

Proceedings of the Manitoba Tall Grass Prairie Preserve Research Symposium

Held Tuesday October 1st, 2013 at
The Weston Family Tall Grass Prairie Interpretive Centre,
Stuartburn, Manitoba



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INTRODUCTION

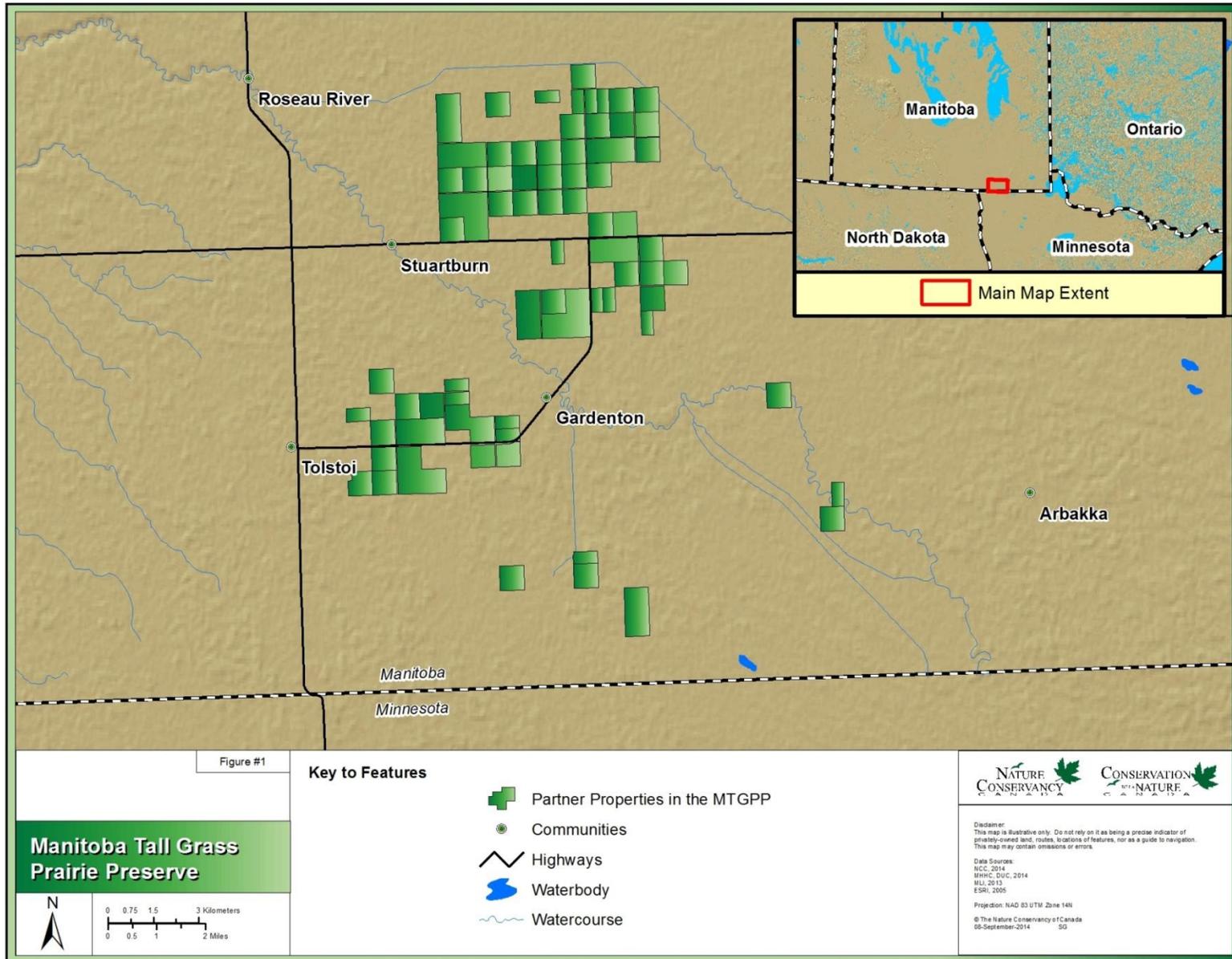
The main goals of the Manitoba Tall Grass Prairie Preserve Research Symposium were to bring together Preserve researchers and conservation practitioners to share their work with one another, and to provide a forum for an open discussion and exchange of knowledge, information, and ideas.

