

Charlottetown, Prince Edward Island

**Atlantic Society of Fish
and Wildlife Biologists**
Proceedings of the 49th Annual Meeting
October 23rd-25th



2012

Hosting Organization

The [CCWHC](#) applies veterinary medical science to wildlife conservation and management through the acquisition of knowledge of wildlife health and disease via continuous disease surveillance in free-ranging populations. We coordinate Canada's National Wildlife Health Surveillance Program and provide educational programs, information, and consultation to government agencies and the public. The Atlantic node of the CCWHC is based within the Atlantic Veterinary College, in Prince Edward Island.

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BIRD STUDIES
ÉTUDES D'OISEAUX CANADA



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ASFWB 2012 Scientific Program

Session 1: Wildlife Management and Conservation I

Day 1 (October 24th)

09:00	Gary Schneider	Putting a public face on forest restoration
09:40	Kirby Tulk	Managing forest ecosystems in Terra Nova National Park of Canada: the good, the bad, the ugly
10:00	John Brazner	Vernal pool mapping and monitoring project: promoting stewardship and understanding of Nova Scotia's smallest wetlands
10:20	Paul Chamberland	Geese, gulls, grains and golf: proper permits provide protection from protected birds
10:40	COFFEE BREAK	
11:00	<u>Alyssa Mitchell</u>	Operation shrew poo: a community-centered approach to conserving rare wetland shrews in Nova Scotia
11:20	Kate Bredin	The Maritimes breeding bird atlas: conservation applications, changes in Maritimes birds and continuing volunteer support
11:40	Margaret Campbell	Using breeding bird atlas data to conserve species at risk in industrially managed Atlantic forests
12:00	Becky Whittam	Bank swallows in the Maritimes: preliminary surveys and future needs for a declining aerial insectivore
12:20	LUNCH	
1:40	ASFWB Annual General Meeting	
2:40	COFFEE BREAK	

Session 2: Wildlife Health

3:20	Pierre-Yves Daoust	Animal welfare and wildlife use
4:00	<u>Heather Fenton</u>	Unusual mortality event of young grey seals (<i>Halichoerus grypus</i>) associated with apicomplexan protozoal hepatitis in Nova Scotia, Canada
4:20	<u>Ana Gradil</u>	Comparative immunological development and responses in lower vertebrates – shortnose (<i>Acipenser brevirostrum</i>) and Atlantic (<i>A. oxyrinchus</i>) sturgeon
4:40	David Groman	Results of fish health assessments of glass eels, <i>Anguilla rostrata</i> , from Canadian maritime rivers from 2006-2010
5:00	Helene Van Doninck	Lead poisoning in bald eagles

Session 3: Wildlife Management and Conservation II

Day 2 (October 25th)

8:40	Brad Toms	New finds in eastern mountain avens (<i>Geum peckii</i>) conservation on Brier Island and Digby Neck
9:00	<u>Scott Roloson</u>	Delineating anadromous movements of non-native rainbow trout on Prince Edward Island
9:20	Rick Hawkins	Aquatic connectivity in Prince Edward Island national park: monitoring for ecosystem integrity and management effectiveness
9:40	Daryl Guignon	Silent streams: the impact of impoundments on headwater streams in Prince Edward Island
10:00	COFFEE BREAK	
10:20	<u>Kate Goodale</u>	How do Nova Scotia farmers feel about biodiversity on their properties?
10:40	<u>Megan MacIntosh</u>	The effect of land-use on waterfowl habitat quality in an agricultural region of Atlantic Canada
11:00	<u>Cassandra Mellish</u>	Monitoring of green crabs from two Prince Edward Island estuaries: exploring the basis for a potential management plan
11:20	<u>Garry Gregory</u>	Muskrat harvest and the influence of external variables
11:40	LUNCH	

Session 4: Ecosystem Studies

1:00	Donna Giberson	Putting the research into action: how do we get from university studies to work on the ground?
1:40	<u>Paula Tummon Flynn</u>	Occurrence of autotomy in PEI green crab populations and their influence on the potential impact of this invasive species
2:00	<u>Julia A. Whidden</u>	Skating around the drink: preliminary movement patterns, population density and distribution of little skate and winter skate in the Avon estuary
2:20	<u>Lauren Banks</u>	Too much? Too little? Or just right?: impacts of nutrient availability on duck brood presence in the Annapolis valley
2:40	<u>Lee Millett</u>	Factors affecting productivity of duck brood rearing in small wetlands in the Annapolis valley, Nova Scotia
3:00	COFFEE BREAK	
3:20	Rosemary Curley	Were beavers native to Prince Edward Island?
3:40	David J. Lieske	Using models to link survey designs: a case study involving maritime American black ducks
4:00	Paul Giroux	Monitoring wetland odonata communities in Prince Edward Island national park of Canada
4:20	Student Awards/Closing	

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Wildlife Management and Conservation I

Moderated by:

Nic McLellan



Gary Schneider, Keynote Speaker

Gary began the Macphail Woods Ecological Forestry Project in 1991, in an effort to promote the restoration of the native Acadian forest in Prince Edward Island. The project has received numerous local and national awards for its work on environmental education, native plant propagation and forest restoration. Thousands of Islanders have benefitted from the walks and talks at Macphail Woods, and 2012 marked the fifth offering of the UPEI Ecological Forestry course at Macphail Woods. Gary helped design the course and is a co-instructor.

PUTTING A PUBLIC FACE ON FOREST RESTORATION

Gary Schneider

Macphail Woods Ecological Forestry Project, Orwell, PEI

The Macphail Woods Ecological Forestry Project was started in 1991 in reaction to the clearcutting and plantations that dominated the forest landscape. The intention was to set a good example for forest management and to inspire others to help with the restoration of the Acadian forest, which remains under threat from land use practices in the region. The Acadian forest is listed as one of six endangered forests in North America by the World Wildlife Fund.

Today, that vision has blossomed into a full-blown educational facility that includes school tours, a summer children's program, three nature trails, an arboretum, a large native plant nursery and the Macphail Woods Nature Centre. The project has won numerous local and national awards and has begun managing 2,000 acres of public forest land for the provincial government. Macphail Woods is also actively involved with a growing number of private landowners in improving the health of their forests.

