- Friends of Keji
- Mersey Tobeatic Research Institute
- Monarch Teacher Network Canada
- Monarch Watch
- Canadian Wildlife Federation

J. McKinnon

H. Reed (Acadia), B. Toms (MTRI), M. Crowley (Parks Canada) and J. McKinnon (BCAF) selling Butterfly Club kits at the Wolfville Farmer's Market



T. Fetch

The location of Butterfly Club members gardens in the maritimes

CONTACTS

Megan Crowley
Parks Canada
PO Box 236,
Maitland Bridge, NS BOT 1B0
Ph. (902) 682-2185
Fx. (902) 682-3367
megan.crowley@pc.gc.ca
www.pc.gc.ca
www.merseytobeatic.ca

Rationale

We live in a special place! The Southwest Nova Biosphere Reserve is one of Canada's "Biodiversity Hotspots". There are over 40 species at risk in the province and southwest Nova Scotia is home to over 80% of these plants and animals. Species at Risk Stewardship Biologists from Kejimkujik have partnered with MTRI and other organizations such as First Nations, schools, community groups, industry and all levels of government to help recover the species at risk that live in this unique and special region. Their work is to learn about species at risk in the SNBR, share their knowledge with the public and engage and empower interested families and communities in hands-on recovery actions for these species and the habitats that they depend on.

Volunteers radio-tracking headstart Blanding's turtles, contributing to the 13 000 hrs and 350 volunteers in 2012

Research

SPECIES AT RISK STEWARDSHIP IN SNBR

OBJECTIVES

- To promote environmental stewardship actions and advocacy and to create ambassadors for species at risk.
- To increase awareness and understanding within the general public about species at risk in the SNBR and generate sighting reports.
- To engage and involve Canadians in hands-on recovery actions that help recover key species at risk including Blanding's turtle (Endangered), Eastern ribbonsnake (Threatened), Monarch butterfly (Special Concern), Piping plover (Endangered) and Atlantic Coastal Plain Flora.

METHODS

- Species at risk stewardship volunteer opportunities in the SNBR include: Blanding's turtle nesting monitoring, trapping, radio-tracking and visual surveys; American eel potting; Eastern ribbonsnake surveys; Piping plover monitoring and habitat restoration; Atlantic Coastal Plain Flora monitoring; water quality sampling; rare lichen surveys and more.
- Partnerships continue to be established with individuals and organizations that work with species at risk in Nova Scotia to enhance communication and collaboration and ultimately the recovery of species at risk in the SNBR.
- Outreach strategies were developed to link science and stewardship to achieve awareness and appreciation for species at risk.


M. Crowley

Preparing to add stones along the walk engraved with the names of the volunteers inducted at the 2011 Volunteer Banquet

RESULTS

- In 2012, 350 volunteers contributed more than 13,000 hours of their time toward environmental conservation in the SNBR. This is the highest recorded number of volunteer hours for one year, which has been steadily climbing since 2006.
- This effort was celebrated on November 25 at the Seventh Annual Volunteer Banquet, where over 100 people gathered to celebrate their achievements. There were 16 new inductees into the volunteer "Walk of Honour" and one volunteer moved from the gold to platinum level. Colin Grey received the Key to Kejimkujik Volunteer of the Year award.
- Two "Walk of Honour" BBQs were held in June and July to

RESULTS
Continued

M. Crowley, Parks Canada

Picture House capturing footage for video vignettes

celebrate the volunteers inducted at the 2011 Volunteer Banquet. The Walk of Honour is behind the Kejimkujik Visitor Center and recognizes volunteers that have cumulatively contributed over 250 (bronze), 1000 (gold) or 2000 (platinum) hours. Eleven volunteers added their stone to the bronze section of the walk and one volunteer moved up from gold to platinum.

- Three vignettes were filmed in Kejimkujik to highlight opportunities in the Southwest Nova Biosphere Reserve, including behind the scenes research opportunities. You can view all 11 of the videos here: http://www.youtube.com/user/UNESCOSNBiosphere?feature=watch

YEARS OF DATA

- Ongoing project since 2006

PARTNERS

Parks Canada

Read the "Volunteer News" to learn more about our stewardship programs

- Parks Canada
- Friends of Keji
- Mersey Tobeatic Research Institute
- Bear River First Nation
- Acadia First Nation
- Acadia University
- Dalhousie University
- Bird Studies Canada
- Southwest Nova Biosphere Reserve Association
- Government of Canada's Habitat Stewardship Program for Species at Risk

S. Mockford

Volunteers celebrating at the Seventh Annual Volunteer Banquet on December 2 2012