The round table format of the symposium gave participants the opportunity to speak briefly about their current and recent projects and observations, interact with one other in an open environment, and compare and contrast their understandings of the Preserve ecosystem and its management. All participants were asked to provide a brief summary of their research, along with their contact information and links to any published information or available reports. Participants were also asked to highlight upcoming projects as well as opportunities for future research and collaboration. This information has been compiled below.

The symposium brought together individuals representing academia, provincial and federal governments, Canadian and American not-for profit organizations and Museums, as well as independent volunteers. The passion of symposium participants and their commitment to sharing knowledge and perspectives is to be commended, and will inform conservation activities at the Preserve for years to come.

The symposium was made possible thanks to the generous support of The W. Garfield Weston Foundation.

MANITOBA TALL GRASS PRAIRIE PRESERVE PARTNER LANDS



AGENDA

Activity	Time Slot	Presenters	Topic/Title
Opening	15 mins 9:00 - 9:15	Cary Hamel	Opening Greetings and Acknowledgements
		Cary Hamel, Peggy Westhorpe	How to Get a Research Permit, NCC Research Opportunities
Morning Session 1: Prairie Plants and Pollinators	60 mins 9:15 - 10:15	Sarah Semmler	From Poweshiek Skipperlings to Pollination Networks: Studying Plants and Insects in the Tall Grass Prairie
		Cary Hamel	Unravelling the Mystery of the Range-wide Decline of Endangered Poweshiek Skipperling (<i>Oarisma poweshiek</i>)
		Diana Robson	Pollination Ecology of Rare and Common Tall-grass Prairie Plants
		Melissa Pearn	Pollination and Comparative Reproductive Success of Lady's Slipper Orchids <i>Cypripedium candidum</i> , <i>C. parviflorum</i> , and their Hybrids in Southern Manitoba
		Christie Borkowsky	Western Prairie Fringed Orchid (<i>Platanthera praeclara</i>) Pollination and Nectar Production in Remnant Tall Grass Prairie in Southeastern Manitoba
Coffee Break	15 mins 10:15 - 10:30		
Morning Session 2: Prairie Ecology and Restoration	75 mins 10:30 - 11:45	Stephen Gietz	Native Prairie Evaluation in the Tall Grass Prairie Natural Area
		John Markham	Hydrological Niches in Tall Grass Prairie Plant Communities
		Chris Hay, Julie Pelc	Assessment of Long-Term Effects of Tallgrass Prairie Restoration Treatments in Southeastern Manitoba, Canada
		John Morgan	Tbd
		David Toop	Hydrogeological Influences on <i>Cypripedium</i> Habitat in Manitoba
		Cary Hamel	Near-surface Groundwater Monitoring (in Advance of Hydrological Restoration)
Lunch Optional trail walking tour (30 mins)	90 mins 11:45 - 1:15		

Activity	Time Slot		Presenters	Topic/Title
Afternoon Session 1: Land management	75 mins	1:15 - 2:30	Cary Hamel	Habitat Conservation & Restoration in Light of a Changing Climate: Adapting Conservation Strategies for the Manitoba Tall Grass Prairie Preserve
			Laura Reeves	A Comparison of Once-over, Twice-over and No Grazing on Vegetation Cover, Biomass, and Species Composition in an Upland Habitat
			Russ Reisz	Prairie Management Through Conservation Grazing, Controlled Burns and Invasive Species Control
			Julie Pelc	Characterization of Wildfire Event in the Tall Grass Prairie Region of Manitoba
			Lionel Leston	Transmission Lines as Tall-grass Prairie Habitats: Local Mowing, Spraying, and Surrounding Urbanization as Determinants of Wildlife Richness and Abundance
			Julie Pelc	Tall Grass Prairie Roadside Invasive Species Survey
Break	15 mins	2:30 - 2:45		
Afternoon Session 2: Monitoring and Data Management	60 mins	2:45 - 3:45	Robert Wrigley	Mammal and Arthropod Studies at the Tall Grass Prairie Preserve of Southeastern Manitoba
			Bob Jones	Monitoring Avian Productivity and Survivorship (MAPS) at the Tall Grass Prairie Preserve.
			Ron Bazin	Least Bittern Surveys in Southern Manitoba in Support of Recovery Planning and Critical Habitat Identification
			Stephen Gietz	GIS Datasets Available to Researchers
			Chris Friesen, Colin Murray	The Conservation Data Centre's Work Flow: Species-at-Risk Surveys to Developing Conservation Oriented Information Products
Closing	15 mins	3:45 - 4:00	Melissa Pearn	