This presentation will show how Macphail Woods helps remove the mystique surrounding restoration and encourages everyone – foresters, biologists, horticulturalists, students and the public at large – to play a role in healing our forests. Today, many Islanders are proponents of native plants and are actively improving their woodlands by adding high-value species such as red oak (*Quercus rubra*) and yellow birch (*Betula alleghaniensis*) and also rarer plants such as witch hazel (*Hamamelis virginiana*) and hobblebush (*Viburnum lantanoides*).

Key words: Acadian forest, restoration, native plants, Macphail Woods

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MANAGING FOREST ECOSYSTEMS IN TERRA NOVA NATIONAL PARK OF CANADA: THE GOOD, THE BAD, THE UGLY

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Within the past two decades, Parks Canada has shifted from a passive to an active approach in the management of park ecosystems. In Terra Nova National Park, staff work to improve and maintain the park's ecological integrity through active ecosystem management programs such as the restoration of fire on the landscape and most recently, the removal of moose through public hunting. Current management strategies are examined with predicted forest modelling and land use constraints, to gain insight in how current management activities will/can maintain ecological integrity in Terra Nova's forests.

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VERNAL POOL MAPPING AND MONITORING PROJECT: PROMOTING STEWARDSHIP AND UNDERSTANDING OF NOVA SCOTIA'S SMALLEST WETLANDS

John Brazner and Krista Hilchey

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Vernal pools are small, shallow wetlands that lack permanent inlet or outlet streams and often dry out in the summer. They provide critical breeding habitat for frogs, salamanders, insects and fairy shrimp, and feeding and drinking sites for birds, mammals, turtles and other wildlife. Vernal pools are probably the least well understood of all the wetlands in Nova Scotia. We know very little about the overall distribution of vernal pools, the range of types present here, how many we have, how many are being lost to development or what biological communities, physical-chemical conditions or hydroperiods are typical. Based on this lack of information and anecdotal evidence that suggests vernal pools are disappearing rapidly in some areas, Nova Scotia Environment launched a pilot project in the spring of 2012 to engage citizen scientists across the province in the process of gathering some of the much needed data that will help answer key questions. The pilot project has been primarily focused on gathering information on distribution and baseline conditions of pools and engaging volunteers, but the plan is to expand the focus to include biological observations in the near future. Progress to date will be discussed and not-so-subtle recruitment of volunteers from among conference participants will be attempted.

Key Words: vernal pools, citizen science, pilot project, baseline conditions

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GEESE, GULLS, GRAINS AND GOLF: PROPER PERMITS PROVIDE PROTECTION FROM PROTECTED BIRDS

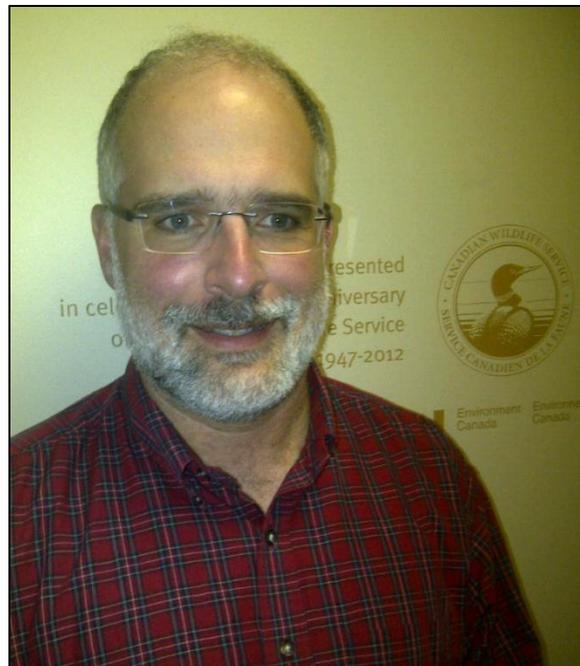
Paul Chamberland

Canadian Wildlife Service, Environment Canada, Sackville, NB.

Rapidly increasing populations of non-migratory geese and other bird species often cause damage to urban and agricultural interests. Though the problem may be simple, the regulations pertaining to damage from birds are complex and case-specific. The presentation will help biologists and front-line staff find solutions by: explaining federal and provincial jurisdiction with respect to birds; reviewing applicable laws and, explaining procedures and requirements relating to permits that may be available to address migratory birds causing damage or danger to properties ranging from: cottages, parks, and airports to: farms, blueberry fields, aquaculture leases, golf courses, industrial facilities and even rooftop air conditioning units.

Key words: Overabundant, Goose, Gull, Control, Bird Damage.

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OPERATION SHREW POO: A COMMUNITY-CENTERED APPROACH TO CONSERVING RARE WETLAND SHREWS IN NOVA SCOTIA

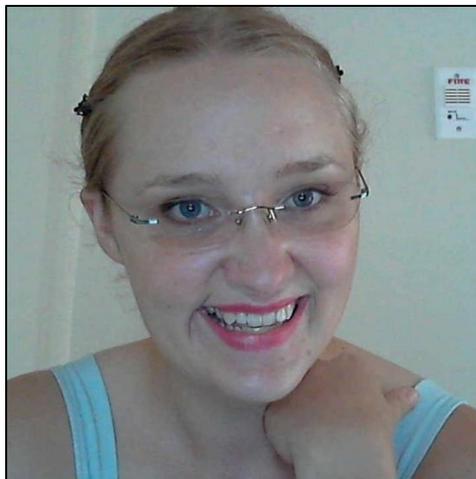
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Little-known and often misunderstood, shrews occupy a variety of ecological niches and habitats in Nova Scotia. There are seven different species in the province, including a diver (*Sorex palustris*, the North American water shrew), an endemic species (*Sorex maritimensis*, the maritime shrew) and one with venomous saliva (*Blarina brevicauda*, the North American short-tailed shrew). Shrews have an exceptionally high metabolic rate, a low body mass, are easily frightened and are most active at night, making them notoriously difficult to work with. Live trapping requires almost constant monitoring, and any shrews safely captured could easily die of fear or stress once found. Species in Nova Scotia must usually be identified by studying their teeth under a microscope, or using genetic techniques. In 2004, a group in the United Kingdom used a low-tech survey to determine the location of their water shrews, which inspired Operation Shrew Poo. We work with volunteers to put out and monitor feeding stations, which are simple pieces of PVC piping closed and baited at one end. Shrews may enter, eat, turn and leave freely, often depositing a scat sample inside. The UK team was able to match samples to species based on size, shape and content, however we have too many species with similar sizes and diets to do this. Instead, DNA is extracted and purified from the feces. A short segment of the mitochondrial cytochrome b gene is amplified using PCR and primers that match the genomes of all seven species. After amplification, two restriction enzymes are used to test for the presence of either maritime shrew or water shrew DNA. In addition to helping educate the public about the role of these insectivorous mammals in the ecosystem, this study will provide critical baseline data on habitat use and abundance for wildlife and conservation agencies.