Banner for Kejimkujik-Southwest Nova Volunteer Programs on Facebook

CONTACTS

Megan Crowley
Parks Canada
PO Box 236,
Maitland Bridge, NS BOT 1B0
902-682-2185
902-682-3367
volunteer.keji@pc.gc.ca
http://bit.ly/keji-volunteer
www.pc.gc.ca

Rationale

The MTRI established a Forest Stewardship Council (FSC) certification pool for small and low intensively managed forests in 2011. During the establishment of this pool a landowner survey was developed and delivered to gain some insight to their opinions and ideas about woodlot management and forest certification. This survey has shown that certified small woodlot owners are not receiving a premium for their certified forest products from mills, but that they would like to gain financial incentives for managing their woodlot sustainably. A research project was conducted in order to better understand customer attitudes towards and availability of forest certified products in Nova Scotia and build capacity for local sustainable forestry initiatives. Dalhousie University students also worked with MTRI to create a marketing plan for forest products from small private woodlands in Nova Scotia.

A Belliveau, MTRI

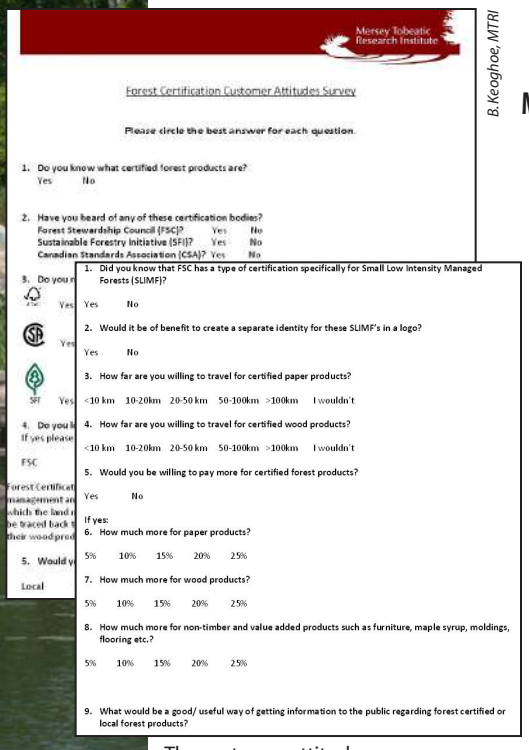
Lumber from a small woodlot

Research

MARKETS FOR FOREST CERTIFIED PRODUCTS IN NOVA SCOTIA

OBJECTIVES

- To identify whether consumers are aware of forest certified products and whether they are willing to travel to pay premiums for such products.
- To identify if there is enough information available at building and stationary stores for consumers to make educated decisions in their purchases.
- To create a marketing plan for forest products from Forest Stewardship Council certified small and low intensively managed forests in Nova Scotia.
- To develop outreach information for consumers, to enable more awareness and knowledge of forest certified products in Nova Scotia.



Mersey Tobeatic Research Institute

Forest Certification Customer Attitudes Survey

Please circle the best answer for each question.

1. Do you know what certified forest products are?
   Yes No
2. Have you heard of any of these certification bodies?
   Forest Stewardship Council (FSC)? Yes No
   Sustainable Forestry Initiative (SFI)? Yes No
   Canadian Standards Association (CSA)? Yes No
3. Do you r
   Yes
   Yes
   SFI Yes
4. Do you k
   If yes please
   FSC
   Forest Certificat
   management ar
   which the land
   be traced back
   their wood prod
5. Would y
   Local

1. Did you know that FSC has a type of certification specifically for Small Low Intensity Managed Forests (SLIMF)?
   Yes No
2. Would it be of benefit to create a separate identity for these SLIMF's in a logo?
   Yes No
3. How far are you willing to travel for certified paper products?
   <10 km 10-20km 20-50 km 50-100km >100km I wouldn't
4. How far are you willing to travel for certified wood products?
   <10 km 10-20km 20-50 km 50-100km >100km I wouldn't
5. Would you be willing to pay more for certified forest products?
   Yes No
   If yes:
6. How much more for paper products?
   5% 10% 15% 20% 25%
7. How much more for wood products?
   5% 10% 15% 20% 25%
8. How much more for non-timber and value added products such as furniture, maple syrup, moldings, flooring etc.?
   5% 10% 15% 20% 25%
9. What would be a good/ useful way of getting information to the public regarding forest certified or local forest products?

B. Keoghoe, MTRI

The customer attitudes survey

METHODS

- A survey was created and distributed at farmers markets around Nova Scotia and online.
- Visits and interviews were made with managers at major building and stationary stores in Halifax Regional Municipality to assess how often customers were asking for forest certified products, what certified products were being sold, how well certified products were labeled and if a premium was charged on the forest certified products.
- Two literature reviews were conducted based on market success and customer attitudes towards forest certification and a marketing plan was created for Nova Scotia based from background information.