PARTICIPANT RESEARCH SUMMARIES

Prairie Plants and Pollinators

1. Sarah Jericho Semmler

*The Nectar Sources and Flower Preferences of the Poweshiek Skipperling (*Oarisma poweshiek*) in Manitoba*

Affiliation: Department of Biological Sciences, University of Manitoba

Phone Number: please use email below

E-mail Address: semmler.sj@gmail.com

Other Contact Information: sarahsemmler.com. Twitter: @SarahSyrphid

Research Partners: Dr. Richard Westwood (University of Winnipeg)

Brief Description of Research Project:

The Poweshiek Skipperling is a threatened species of butterfly that specializes in undisturbed tall grass prairie habitat. The Manitoba population is restricted to the Tall Grass Prairie Preserve and is believed to be the largest population globally. Poweshiek Skipperling are sensitive to land management practices such as burning and grazing which may alter key nectar sources and larval habitat. I assessed Poweshiek Skipperling abundance and nectar preferences within two sites burned in 2002 and 2008. I also compared percent cover of vegetation, potential competition by other butterfly species for nectar, predator density, and nectar sugar concentrations. Poweshiek Skipperling were more abundant in the 2002 site where flowering plant diversity increased throughout the two week adult flight period. Preferred nectar sources were primarily Black-eyed Susan (*Rudbeckia hirta*) and Upland White Aster (*Solidago ptarmicoides*). Competition and predators did not appear to influence site preference.

Major Results:

- Poweshiek Skipperling were more abundant in the older site burned in 2002.
- The 2008 site had taller grasses and a greater density of grass cover, potentially impeding nectar foraging behaviour and the density of nectar species available.
- The diversity of flowering species increased over the flight period in the 2002 burn, which may offer a greater variety of nectar sources to adult butterflies.
- The primary preferred nectar source was *Rudbeckia hirta*, followed by *Solidago ptarmicoides*, with a greater abundance of both species found in the 2002 burn.
- Competition for nectar by other butterfly species was similar between sites.
- The density of predatory ambush bugs (*Phymata* spp.) on *R. hirta* was greater in the 2002 burn, likely due to the greater number of *R. hirta* stems in that site.
- Nectar sugar concentrations of *R. hirta* and *S. ptarmicoides* were relatively low, though the method of nectar collection likely produced unreliable results.

List of Relevant Research Papers/Reports/Theses/More Information:

- 1) Semmler, S.J. and R. Westwood. 2010. The nectar sources and flower preferences of the Poweshiek Skipperling (*Oarisma poweshiek*) in Manitoba. Undergraduate thesis. University of Winnipeg. p.1-46.
<http://ion.uwinnipeg.ca/~moodie/Theses/Semmler2010.pdf>

2) COSEWIC 2003. COSEWIC assessment and status report on the Poweshiek skipperling *Oarisma poweshiek* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 25 pp.

<http://publications.gc.ca/collections/Collection/CW69-14-361-2004E.pdf>

3) Poweshiek Skipperling Workshop Participants. 2011. Minutes from the Poweshiek Skipperling Workshop, March 24th & 25th Winnipeg, Manitoba. Edited by J. Dupont.

http://www.mnzoo.org/PrairieLepidopteraConference/Poweshiek%20skipperling%20Workshop_Winnipeg%202011.pdf

4) Poweshiek Skipperling Working Group 2012. Minutes from the Poweshiek Skipperling Regional Update Conference Call, March 6, 2012. Edited by L. Bergen. Nature Conservancy of Canada, Winnipeg, Manitoba.

<http://www.mnzoo.org/PrairieLepidopteraConference/Poweshiek%20skipperling%202012%20conference%20call%20Minutes.pdf>

Next Steps / Upcoming Research:

-Continued monitoring of the Manitoba population is essential (refer to Cary Hamel, NCC Manitoba)

What else do we need to know about your topic (what should future researchers focus on)?

-The sensitivity of this species to habitat loss and disturbance makes management and protection a challenge.

-The time of year a fire occurs, as well as site-to-site variation in flowering species composition and previous land use, all contribute to habitat quality for Poweshiek Skipperlings. These factors should be considered when planning management activities or assessing potential skipperling habitat.

-A 5-6 year burn rotation including unburned refugia has been suggested as an appropriate management regime.

-Further studies of possible diseases and rates of parasitism would be ideal.

-Little is known about larval food preferences in Manitoba. This topic is difficult to approach due to the small size of the larvae and low abundance, but would benefit from further study.