Keywords: non-invasive sampling, Nova Scotia, shrews, *Sorex maritimensis*, *Sorex palustris*

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Student Presenter

THE MARITIMES BREEDING BIRD ATLAS: CONSERVATION APPLICATIONS, CHANGES IN MARITIMES BIRDS AND CONTINUING VOLUNTEER SUPPORT

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The Second Maritimes Breeding Bird Atlas is the largest volunteer-based environmental initiative ever undertaken in the Maritimes. It was designed to document the distribution and abundance of all bird species breeding across New Brunswick, Nova Scotia, and Prince Edward Island and to compare these findings with the results of the first Maritimes Atlas (1986-1990). From 2006 to 2010, a thousand volunteers spent 50,000 hours in the field surveying for breeding birds. Atlassers used consistent, scientifically-rigorous methods to record observations, and amassed an enormous geospatial data set of over 250,000 breeding bird records and 3,500 records for species at risk.

This comprehensive information on distribution, abundance, and status of Maritimes breeding birds is being analyzed, summarized and prepared for publication in a bilingual hard-cover Atlas book, and for delivery through the MBBA website. All Atlas information is freely available to wildlife agencies, governments, industry, consultants, ENGOs, educators, and citizens, ensuring that concerns for birds can be effectively built into environmental decisions. Atlas data and maps, available through the MBBA website, are already informing the location of new development projects such as roads, industrial operations and resource extraction projects, thus helping to minimize environmental impacts. Atlas data are also being put to use in a number of key conservation planning projects across the Maritimes. An undertaking of this scope would not succeed without volunteer support at all levels, throughout the duration of the project. Volunteers continue to assist the MBBA through the stages of data review, writing, photo selection and publication, and the atlas derives immeasurable benefit from the ongoing contributions of skilled citizen scientists.

Comparing results from this second Atlas to the first, completed 20 years ago, has enabled us to detect important broad-scale changes in bird distribution and abundance over the last two decades. Some noted changes reflect region-wide ecosystem shifts, like changing tree composition in Maritime forests or warming climates, while others result from the direct effects of human activities on birds, such as impacts from farming, forestry, release of game birds, or improvements in the use of dangerous pesticides.

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USING BREEDING BIRD ATLAS DATA TO CONSERVE SPECIES AT RISK IN INDUSTRIALLY MANAGED ATLANTIC FORESTS

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Breeding Bird Atlases are five-year, volunteer-based projects to determine the distribution, abundance and status of all birds within a defined geographic region. From 2006-2010, over 1,000 volunteers gathered data for the second Maritimes Breeding Bird Atlas, including conducting point counts and collecting location information for 78 species at risk. The result was an enormous geospatial dataset with location information for approximately 16000 points and 120 Maritimes breeding birds. Traditionally, the primary products of atlases are maps of abundance and breeding evidence, but the geo-referenced information gathered provides a myriad of opportunity to address additional questions, particularly when combine with other resource information. To determine Maritimes-specific species-habitat associations, habitat variables were extracted at 5 buffer sizes (50, 100, 200, 500, 100m) from provincial forest resource inventories for approximately 120 species. The results were used to describe habitat characteristics for forest species at risk in the Maritimes based on tree species, stand age, harvest regime, aquatic features and land use practices. Understanding region-specific habitat preferences is integral to developing effective management practices for high priority species and their habitats. In the Maritimes, a large proportion of forest ecosystems are subject to commercial and industrial forestry management practices. Habitat information based on breeding bird atlas data can be integrated into long-term planning to meet habitat targets and preserve key habitat features for species at risk over the short and long term. This type of relational habitat analysis could be applied to other breeding bird atlases to identify important habitat features for regionally rare species.

Keywords: Breeding Bird Atlas, Canadian Maritime Provinces, Habitat Association,

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BANK SWALLOWS IN THE MARITIMES: PRELIMINARY SURVEYS AND FUTURE NEEDS FOR A DECLINING AERIAL INSECTIVORE

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Bank Swallows (*Riparia riparia*) are declining across Canada, with the decline most pronounced in the east. In the Maritimes, the species is widely distributed along the coasts of PE and the Northumberland Strait of NS and NB, where habitat is threatened by a variety of factors including sea level rise and shoreline hardening activities. The species is being assessed by COSEWIC in November 2012.

Because of their clumped distribution and ephemeral habitat, Bank Swallows are more challenging to monitor than are other swallow species. In PEI National Park, the number of Bank Swallow nesting burrows has been chosen as an indicator of coastal habitat integrity, and boat-based surveys of breeding habitat including burrow counts post-breeding have been conducted since 1995. In 2012, the Canadian Wildlife Service piloted a variety of additional survey techniques including citizen science reports to e-bird and shore-based surveys of western PE. Results of PEI National Park surveys indicate a decline in the number of burrows since 1995 despite few habitat threats. Preliminary results of ground-based surveys in western PE from West Cape to Nail Pond indicate that this is an important region for Bank Swallows, with 21 colonies ranging from 5 to 438 burrows. Finally, e-bird is an effective way of gathering presence data, but standardized counts are required. Some combination of citizen science and formal surveys in protected and unprotected habitat is needed to effectively monitor this species in the Maritimes.

Finally, habitat loss or mortality during migration or wintering may be contributing to population declines. To begin to assess the contribution of such factors to declines, CWS deployed 47 geolocators on Bank Swallows from four colonies in NB, IN, ON and BC. Data returned in 2013 should help delineate migration routes and wintering areas for birds across the breeding range showing different population trends.

Key words (3-5): Bank swallow, coastal conservation, aerial insectivore

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Wildlife Health

Moderated by:

Mark Pulsifer



Pierre-Yves Daoust, Keynote Speaker

Pierre-Yves is Professor of Anatomic Pathology and Wildlife Pathology at the Atlantic Veterinary College and coordinator of the CCWHC for the Atlantic region.