RESULTS

- One hundred and seventy nine surveys were collected with 70% of respondents saying that they knew what forest certified products were. There was less recognition of names and logos however. Eighty-nine percent of participants were willing to travel to get forest certified products and 83% were willing to pay a premium of some sort.
- Store visits and interviews found that little to no customers were asking for forest certified products and that floor staff generally didn't know about these items in their store.

RESULTS *Continued*

B Keoghoe, MTRI

FSC logo on hardwood flooring at a building store

Most stores carried forest certified products of some kind but were only identifiable by the logos on their packaging. Some stores charged about a 5-10% premium for certified products.

- A marketing plan was created by Management without Borders students from Dalhousie University, with recommendations on marketing and advertising strategies in Nova Scotia for small woodlot owners.
- A brochure, map and display boards were created to help raise awareness and knowledge of forest certified products at events, farmers markets and stores.

YEARS OF DATA

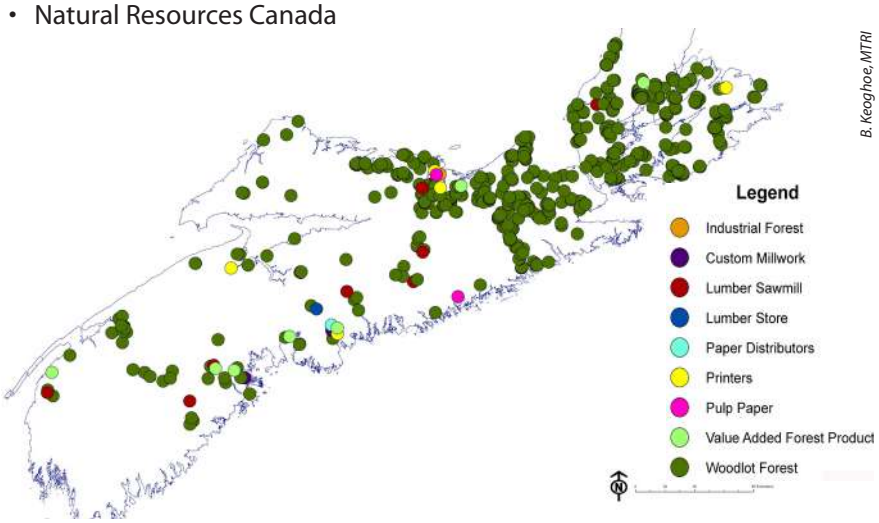
- Year 1 of a 2 year project

PARTNERS

- Nova Forest Alliance
- Nova Scotia Department of Natural Resources
- Dalhousie University - Management without Borders Program
- Ecology Action Center
- Federation of Nova Scotia Woodland Owners
- Nova Scotia Landowners and Forest Fiber Producers Association
- Forest Stewardship Council
- Mersey Tobeatic Research Institute
- Natural Resources Canada

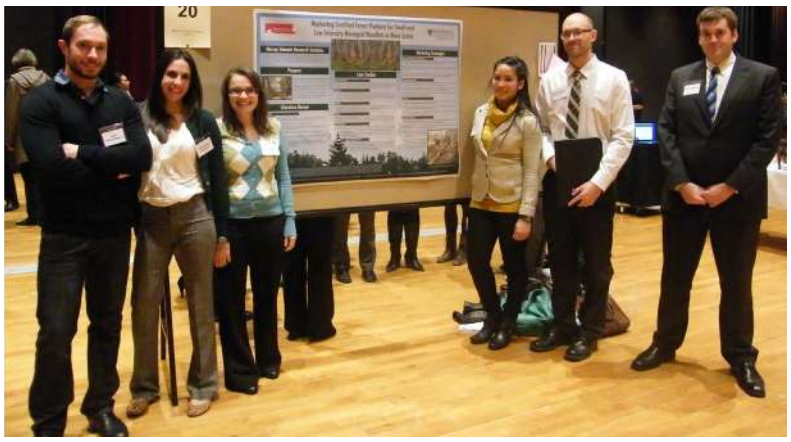
B Keoghoe, MTRI

Program for the Endorsement of Forest Certification (PEFC) logo on some laminate flooring at a building store



B. Keoghoe, MTRI

Map showing locations of woodlots, producers, mills and retailers of FSC forest certified products in Nova Scotia