2. Sarah Jericho Semmler

The Short Term Effects of Fire and Climate on Plant-Insect Interactions in Canada's Tall Grass Prairie

Affiliation: Department of Biological Sciences, University of Manitoba

Phone Number: please use email below

E-mail Address: semmler.sj@gmail.com

Other Contact Information: sarahsemmler.com. Twitter: @SarahSyrphid

Research Partners: Dr. Anne C. Worley (University of Manitoba), Dr. Richard Westwood (University of Winnipeg), NSERC-CANPOLIN.

Brief Description of Research Project:

Fires are an important management tool for the maintenance of tall grass prairie vegetation. However, the effects of fire on plant-insect interactions are poorly understood. I am studying pollination networks in sites of three burn ages (new: 0-1 years; mature: 5-6 years; old: 10+ years) by assessing community structure and interaction quality. In 2010 and 2011, I surveyed insect and flowering plant diversity and phenology, observed insect visitations, sampled pollen loads from insects, created a pollen library, and assessed pollen limitation of fruit set on selected flowering species. Community structure and plant-insect interactions will be used to describe pollination networks for different burn ages, and will also provide insight into annual fluctuations in insect populations due to factors such as climate.

This work is being completed in partnership with the Canadian Pollination Initiative (NSERC-CANPOLIN), an NSERC strategic network which facilitates the study of pollinating insect diversity across Canada. As per CANPOLIN protocol, I collected insects within the preserve using biweekly pan-trapping from 2009 to 2011. Emphasis was placed on the identification of bees (Anthophila) and flower flies (Syrphidae). Specimens from the preserve will be deposited in the Wallis Roughley Museum of Entomology, University of Manitoba, and a detailed data base of species will be provided to CANPOLIN. Lepidoptera collected in 2009 are currently housed in the collection of Richard Westwood, University of Winnipeg. Please see <http://www.uoguelph.ca/canpolin/> for more information.

Major Results:

Flowering community

- New burn sites produced significantly more open blooms, and peak dates of flowering were approximately two weeks earlier than mature sites. However, these effects were only observed in the first year following fire.
- There was no effect of burn age on the flowering community in terms of species richness and diversity, but site-to-site differences in species composition and annual shifts in abundance were observed.
- Litter accumulation likely accounted for delayed phenology and lower abundance of flowers in older sites, while the increase in blooms in new burns, and year-to-year similarities in community structure within sites, suggested a fire adapted perennial community.
- Old sites were located in wetter sedge meadow habitat and had consistently lower species richness and diversity than more recently burned upland sites.

Insect community

- The number of observed insect visits declined with site age.
- There was little difference in the diversity of insects between sites, and there were no differences in dates of peak activity and visitation frequency between burn classes when common species were compared.
- Visitation patterns in specific bee taxa were related to burn class. Sweat bees (*Lasioglossum* spp.) made the majority of early season visits, while bumble bees (*Bombus* spp.) made the majority of late season visits in the new burns in both years. This pattern was absent or weakly observed in the mature sites.

- Bee nest location may have influenced visitation patterns. Sweat bees nest deep below ground, while surface nesting bumble bees would have been susceptible to mortality by fire.
- The most frequent visitors were flower flies, and the number of observed visits was influenced by climate. Flower flies with aquatic larvae were the top visitors in 2010 when rainfall was high. Flower flies with predatory larvae were the top visitors in 2011 when rainfall was low.
- Lepidoptera also showed annual fluctuations, with more visits observed in all sites in the low rainfall 2011 season.

Pollination networks

- Network metrics showed that all sites had a nested structure, with a core of frequently interacting generalists supporting less frequently interacting specialist species.
- This structure has been found to provide resilience following disturbance through the presence of pollinator redundancies.

List of Relevant Research Papers/Reports/Theses/More Information:

Publications using visitation data:

- 1) Chamberlain, S.A., R.V. Cartar, A.C. Worley, S.J. Semmler, G. Gielens, S. Elwell, J. Vamosi, E. Elle. 2013. Traits and phylogenetic history contribute to network structure across Canadian plant-pollinator communities. Submitted.
- 2) Semmler, S.J. 2013. Sampling pollen from insects. In: NSERC-CANPOLIN. 2013. Tips and tricks for pollination biologists (PDF).