He was born and raised in Québec, he worked in Saskatchewan, Ontario and Alberta, and he has now been in Prince Edward Island for more than 20 years. He loves this country, its diversity and its nature and went into veterinary medicine (Université de Montréal, 1974) because of his interest in wildlife. Pierre-Yves' main professional interests include diagnostic wildlife pathology, factors associated with whale stranding events in the Canadian Maritime provinces, animal welfare aspects of trapping and sealing, and a fondness for Northern Gannets

ANIMAL WELFARE AND WILDLIFE USE

Pierre-Yves Daoust

Canadian Cooperative Wildlife Health Centre, Atlantic Veterinary College, University of Prince Edward Island.

It is increasingly important for wildlife harvesters and scientists to address upfront and objectively potential issues of animal welfare in the context of their activities. However, perception of good animal welfare may vary considerably among people, depending on their own culture and personal experience, and it may be difficult to reconcile some of the values ascribed to animals by different people. Equal respect for the animals, the environment, and the people should be a guiding principle in discussions aimed at improving the fate of wild animals that we use or harvest. The bowhead whale hunt is socially and culturally important for Inuit people, but the logistics of this hunt rarely lead to immediate death of the animal. Respect for these people dictates that we tolerate some degree of animal suffering while working with them to achieve as efficient a hunt as possible. The seal hunt is culturally, socially and economically important for many coastal communities in Atlantic Canada. Respect should be extended to members of these communities as well, and substantial progress has been achieved through cooperation with sealers to ensure that this hunt is done as professionally as possible. The trapping industry has also addressed animal welfare through implementation of the Agreement on International Humane Trapping Standards, and Canada in particular has become a world leader in trap research. It is imperative that sport hunters as well as wildlife scientists be proactive and, objective in addressing issues of animal welfare that they may face. For sport hunters, lead poisoning in common loons and bald eagles from ingestion of fishing sinkers or spent lead ammunition may be a case in point: focussing the discussion on the possible impact, or lack thereof, of this type of poisoning on these species at the population level obscures its detrimental effects on individual birds.

Key words: animal welfare, Inuit hunt, sealing, sport hunting, trapping

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UNUSUAL MORTALITY EVENT OF YOUNG GREY SEALS (*Halichoerus grypus*) ASSOCIATED WITH APICOMPLEXAN PROTOZOAL HEPATITIS IN NOVA SCOTIA, CANADA

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In March 2012, an unusual mortality event involving recently weaned young grey seals was reported on Hay Island, east of Cape Breton Island, Nova Scotia. All dead animals appeared in good body condition and had probably never yet gone in the water. The estimated mortality was approximately 400 pups out of an annual average production of 2,500 pups on this island. Ten animals were necropsied on site. All were in good body condition (sternal blubber thickness, 40-60 mm). Gross lesions were inconsistent and included irregular pulmonary congestion, mild lymphadenomegaly, and occasional petechiae in lymph nodes and thymus. Microscopic lesions were similar in all 10 animals, consisting of a marked, acute, multifocal, necrotizing hepatitis with intralosomal protozoa. A few animals had a diffuse interstitial pneumonia of moderate intensity. On electron microscopy of the liver, the protozoa were identified as asexual stages of an Apicomplexan parasite with a basaloid nucleus, conoid apparatus and visible micronemes. Extensive survey of other whelping colonies of grey seals in the region suggested that this unusual mortality event was confined to Hay Island. Further investigation is planned for the next whelping season.

Key Words: grey seal, mortality outbreak, *Halichoerus grypus*, Apicomplexan, protozoal hepatitis

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Student Presenter

COMPARATIVE IMMUNOLOGICAL DEVELOPMENT AND RESPONSES IN LOWER VERTEBRATES – SHORTNOSE (*Acipenser brevirostrum*) AND ATLANTIC (*A. oxyrinchus*) STURGEON

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Sturgeons are Chondrosteans (order Acipenseriformes), primitive bony fish considered to be a transition group between cartilaginous fish (Chondrichthyes) and modern teleosts, and as such are extremely useful for the understanding of vertebrate evolution. Sturgeon physiology, longevity, late sexual maturation and migration patterns render them particularly susceptible to habitat degradation and over-harvesting for meat and eggs (sold worldwide as caviar), and has resulted in >80% of sturgeon species to be considered threatened or endangered. Research on sturgeon has focused on physiology and conservation but little is known about the development (ontogeny) of their immune system or their immune response to stressors such as environmental temperature fluctuations and pathogens. To begin to fill in this knowledge gap, we have initiated studies to describe the ontogeny of the immune organs and tissues in sturgeon, and their responses to temperature and parasite exposure. Young-of-the-year shortnose (*Acipenser brevirostrum*) and Atlantic (*A. oxyrinchus*) sturgeon were maintained at different temperatures and samples of spleen, meningeal lymphoid tissue, thymus and skin were collected for light and electron microscopy and gene expression analysis. Understanding at what stages these immune organs appear, how they develop and respond with time under such stressors will allow for a more critical evaluation of a functional immunity in sturgeon.