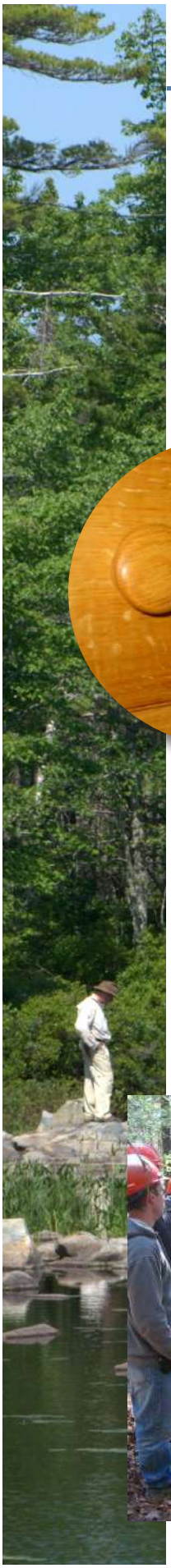


B. Keoghoe, MTRI

The Management without Borders students presenting their marketing plan for certified small woodlot owners in Nova Scotia at Dalhousie University

CONTACTS

Benna Keoghoe
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, Nova Scotia
Ph. (902) 682-2371
Fx. (902) 682-2670
info@merseytobeatic.ca
www.merseytobeatic.ca



Rationale

Forest Stewardship Council (FSC) forest certification has been developing since the early 1990's as a response to public concern about unsustainable forestry systems around the world. It is a voluntary, market-based process developed to certify forest management practices to a set of globally recognized environmental, social and economic standards. Since November 2009, MTRI has been promoting Forest Stewardship Council (FSC) certification of small woodland owners in Nova Scotia. In 2010, MTRI partnered with the Federation of Nova Scotia Woodland Owners (FNSWO) to facilitate affordable FSC certification for small private woodlot owners.

J. Barker, MTRI

Furniture from locally harvested wood

Research

FOREST CERTIFICATION FOR SMALL WOODLOT OWNERS

OBJECTIVES

- To work collaboratively with smallholders, woodlot owner groups and other partners throughout Nova Scotia to continue promotion of FSC certification in the SNBR and facilitate the certification of small, privately-owned woodlots.
- To prioritise outreach, education and landowner training to increase sustainable forest management and encourage diverse use of forest resources.
- To explore the potential of a community demonstration forest.
- To initiate an awareness-raising program for youth about trees, forest ecosystems and our dependence on the resources that we harvest from our forests.

METHODS

J. Barker, MTRI

Best Management Practices course in 2012

- A range of training courses and in-field workshops were provided to a variety of audiences to encourage ecologically-based, sustainable forest management and diversification of woodlot use.
- Information was presented via a variety of media to raise awareness of the benefits of FSC certification and the MTRI/FNSWO program.
- One-to-one and collective landowner meetings and interviews were held throughout the year.
- A three part, in field, hands-on program was delivered with the staff of Greenfield Elementary School. Activity field stations were hosted at two "Kids in the Forest" days organized by Nova Scotia Department of Natural Resources.
- Collaborated with partners to explore new ideas and innovations in the forestry sector that support sustainable forest management.

RESULTS

- Twenty-one woodland management plans were added to the MTRI FSC pool in 2012 totalling 2164 hectares.
- Ninety-three participants attended seven improvement training courses/workshops offered during spring and summer 2012.
- All children at Greenfield Elementary school participated in

RESULTS
Continued

a three part program incorporating field studies, looking at one tree, one woodlot and all the wood products we use in our everyday lives. Over 300 children took part in two Nova Scotia Department of Natural Resources "Kids in the Forest" days.

- Eleven presentations were given on forest certification and community forests at conferences, forums, training session and by request. New forest program information panels were produced for the MTRI booth to promote certification, community forests and value-added and non-timber forest products.

YEARS OF DATA

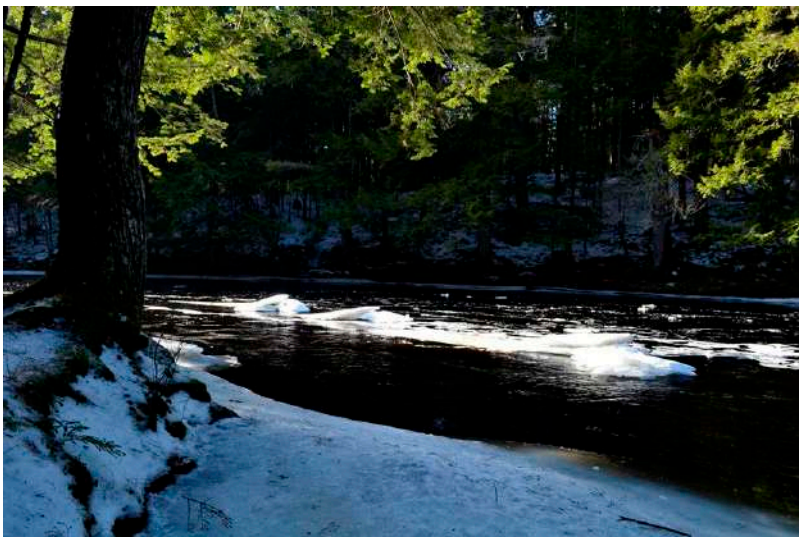
- Ongoing project since 2009

PARTNERS

- Nova Scotia Department of Natural Resources
- Nova Forest Alliance
- Federation of Nova Scotia Woodland Owners
- Mersey Tobeatic Research Institute