<http://www.uoguelph.ca/canpolin/New/Tips%20and%20Tricks%20Guide%20for%20Pollination%20Biologists.pdf>

Publications using pan trap data:

- 1) Dumesh, S., Sheffield, C.S. 2012. Bees of the Genus *Dufourea* Lepeletier (Hymenoptera: Halictidae: Rophitinae) of Canada. Canadian Journal of Arthropod Identification No. 18, 11 May 2012, available online at http://www.biology.ualberta.ca/bsc/ejournal/ds_20/ds_20.html, doi: 10.3752/cjai.2012.20
- 2) Semmler, S. J., and A. R. Westwood. 2012. *Wallengrenia egeremet* (Hesperiidae): a new population for Western Canada. Journal of the Lepidopterists' Society 67: 59-62. <http://images.peabody.yale.edu/lepsoc/jls/2010s/2013/2013-67-1-059.pdf>.

Additional information:

- 1) CANPOLIN backgrounder: <http://www.uoguelph.ca/canpolin/Publications/CANPOLIN%20background.pdf>

Next Steps / Upcoming Research:

- Further network analysis is underway to assess the identity of interacting plants and insects, and whether interaction frequency is related to insect or plant abundance.
- Seed set in hand pollinated, insect pollinated, and pollen restricted flowering species will be compared to determine the presence of pollen limitation in sites of differing burn ages.
- Pollen loads sampled from visiting insect taxa will determine the importance of certain insects to floral reproduction.

What else do we need to know about your topic (what should future researchers focus on)?

- Future studies should emphasize assessments of individual insect species. It appears that the community as a whole is fire adapted, but certain species respond more negatively to fire than others (ex. *Oarisma powshiek*).
- Unburned refugia is likely very important for the recolonization of burned habitat by pollinators, and for the protection of fire sensitive species.
- Climate played a significant role in determining the abundance of certain insect taxa. Perhaps the tolerance of certain species to temperature and drought should be considered when planning a prescribed burn within a season of unusual weather.
- The flowering community showed the benefits of fire through increased floral abundance compared to older sites. Mature sites still maintained a fairly high diversity of species, though sites with 10+ years since fire represented poor prairie habitat.

3. Cary Hamel

Unravelling the Mystery of the Range-wide Decline of Endangered Poweshiek Skipperling (Oarisma poweshiek)

Affiliation: Nature Conservancy of Canada

Phone Number: 204-942-2187

E-mail Address: cary.hamel@natureconservancy.ca

Research Partners: Richard Westwood (University of Winnipeg), Emily Saarinen (University of Michigan-Dearborn), Erik Runquist (Minnesota Zoo), Nicky Koper (University of Manitoba), Barbara Bleho (Independent Ecologist)

Brief Description of Research Project:

The Poweshiek Skipperling is a globally rare tallgrass prairie-endemic species found in Canada only in the vicinity of the Manitoba Tall Grass Prairie Preserve. While the species is dependent on natural prairie habitat, it may also be sensitive to natural and prescribed prairie disturbance (e.g. fire and grazing). The Canadian population of Poweshiek Skipperlings appears to have declined since first discovered in the 1980s. Surveys of known habitat patches resulted in the detection of only thirteen individuals in 2010, less than 220 individuals in 2011, and 50 or fewer in 2012 and 2013. The species is declining across its range (which extends from Iowa to Michigan to Manitoba). A group of experts from across the species' global range met in Winnipeg in March of 2011 and identified several urgent recovery actions, including intensive range wide surveys, captive breeding, and increasing public profile. Several critical information gaps were also identified including basic biology/life history, vulnerabilities, dispersal, genetics studies, and habitat characterization including microsites.

Since 2011, NCC has taken a lead role in working to directly undertake or support information sharing, workshops, land management and research work to address these priorities and information needs as they pertain to recovery of Poweshiek Skipperling in Canada.

Observations:

- Decline appears to be range-wide, except maybe in Michigan fen populations
- Species has declined or disappeared at both managed and unmanaged sites
- Systematic surveys of potential habitat resulted in the discovery of new sites in Manitoba. These sites are in close proximity to previously known sites.
- Species persists in Manitoba at sites that are managed using prescribed fire and grazing, and in sites with recurrent wildlife
- The relationship between fire (prescribed & wildfire) and Canadian Poweshiek Skipperling habitat was explored – characterization of fire effects indicates wide variation between fire events in the extent of Skipperling habitat burned, the degree of duff burned and the extent of unburned 'fire skips' within the burn extent.

Projects that are in Progress:

- Genetic analyses (local and range-wide diversity, presence of Wolbachia, etc) (Saarinen)
- Captive Breeding of Manitoba Poweshiek Skipperling (Runquist)
- Statistical analyses of effects of habitat characteristics, weather and land management on Poweshiek Skipperling – paper in prep (Bleho, Koper, Westwood & Hamel).