Key words (3-5): Immune organs, morphology, sturgeons

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Student Presenter

RESULTS OF FISH HEALTH ASSESSMENTS OF GLASS EELS, *Anguilla rostrata*, FROM CANADIAN MARITIME RIVERS FROM 2006-2010

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This presentation reports on the results of fish health assessments for newly captured glass eels (*Anguilla rostrata*) from Nova Scotia and New Brunswick in Atlantic Canada, which were part of a regional re-stocking program for Lake Ontario. Glass eel populations were segregated by watershed or river of capture, held in quarantine and subsequently assessed for the following infectious disease agents as recommended by the Great Lakes Fish Health Committee (GLFHC): for viruses - VHSV, IPNV, ISAV, IHNV, SVC and HVA; for bacteria - *Aeromonas salmonicida*, *Yersinia ruckeri*; and for parasites *Anguillicoloides crassus*. Assessments completed in 2006 were on a single sample Lot of 225 glass eels (150 for virus isolation, 75 for gross histopathology). Those completed in 2007 were on 5 sample Lots of 300 individuals (150 for virus isolation and PCR analysis, 150 for gross and histology examination). In 2008 on 4 additional sample Lots with the glass eel numbers increased to 340 as per recommendation of the GLFHC (170 for virology and 170 for gross and histopathology). And, in 2009-10 on 5 sample Lots of 340 eels, including bacteriology on each of the 17 virus pools per Lot to meet newly adopted fish health regulations in New York State. Results of virus isolation and molecular assays of pooled samples from all years were negative for all viruses of interested. Bacteriological culture of the 2009-10 pooled samples revealed that one lot held on surface water prior to sampling was harboring *Yersinia ruckeri*. Gross parasitological examination revealed only sporadic regions of integumental hyperplasia, which on histology section were determined to be trophozoite stages of the ciliate *Ichthyophthirius multifiliis*. Histopathological examination of individuals in all Lots revealed necrotizing hepatitis and associated an intranuclear microsporidian, morphologically consistent with a *Nucleospora* sp. One Lot of older elvers from the estuary of the St. Mary's River in Guysborough County, Nova Scotia was found to be harbouring larval and pre-adult nematodes in association with the wall and lumen of the gas bladder. These nematodes were morphologically consistent with *Anquillicoloides crassus*. In addition, this Lot was infected with an as yet identified Myxosporidian infection of the urethra and urinary bladder. The significance of these results will be discussed.

Key words:

Anquillicoloides crassus,
glass eel,
elver,
Anguilla rostrata,
Nucleospora sp.,
Yersinia ruckeri,
Myxosporidian,
Ichthyophthirius multifiliis
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LEAD POISONING IN BALD EAGLES

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Poisoning from spent lead ammunition has been documented in many species worldwide and is an issue that occurs repeatedly in Nova Scotia in the bald eagle (*Haliaeetus leucocephalus*). This presentation will discuss the science behind lead poisoning, concerns about the entry of lead into the human food chain through lead harvested game, and the solution to this solvable problem: the use of non-lead ammunition. The key to decreasing the incidence of lead poisoning is hunter outreach. Education efforts in Nova Scotia have resulted in positive and groundbreaking initiatives.

Key Words: Lead poisoning, Bald eagle, Hunter outreach, toxicology, *Haliaeetus leucocephalus*

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Wildlife Management and Conservation II

Moderated by:

Jason Leblanc



Cove Head Beach, Prince Edward Island

NEW FINDS IN EASTERN MOUNTAIN AVENS (*Geum peckii*) CONSERVATION ON BRIER ISLAND AND DIGBY NECK

Brad Toms, Diane LaRue

Mersey Tobeatic Research Institute, MTRI

Summary The Eastern Mountain Avens (*Geum peckii*) is a globally endangered vascular plant that has recently been distinguished from *Geum radiatum* through genetic taxonomy. Its global range consists of 24 sites in New Hampshire and two sites in Nova Scotia. The global population was previously estimated at 8-12000 individuals (2008) with about 2500 of those in the Canadian population. A project undertaken by MTRI in 2012, in partnership with Nature Conservancy Canada and Environment Canada, made significant new finds on the Brier Island population and completed the first census of the population placing it at around 6000 individuals. MTRI is also creating a monitoring protocol to standardize plant counting, vegetation monitoring, and threat monitoring by professionals and volunteers.

In 2012 previously undocumented sub-populations were found and all populations were documented with a greater resolution than previously possible. The main population in Big Meadow Bog is still under immediate threat from bog drainage, and an encroaching gull population. It is apparent that these two threats are accelerating and intervention will be needed soon.

Keywords (Bog, discovery, Eastern Mountain Avens, monitoring, restoration)

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DELINEATING ANADRAMOUS MOVEMENTS OF NON-NATIVE RAINBOW TROUT ON PRINCE EDWARD ISLAND

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The rainbow trout (*Oncorhynchus mykiss*) is one of the most successful invasive fish species on the planet. Most often, they were introduced as overharvest and habitat degradation caused declines in native salmonids. On PEI, non-native rainbow trout have been introduced for almost a century and have established on over two dozen waterways. There is great concern over the negative implications for Atlantic salmon (*Salmo salar*) as their reproduction has declined on all PEI rivers that now have rainbow trout. Aside from in-stream interactions, there is also concern that anadramous rainbow trout may enter other watercourses throughout the region, leading to an active invasion. Understanding the movement patterns of PEI rainbow trout is particularly important as PEI lies in close proximity to many iconic Atlantic salmon rivers in the Gulf of St. Lawrence (Margaree, Miramichi, Gaspé). Seagoing rainbow trout were tagged with acoustic transmitters (13 in 2011, 22 in 2012) on three prominent rainbow trout systems. Receivers were placed to the estuary mouth and arrays belonging to Ocean Tracking Network presented an opportunity to detect more distant movements. Of the 35 tagged trout, two were observed entering freshwater in adjacent systems. Five large rainbow trout (2-4kg) travelled beyond the estuary mouth, without returning. The others were resident in the estuaries. Water quality monitoring showed that rainbow trout exhibited tolerance to hypoxic conditions caused by midsummer algal blooms. Thus, tolerating deteriorated oxygen levels in the estuary may partially explain the success of rainbow trout, as it enables them to access dietary resources and continue rapid growth during this period. The findings of this study also suggest that large seagoing rainbow trout pose the greatest risk of invading other watercourses in the region. Continued rainbow trout tracking, and otolith microchemistry will further refine our understanding of the movements, success, and implications for native salmonids.

Keywords:

Gulf of St. Lawrence, Invasive species, *Oncorhynchus mykiss*, Prince Edward Island, *Salar salmo*

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Student Presenter

AQUATIC CONNECTIVITY IN PRINCE EDWARD ISLAND NATIONAL PARK: MONITORING FOR ECOSYSTEM INTEGRITY AND MANAGEMENT EFFECTIVENESS

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A Dendritic Connectivity Index (DCI), developed by Cote et al. (2008), to quantify the structural connectivity of watersheds and assess the cumulative impacts of barriers to connectivity, is currently being used by Prince Edward Island National Park (PEINP) to evaluate ecological integrity in the parks freshwater ecosystem. The DCI has also been used to effectively identify and prioritize fish passage restoration opportunities. The DCI provides a single park wide value that incorporates: (i) the location of barriers within a watershed; (ii) the amount of intervening habitat between barriers; and (iii) the passability of barriers to fish movement. On-site inventory (culvert and hydrology) information is collected and entered into FishXing hydrological modelling software (V3, USFS) to determine passability for specific fish species and life stages. DCI calculations result in two measures that represent the two life histories of fish found in PEINP: potamodromous (movements restricted to freshwater) and diadromous (movements between fresh and saltwater). The DCI is scored 0 to 100; 0 representing unconnected; and 100 representing fully connected watersheds. In 2007, we assessed park-wide connectivity as 80.141. In 2011, after two culverts assessed as barriers were removed and replaced, the DCI increased to 83.859. The use of the DCI index has allowed Park management to strategically determine which culverts will increase the watershed connectivity index the most and ultimately improve watershed ecological integrity.