J. Barker, MTRI

One-Tree project with Greenfield Elementary School



J. Barker, MTRI

A woodland riparian zone in Kejimkujik

CONTACTS

Jane Barker
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

In community forestry, forest-related activities and management are governed in some way by the community. Community forests have four things in common: (1) There is local control by people who live in the community, (2) Direct benefits are created for the community according to the community's priorities, (3) They manage for multiple values (*e.g.* sustainable forest harvesting, recreation, eco-tourism, carbon storage, hunting and fishing and non-timber forest products) and (4) They manage the forest sustainably for the long-term. There are at least 120 community forests in Canada each with its own unique components, reflecting community values. A group including foresters, woodlot owners, recreation groups, environmental groups and other partners is working towards creating a community forest called the "Medway Community Forest Co-operative" for lands recently purchased by the provincial government. A public opinion survey was circulated to help inform the development of a community forest for the Medway.

A. Belliveau, MTRI

Community forest meeting in Caledonia about the Bowater woodlands and the Buy Back the Mersey initative

Research

COMMUNITY FOREST PUBLIC SURVEY

OBJECTIVES

- To determine public knowledge and information sources about community forests.
- To determine public support for community forests as a use of crown land.
- To determine the relative importance of multiple values for a proposed community forest.
- To collect input on geographic location and governance models for a Medway Community Forest.

METHODS

- An eight question survey was designed with input from multiple partners and social scientists using Survey Monkey (an online tool).
- Three thousand hard copies of the survey were distributed by mail to households in south Annapolis County and north Queens County with an information sheet and advertisement for a public meeting.
- An electronic link to the survey was distributed by email, FaceBook and on MTRI's website. Hard copies of the survey were collected at the public meeting and at multiple drop-off points in Caledonia and Annapolis Royal. Responses were collected for a three week period in January 2013.

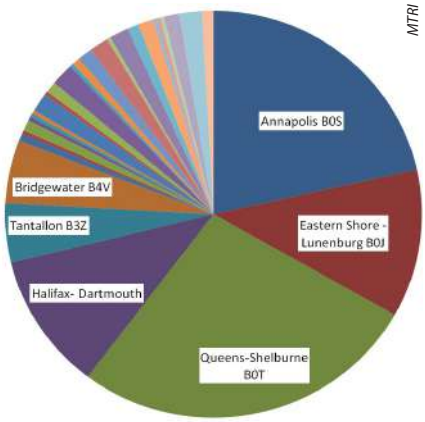
G. Delaney, Chronicle Herald

N. Oliver, Community Outreach Co-ordinator for MTRI, points to Bowater Mersey lands on a map during a meeting in Milford, Annapolis County

RESULTS

- A total of 363 people participated in the survey. About half of the respondents were from Queens and Annapolis counties and most others were from the south shore and Halifax County. One hundred and sixty-three responses were collected from the MTRI web link, 83 responses were from FaceBook, 75 responses were from email invitations and 42 responses were provided in hard copy.
- Before completing the survey, 72% of respondents had heard of community forests. Most respondents had learned about them through the newspaper (32%), internet (30%), at a public meeting (28%), from friends and family (25%) or at work (24%). Respondents could provide more than one information source. Other sources included radio, newsletter, school and TV.
- Most respondents thought that of the 550,000 acres recently

RESULTS
Continued



Postal codes provided for residences of 362 survey respondents

purchased by the province from Bowater, none should be sold to private developers (79%), up to a quarter should be leased to local mills (46%), up to a quarter used to create protected areas (39%) and up to half be used to create working community forests (37%).