Key words: Aquatic restoration, fish passage, watershed connectivity.

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SILENT STREAMS: THE IMPACT OF IMPOUNDMENTS ON HEADWATER STREAMS IN PRINCE EDWARD ISLAND

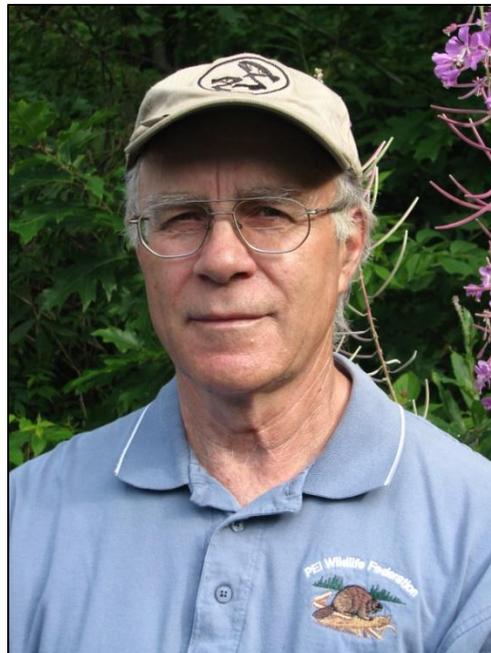
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The impact of impoundments on water quality in Prince Edward Island rivers has been well documented. What is less understood is the long term impact on lotic habitat and wooded riparian zones following decades of repeated impounding. In the 1970s and 1980s, large shallow impoundments were constructed in the headwaters of rivers, primarily to enhance waterfowl production. Since the last introduction of beavers to P.E.I. in 1949, they have spread throughout the Island. In areas of low topography, the area impounded by humans and beavers can encompass virtually all headwater streams. Many of the former stream reaches so crucial to spawning and rearing of salmonids are no longer suitable and many cold water refuges have been affected. As well, the conversion of wooded riparian zone to brush marshes and grassy meadows in many rivers has been extensive and dramatic. This presentation will give examples of impacts of beaver and human-constructed impoundments on low gradient streams on Prince Edward Island and discuss the implications to native cold water fishes and other wildlife.

Key Words: Impoundments, Lotic Habitat, Riparian Zone, Water Quality

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HOW DO NOVA SCOTIA FARMERS FEEL ABOUT BIODIVERSITY ON THEIR PROPERTIES?

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Two primary approaches exist for conserving biodiversity in agricultural areas: protecting land outright, often while intensifying production elsewhere, and finding space for wildlife amidst agricultural production. There is increasing evidence that integrating habitat within farmed areas (thereby increasing biodiversity) does not necessarily compromise production. In fact, farmers may receive benefits from that biodiversity in the form of services such as pest control, water storage, and soil fertility. There has been little research to date on such farming in Atlantic Canada. What is more, existing incentive and support programs for farmers focus on projects to mitigate off-farm pollution rather than to support on-farm biodiversity benefits. Farmers rarely hear that undertakings like constructed wetlands and shelterbelts can serve multiple purposes, on farm and off. We undertook a landholder survey to find out how Nova Scotia farmers in a selection of agricultural counties understood and felt about biodiversity on their farms, and what wildlife-friendly farming activities – if any – they were undertaking and why. Follow-up qualitative interviews and survey analysis are still underway, but this presentation will give preliminary quantitative results from the survey responses, including what demographic characteristics seem most related to attitudes and practices related to biodiversity. Potential implications for policy and management will be identified.

Keywords (3-5): Biodiversity, Agriculture, Habitat, Values and Attitudes

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Student Presenter

THE EFFECT OF LANDUSE ON WATERFOWL HABITAT QUALITY IN AN AGRICULTURAL REGION OF ATLANTIC CANADA

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Previous work has indicated a link between maritime agricultural landscapes and breeding American Black Ducks (*Anas rubripes*). To better understand this connection, a more detailed study at multiple scales was conducted during the 2012 field season in the Annapolis Valley of Nova Scotia. In May, the Nova Scotia Department of Natural Resources conducted aerial surveys for breeding pairs within 31 2x2km plots (a 124km² area). During late May through July, 61 individual wetlands contained within the plot boundaries were chosen for brood surveys. In addition, a subsample of 30 sites was tested for water chemistry values and macro invertebrate diversity and abundance. In August, two types of high-resolution satellite imagery (SPOT and Worldview) of the study area were obtained in order to compare their cost-effectiveness in their ability to characterize land use for waterfowl management purposes. Ground-truth surveys were performed in late June and early July to serve as training points to support the land cover classification analysis of the satellite imagery. Each of the variables studied during the 2012 field season will be mapped and assessed for correlation with the land use information. The goal of the study is to contribute to waterfowl management decisions by determining if there is an optimal relationship between land use combination and waterfowl habitat quality that could ultimately contribute to higher breeding and rearing success of waterfowl. This talk will present the preliminary results and future objectives of the project.

Key words: American Black Duck (*Anas rubripes*), land use, species distribution mapping, waterfowl.

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Student Presenter

MONITORING OF GREEN CRABS FROM TWO PRINCE EDWARD ISLAND ESTUARIES: EXPLORING THE BASIS FOR A POTENTIAL MANAGEMENT PLAN

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Invasive green crabs (*Carcinus maenas*) are becoming an increasing concern to Prince Edward Island coastal regions, as well as around the world. They are causing disturbances to the shoreline ecology, are found in high abundances, spread rapidly, and consume commercially-important shellfish species. Trapping green crabs aiming to control their numbers would be ecologically beneficial but not economically feasible without a market for this species. The goal of this project is to explore the availability of green crabs for a potential fishery and the suitability of green crab meat to become a relatively low-cost additive in animal feed, specifically commercial salmon feed. Green crab populations from two locations (Souris and North River) were monitored on a weekly basis to determine how their numbers, sizes, and sex ratios varied over the course of the summer. In addition, nutrient analyses were conducted to determine the protein, lipid, ash, and dry matter content of their meat. Preliminary results suggest that although there were larger crabs found near the end of the summer, average crab size did not appear to change due to the increasing number of juvenile crabs. The North River population, in particular, showed a dramatic increase in the number of juvenile crabs as the summer progressed, whereas Souris had proportionally lower numbers of juvenile crabs. The number of juveniles seemed to be related to the higher ratio of females to males in North River. The content of protein per dry matter decreased as crab size increased in both populations, and the lipid content was higher on the North River population. These results will be complemented with late season analyses and discussed in relation to season and the time of invasion in each location.