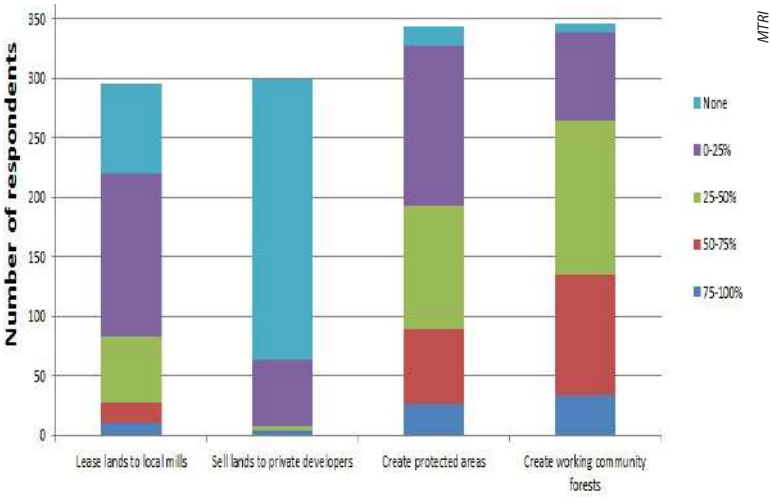
- The most important values for a proposed Medway Community Forest (in order of priority) were as follows: protecting waterways; protecting special areas for old forests and species at risk; canoeing routes; developing trails for skiing, cycling and hiking; creating and maintaining jobs in local sawmills; access to the land for fishing, hunting and trapping; creating jobs in the woods with chainsaws and small harvesters; and stimulating value-added industry development in the region.
- Respondents considered the following values either a bad idea or not important for a proposed Medway Community Forest: producing biomass for large scale producers and access to the land for all terrain vehicles.
- Most respondents who provided suggestions about governance of a community forest favoured a co-operative model. When asked about the geographic location of a community forest, there was some satisfaction with the proposed map and some specific comments. Almost half of respondents left their contact information so that they could be involved in future discussions about the Medway community forest proposal.
- Respondents who valued economic considerations were more likely to have heard about community forests (from newspapers, work and public meetings), thought more Bowater land should be used for creating community forests and less for creating protected areas. These respondents were also less adverse to large scale biomass and all-terrain vehicle access and saw more value in co-operative marketing of wood supply.

YEARS OF DATA

- Single year project

PARTNERS

- Mersey Tobeatic Research Institute
- North Queens Board of Trade
- Windhorse Woods
- Ecology Action Centre
- Parks Canada
- Nova Scotia Woodlot Owners and Operators Association



Results from the survey about the preferred proportion of the recently purchased Bowater woodlands for different purposes

CONTACTS

Amanda Lavers
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, NS B0T 1B0
Ph. (902) 682-2371
Fx. (902) 682-2760
info@merseytobeatic.ca
www.merseytobeatic.ca

A. Belliveau, MTRI

Rationale

In the summer of 2010, Kejimkujik was declared a "Dark Sky Preserve" by the Royal Astronomical Society of Canada (RASC), owing to its natural dark sky, the commitment of Parks Canada to follow outdoor lighting guidelines and the astronomy themed interpretative events that are a part of every summer season. RASC Halifax Centre members continue to advise Parks Canada staff on outdoor lighting issues and appropriate astronomy related activities. Each year, RASC volunteers assist with the "Dark Sky Weekend" in August, chosen to coincide with the absence of moonlight to highlight Kejimkujik's spectacular dark skies, free of light pollution.

D. Chapman, RASC

Gazing at Muin and the Seven Bird Hunters, stars associated with a Mi'qmaw sky story

Monitoring

DARK SKY PRESERVE: MONITORING AND SUPPORT

OBJECTIVES

- To monitor outdoor lighting for sky glow, glare and light trespass.
- To plan and lead astronomically themed activities in the park.
- To seek unique observing locations within the dark sky core.

METHODS

- In 2012, park facilities were toured to ensured that the levels and "throw" of outdoor lights was appropriate and fit the RASC guidelines.
- Keynote speaker and workshop leaders were arranged for the Dark Sky Weekend and volunteer RASC observers with telescopes complemented Parks Canada staff at Kejimkujik from 2010 to 2012.
- Parks Canada interpreters were advised on special astronomical events and provided training on telescope operation and event planning from 2010 to 2012.
- Good observing locations were investigated by foot and canoe from 2011 and 2012.

RESULTS

D. Chapman, RASC

The Sky Circle, public sky-viewing installions behind P1, Jeremy's Bay in Kejimkujik

- A lighting audit was submitted to Kejimkujik management in September 2012 which noted very good progress in converting lighting to full cutoff fixtures, very good compliance overall with RASC guidelines and one or two problem light fixtures. The next audit will be in 2014.
- The 2012 Dark Sky Weekend had great content and participation, although the skies did not fully cooperate. Activities were centred on the Sky Circle, constructed in 2011 in Jeremy's Bay campground.
- Astronomy training was provided by RASC in 2010 and telescope training in 2012.
- In 2011, back county campsite 14 was found to be a good point

RESULTS
Continued

from which to observe the southern Milky Way in summer, owing to its low horizon to the south. An August 2012 night hike to Peter's Point revealed a beautiful vantage point to observe nearly the whole sky over the lake, without glare or sky glow from the front country campground. A list of recommended back country sites for viewing the sky will be generated in the future.

- A Dark Sky Weekend is scheduled for August 9 to 11 2013.

YEARS OF DATA

- Ongoing project since 2009

PARTNERS

- Parks Canada
- Royal Astronomical Society of Canada

D. Chapman, RASC

The southern Milky Way, from back country campsite 14 in September 2011

D. Chapman, RASC

The constellation Perseus rising at back country site 24 on Minard's Bay, July 2011

CONTACT

David Chapman
Royal Astronomical Society of Canada
Halifax Centre
8 Lakeview Avenue,
Dartmouth, NS B3A 3S7
Ph. (902) 463-9103
dave.chapman@ns.sympatico.ca
halifax.rasc.ca

Rationale

The backyard biodiversity project aims to increase biodiversity in southwest Nova Scotia with a focus on rural communities. With the help of many landowners in these communities, the goal of reconnecting youth and landowners with nature while restoring ten hectares of native habitat will be met. Free starter kits have been developed as an incentive for landowner participation. Along with this project we are encouraging landowners to plant native species, remove invasive species, put up bird feeders, keep pets on leash and plant chemical free butterfly gardens.

M. Boucher, MTRI

Black-capped chickadee in a lilac bush

Research

BACKYARD BIODIVERSITY

OBJECTIVES

- To restore ten hectares of native habitat in southwest Nova Scotia.
- To reconnect youth and landowners with nature.
- To successfully plant 600 native trees and shrubs.
- To have 75% survival rate for the native species planted.
- To increase native species by increasing native habitat.

METHODS

- MTRI has started the restoration project as an example in its own backyard. High school students from Caledonia and Bridgetown helped to plant a variety of trees and winterize plants in October 2012.
- An online guide has been developed from information gathered from experts in various fields and researching various topics. The guide outlines ten ways to increase biodiversity in your own backyard.
- Newsletters, posters, presentations and online media such as FaceBook were used to spread the word and get landowners involved.
- Free starter kits were developed as an incentive for landowners to pledge to restore particular spaces in their backyards. Kits include: nestbox, native tree, invasive species guidebook, butterfly garden sign for a chemical free garden, butterfly garden plants, a bag of seaweed soil amendment, post cards and seeds.
- The online guide is available on MTRI's website.
- Restored lands will be measured and follow-up will occur in the fall of 2013 to monitor the project's success.

M. Boucher, MTRI

Caledonia highschool class planting trees at MTRI in the October

RESULTS

- In the fall, Caledonia and Bridgetown high schools assisted with planting a total of 40 trees and mulched 55 plants in preparation for the winter.
- At the MTRI demonstration site there were 65 volunteers contributing 150 hrs towrards this restoration project.
- There are currently 29 interested participants in rural communities in southwestern Nova Scotia who have pledged to increase biodiversity in their backyards.

RESULTS
Continued

- Twenty-two nest boxes have been constructed by the Caledonia Scout groups.

YEARS OF DATA

- Year 1 of a 2 year project

PARTNERS

- Environment Canada - EcoAction
- Mersey Tobeatic Research Institute
- Nova Scotia Youth Conservation Corps
- Wild Rose Farm
- First Caledonia Scout Troop

A. Belliveau, MTRI

Sugar maple seedling

A. Belliveau, MTRI

Downed trees in the woods provide habitat for various animals including salamanders and amphibians such as Spring peepers and Wood frogs

M. Boucher, MTRI

American tree sparrow (top) and Common redpoll (middle) feeding in the late winter

A. Pray-Leslie, MTRI

Standing dead trees provide habitat for mammals, cavity nesting birds such as woodpeckers and habitat for insects

CONTACT

Megan Boucher
Mersey Tobeatic Research Institute
9 Mount Merritt Road
PO Box 215
Kempt, Nova Scotia
Ph. (902) 682-2371
Fx. (902) 682-2670
info@merseytobeatic.ca
www.merseytobeatic.ca

Rationale

Barn swallows were listed as Threatened in 2011 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Where Barn swallows nest can affect breeding success and so to better understand this species, characteristics of nest sites and the buildings in which they are found were investigated. Establishing nests in manmade structures, Barn swallow nests can persist for several years, providing individuals with the option of reusing old nests from previous seasons rather than building new ones. Reusing old nests can save considerable time and energy.

L. Campbell

Barn swallow sitting on a pole

Research

BARN SWALLOW NEST SITE SELECTION

OBJECTIVES

- Nest building behaviour of Barn swallows in Nova Scotia was studied to determine what site characteristics influence where to place a nest, how many pairs reuse old nests, what influences the decision of which old nest to occupy and how nest site selection affects seasonal reproductive success.
- To determine how building structure influences the number of birds that nest within it.