Keywords: Green crab, Invader, Management, Nutrition

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Student Presenter

MUSKRAT HARVEST AND THE INFLUENCE OF EXTERNAL VARIABLES

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Furbearer harvest is often used as an indicator of population trends, although in many cases it is unknown if harvest is actually correlated with population size. Many factors aside from population size, including weather, market factors (i.e. pelt prices), and the number of trappers also contribute to the number of furbearers harvested. On Prince Edward Island (PEI), anecdotal reports of muskrat population declines have coincided with declines in overall harvest. This study aimed to determine what proportion of the variation in muskrat harvest can be explained by external factors, without any consideration for actual population size. Multiple linear regression was used with muskrat harvest from 1973-2008 as the outcome variable and market factors (average pelt price and average pelt price lagged one year), trapper effort (the number of registered trappers), and weather factors (the number of days in November with a minimum temperature below freezing, the mean November air temperature, and total November rainfall) as predictor variables. The results determined that the model '1913 + 10.4(Number of Registered Trappers)' explained 71.9% of the variation in muskrat harvest. Since so much of the variation in muskrat harvest can be explained by a model which does not incorporate any estimate of population size, it is difficult to support the continued use of muskrat harvest as an indicator of population trends.

Key words: furbearer harvest, muskrat, population trends, Prince Edward Island

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Student Presenter

Ecosystem Studies

Moderated by:

Kirby Tulk



Donna Giberson, Keynote Speaker

Donna has worked at the University of Prince Edward Island, Dept. of Biology, for 20 years. Before coming to PEI, she taught and post-docked for a year at Mount Allison.

Donna is a freshwater ecologist who works in the Maritimes and Canadian Arctic. She conducts research on the life history, diversity, and habitat patterns of aquatic insects; the effects of natural and human-caused disturbance on streams; and works with local community groups on stream projects.

Her current interests include the study of aquatic insect biodiversity in the maritimes and Canadian Arctic, life history responses to disturbance regime, salt marsh insects, pitcher plant-insect relationships, and general aquatic insect ecology.

PUTTING THE RESEARCH INTO ACTION: HOW DO WE GET FROM UNIVERSITY STUDIES TO WORK ON THE GROUND?

Donna J. Giberson¹ and Lisa A. Purcell²

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Academic researchers frequently carry out studies which produce results or methods that could be used directly by practitioners such as watershed coordinators or technicians. However, there seem to be few mechanisms to share these results with the groups that can use them, since the recognized format for disseminating academic research is the scientific paper or presentation. In this presentation we will present an example of a thesis study that provided a baseline survey of aquatic invertebrates on 37 streams across PEI and show how the data could be used to help watershed groups use invertebrates to help monitor their water quality. Suggestions for connecting with practitioners to make use of this sort of data will be discussed.

Keywords: Aquatic insects, Biomonitoring with aquatic invertebrates, PEI streams

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OCCURRENCE OF AUTOTOMY IN PEI GREEN CRAB POPULATIONS AND THEIR INFLUENCE ON THE POTENTIAL IMPACT OF THIS INVASIVE SPECIES

Paula Tummon Flynn, Cassandra Mellish, Tyler Pickering, Pedro Quijon

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The invasion of the green crab (*Carcinus maenas*) in Prince Edward Island's coastal waters has been recognized as a threat to the province's commercial shellfish industry. However, the overall impact of this crab on local shellfish species is not yet very well understood. One aspect that should be taken into consideration is how injury modifies the feeding rate of the green crab. The loss or damage of a claw is a common injury among decapod crustaceans and can have severe effects on their ability to forage efficiently. This study examined the effect of claw loss on the feeding rate of the green crab and whether it differed depending on which claw was lost. Laboratory experiments were performed to measure the feeding rates of healthy and injured crabs on relatively early stages of soft-shell clams (*Mya arenaria*) and oysters (*Crassostrea virginica*). Preliminary results suggest that injury generally reduces the feeding rate of green crabs and that the loss of the right (crusher) claw has a greater effect than the loss of the left (cutter) claw, particularly with oysters. A survey of injuries in the green crab population at two locations on PEI was also carried out and found that approximately 22% of the all the crabs collected were missing at least one limb. The most common type of injury was the loss of at least one walking leg and to a lesser extent the loss of a pincher or crusher claw. The rate of injury was also found to vary between the two locations. These results indicate that injury, as well as the type of injury, could influence the impact of this invasive species on local communities and that injury patterns should be taken into account when assessing the impact of green crab populations on shellfish species.

Key words: *Carcinus maenas*, invasive species, oysters, soft-shell clams

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Student Presenter

SKATING AROUND THE DRINK: PRELIMINARY MOVEMENT PATTERNS, POPULATION DENSITY AND DISTRIBUTION OF LITTLE SKATE AND WINTER SKATE IN THE AVON ESTUARY

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Morphologically similar species of winter skate (*Leucoraja ocellata*) and little skate (*Leucoraja erinacea*) are present in the Bay of Fundy, but scarcely studied. This research was undertaken to estimate population size of the two species and to examine their movement patterns through the Bay of Fundy. Over about 2 months, lengths and weights, tissue samples, and counts were taken of 530 skates in the Avon estuary at a commercial weir. About 170 skates were tagged to estimate population size through mark-recapture analysis. A total of 6 recaptures were found over a 6-week period, and were used to hypothesize timing of movement through the bay and estimate population size. Length-weight relationships, and size distributions of both species will be analyzed. Tissue samples will be used for genetic differentiation of the two species through a restriction digest of mitochondrial DNA cytochrome oxidase I gene using Sty I. This preliminary work provides insights into the distribution of these poorly understood species, which may be of commercial importance.