METHODS

- Barn swallow colonies at four locations in Nova Scotia were investigated (Kejimkujik, McNab's Island, Pleasant River, Port L'Hebert) during the arrival, nest building and laying period of first clutches from May to mid-June.
- At three of these locations nest reuse was analysed by mapping all nests remaining from previous years prior to the swallow's arrival and recording any nests newly built throughout the season.
- Variables measured for all nests included height from the ground, distance to nearest entrance, distance to roof, number of wall surfaces attached to, whether nests were supported underneath, substrate attached to, distance to nearest nest, visibility from other nests and distance to visible nests to determine whether any of these variables were consistent across different nesting locations.
- To determine how building characteristics influence colony size, information recorded for all buildings included number of entrances, openness, number of ceiling rafters and volume.
- Nests were checked regularly to determine which became active, when laying occurred and clutch sizes.

L. Campbell

Researcher surveying old fish plant where one of the study colonies was nesting

RESULTS

L. Campbell

Barn swallow on a nest in the rafters

- One hundred and eighty-two nests were found in ten buildings, 89 of which (49%) were active by the end of the study.
- The only nest characteristic consistent among different locations was a preference for a site providing base support. All other characteristics of the nest site varied between buildings.
- Sixty-five percent of pairs at three locations reused old nests while 35% of pairs built new nests.
- Nests without visible neighbours were more likely to become occupied and to have larger clutch sizes than those with visible neighbours. The number of ceiling rafters in a building was positively associated with the number of nests found within it, for rafters provide nest sites hidden from neighbouring birds. Aside from volume, no other building characteristics were linearly associated with nest numbers.
- As nests were reused, the height from the base to the rim increased as new layers of mud were added each year. Nest height was positively associated with clutch size, possibly suggesting pairs benefit from reusing old nests.

YEARS OF DATA

- Single year project

PARTNERS

- Mersey Tobeatic Research Institute
- Dalhousie University

L. Campbell

Buildings which had many ceiling rafters like this unused barn tended to have more pairs nesting in them

L. Campbell

A pair of Barn swallows on McNabs Island

CONTACTS

Liz Campbell and Cindy Staicer
Department of Biology
Dalhousie University
1355 Oxford Street,
Halifax NS B3H 4R2
e.campbell@dal.ca
cindy.staicer@dal.ca

INDEX OF PROJECTS BY RESEARCHER NAME

Name	Study	Page
LaRue, Diane	Rockrose in Queens County	50
LeBlanc, Mike	Jack Pine Budworm Population and Damage Assessments	32
McCarthy, Chris	European Green Crab Coastal Monitoring	14
	Eelgrass Coastal Monitoring and Recovery	16
	Little Port Joli Estuary Hydrological Restoration	18
	Nocturnal Owl Survey.	28
McNeil, Jeffie	Blanding's Turtle Nest Protection	80
	Eastern Ribbonsnake Overwintering Habitats	86
Mockford, Steve	Radio Tracking Headstarted Blanding's Turtles	84
Neville, Ronald	Brown Spruce Longhorn Better Survey	34
Ogden, Jeff	Jack Pine Budworm Population and Damage Assessments	32
Pouliot, Daniel	White-Tailed Deer Abundance	38
	Glossy Buckthorn Eradication and Management	40
	Plethodontid Salamander Monitoring	42
	Brook Trout Tagging Program	64
	Aquatic Connectivity	66
Smith, Duncan	Peep Lo! Piping Plover Monitoring	10
	Blanding's Turtle Nest Protection	80
	Blanding's Turtle Hatchling Tracking	82
Staicer, Cindy	Modeling Habitat for Landbirds at Risk	22
	Effects of Hemlock Defoliation on Forest Birds	24
	Barn Swallow Nest Site Selection	106
Sterling, Shannon	Catchment Liming Experiment	74
Toms, Brad	Chimney Swift Monitoring in SNBR	30
	Boreal Felt Lichen Monitoring in Nova Scotia	36
	Atlantic Coastal Plain Flora Stewards in Cottage Country	54
	Eastern Ribbonsnake Overwintering Habitats	86
	Investigation of Biodiversity on Tupper Lake	88
Westwood, Alana	Modeling Habitat for Landbirds at Risk	22
Whynot, Wendy	The Kejimkujik-Mersey LoonWatch Program	70

2012
Annual Report
Research and Monitoring in the Greater Kejimkujik Ecosystem

Parks Canada Parcs Canada
Canada

Mersey Tobeatic Research Institute

Printed on 100% post-consumer paper