Key words (3-5): Avon estuary, little skate (*Leucoraja erinacea*), population size, tissue samples, winter skate (*Leucoraja ocellata*)

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Student Presenter

TOO MUCH? TOO LITTLE? OR JUST RIGHT?: IMPACTS OF NUTRIENT AVAILABILITY ON DUCK BROOD PRESENCE IN THE ANNAPOLIS VALLEY

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The importance of wetlands has been often overlooked in favour of land conversion for industrialization and modern agriculture. According to Ducks Unlimited (DU), over 90 percent of the wetlands in the Annapolis Valley have been lost to development. To mitigate these losses, both DU and farm wetlands have been constructed throughout the agricultural regions in the Annapolis Valley. In 2008, the Nova Scotia Eastern Habitat Joint Venture (NSEHJV) developed a plan to assess wetland habitat quality for duck broods of various species. The current project follows the NSRHJV plan and involves a partnership with various academic institutions, non-for-profit organizations, and government whose goals of protecting wetland biodiversity are aligned. To assess biodiversity, surveys of duck broods and invertebrates were carried out in 2009, 2010, and, 2011. However, it was recognized that a holistic assessment of these wetland systems was essential. During 2012, both chemical and physical parameters have been investigated. The chemical limnology portion has been assessed through nutrient analysis (nitrogen, phosphorous), pH measurements, chlorophyll a measurements, and specific conductivity. Physical limnology has been evaluated using shoreline index, substrate type, and surrounding land use. Methods used in previous years to assess biological limnology have continued in 2012. This study's goal is to determine whether links exist between nutrient availability and invertebrate abundance in this region, and whether there is an impact on duck brood rearing preferences and success. Data collected will also provide a baseline for future wetland water sampling in the region.

Key words (3-5): Annapolis Valley, wetland, invertebrates, nutrients

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Student Presenter

FACTORS AFFECTING PRODUCTIVITY OF DUCK BROOD REARING IN SMALL WETLANDS IN THE ANNAPOLIS VALLEY, NOVA SCOTIA

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The creation and restoration/enhancement of wetlands has been prioritized by non-government organizations (NGOs) for decades. Wetlands have been disappearing at alarming rates around the world and by as much as 80 acres per day in Canada alone. Wetlands are important as they reduce flooding, purify water, replenish groundwater and are rich in biodiversity. The Nova Scotia Eastern Habitat Joint Venture (NS-EHJV) establishes the base for wetland conservation in Nova Scotia, under the mandate of the North American Waterfowl Management Plan (NAWMP). Ducks Unlimited Canada (DUC) has recently altered its outlook on the creation of wetlands in the agricultural portion of Nova Scotia. The need for small wetlands was decided preferable over large-scale wetlands for various reasons. It was determined that guidelines regarding implementation of these wetlands would be useful, increasing the ecological potential especially for ducks. A study to investigate the use by ducks of existing wetlands in the Annapolis Valley was initiated in 2009. This study has since broadened to incorporate land use influences around the sites, and the chemical makeup of the water over the duck breeding and brood rearing field season. Freshwater invertebrates were sampled during the brood's development to help understand the food resources during these periods. Brood surveys also were conducted to discover which wetland sites were being used and the magnitude of the usage. Land use factors immediately surrounding the site were also examined. This study aims to determine what mixture of limnetic factors, biological and geographical, that best provides the adequate resources for duck brood rearing. This information may be applied to other agricultural landscapes in Canada and around the world. Here we report on the duck breeding use and brood success in the wetlands.

Key words (3-5): agriculture, Annapolis Valley, invertebrates, wetland

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Student Presenter

WERE BEAVERS NATIVE TO PRINCE EDWARD ISLAND?

Rosemary Curley

A review of historical literature by Sobey (2007) concluded that beaver were not present on PEI after 1720. I review the post-glacial history of PEI, beavers in the archaeological record, and the history of the fur trade in the region. The evidence is interpreted regarding the probability that beavers did occur on Prince Edward Island, though certain knowledge of beaver occupation or absence is not possible with current information. Suggestions for future research are presented.

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USING MODELS TO LINK SURVEY DESIGNS: A CASE STUDY INVOLVING MARITIME AMERICAN BLACK DUCKS

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Summary: By necessity, wildlife studies are designed to address particular problems, at particular scales, in particular landscapes. Occasionally, combining the information from separate surveys allows new or more penetrating questions to be asked. Since 2008, two different surveys for monitoring breeding maritime American Black Ducks have been simultaneously conducted: one situated in predominantly forested landscapes, using a 5x5km sampling frame, and a second situated in predominantly agricultural areas, using a 2x2km frame. Through the use of a species distribution model trained for the 5x5km forest-dominated landscape, this case study demonstrates how predictions can be downscaled and applied to the 2x2km survey to better understand the impact of agriculture on breeding ducks. This talk will provide an overview of the model fusion approach, and present some preliminary results for the two surveys during the 2010 field season.

Key Words: American Black Duck, model fusion, species distribution modelling, GIS

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MONITORING WETLAND ODONATA COMMUNITIES IN PRINCE EDWARD ISLAND NATIONAL PARK OF CANADA

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Odonata have been monitored using a variety of techniques in selected open water shallow basin wetlands in PEI National Park since 2007, as part of Parks Canada's Ecological Integrity monitoring program. Central to the monitoring has been the collection, enumeration and identification of odonata exuvia. Since 2010, a double-dependent observer methodology has been employed to obtain samples that characterize community biodiversity and provide an estimate of abundance for the odonata community. As many as twenty-five taxa of odonata have been collected and identified; however mean annual species richness for all wetlands has ranged between 13.6 – 14.6 during the monitoring period. Between 1200 and 1600 exuvia have been collected annually from wetlands since 2007. In 2010, 1240 exuvia were collected from four wetlands, sampling 20 m² of habitat in each and were used to generate an abundance estimate of 1570 (95% CI=284-2098) odonata. In an attempt to gain perspective of the health of odonata communities in PEINP, 18 wetlands from across PEI from various land use and development profiles were sampled for water quality in September 2011. In the summer of 2012, ten of the 18 wetlands with low water quality index scores were sampled for odonata. Results are pending.

Key words: wetland, odonata, monitoring.

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¹ Proceedings prepared by: María J. Forzán, October 2012