List of Relevant Research Papers/Reports/Theses/More Information:

- Bleho, B. and Koper, N. 2013. Effects of habitat characteristic, weather and land management on the Poweshiek skipperling (*Oarisma poweshiek*) population in Manitoba. Report prepared for the Nature Conservancy of Canada, Manitoba Region. 22 pp.
- Hamel, C., J. Becker, & R. Westwood. 2013. Poweshiek Skipperling, *Oarisma poweshiek*, population trends in south eastern Manitoba Report on 2012 field surveys, habitat preferences and land management. Nature Conservancy of Canada. Winnipeg, Manitoba.
- Kornelson, J., J. Becker, R. Westwood & C. Hamel. in prep. Report on Poweshiek Skipperling, *Oarisma poweshiek*, trends in south eastern Manitoba, 2013. Nature Conservancy of Canada. Winnipeg, Manitoba. 30 pp.
- Poweshiek Skipperling Working Group 2012. Minutes from the Poweshiek Skipperling Regional Update Conference Call, March 6, 2012. Edited by L. Bergen. Nature Conservancy of Canada, Winnipeg, Manitoba. Available online: <http://poweshiekskipper.org/project/Images/Minutes%202012%20conference%20call.pdf>
- Poweshiek Skipperling Workshop Participants. 2011. Minutes from the Poweshiek Skipperling Workshop, March 24th & 25th Winnipeg, Manitoba. Edited by J. Dupont. Available online: http://poweshiekskipper.org/project/Images/Final_POSK_Workshop_2011.pdf
- Westwood, R., J. Dupont & C. Hamel. 2012. Surveys for Poweshiek Skipperling, *Oarisma poweshiek*, in the region of the Tall Grass Prairie Preserve in south eastern Manitoba – Report on the 2011 field activities of the University of Winnipeg and Nature Conservancy of Canada. Nature Conservancy of Canada. Winnipeg, Manitoba. 29 pp.

Next Steps / Upcoming Research:

- Continue annual Canadian census and revisit potential habitat sites (NCC, University of Winnipeg, Manitoba Tall Grass Prairie Preserve)
- Continue characterisation of wildfire and prescribed fire effects on Poweshiek Skipperling fields (NCC)
- Characterization of grazing effects on Poweshiek Skipperling fields (Manitoba Tall Grass Prairie Preserve)
- Examination of effect of microhabitat characteristics on population dynamics (University of Winnipeg (Hooshmandi & Westwood))

What else do we need to know about your topic (what should future researchers focus on)?

- Relationship between fire events and Poweshiek Skipperling microhabitat and subsequent Skipperling site use and breeding success may be influenced by multiple factors occurring during the fire event (wind direction, speed, relative humidity), as well as more or less permanent site characteristics (presence and characteristics of adjacent stands of forest (which may act as fire spread barriers), micro-topography) as well as characteristics that may change year to year (presence of standing water, time since last burn). This relationship needs to be explored.
- Relationship between grazing events/grazing systems and Poweshiek Skipperling
- Factors related to range-wide decline

4. Diana Bizecki Robson

Pollination Ecology of Rare and Common Tall-grass Prairie Plants

Affiliation: The Manitoba Museum

Phone Number: 204-988-0653

E-mail Address: drobson@manitobamuseum.ca

Other Contact Information: Fax: 204-942-3679

Research Partners: The Manitoba Museum Foundation, Manitoba Conservation, World Wildlife Fund Canada, Government of Canada

Brief Description of Research Projects:

Pollinator Research – Common Plants

In 2004 and 2005 I documented, described and compared the flower-visiting insects to plants at the Tall-grass Prairie Preserve (TPP) and Living Prairie Museum (LPM). The number of insect taxa visiting each plant species and the number of visits made by each were documented. The plant-insect visitor interaction matrix was tested for nestedness.

Pollinator Research – Western Silvery Aster (*Symphotrichum sericeum*)

From 2008 to 2011 I conducted research on the nationally rare *S. sericeum* in Birds Hill Provincial Park. I documented and recorded the visitation frequency of flower-visiting insects to the rare plant and other plants that flowered in the same plots. I compared the visitor taxa of *S. sericeum* and the common co-flowering plant Showy Goldenrod (*Solidago nemoralis*). I conducted a hand pollination study on *S. sericeum* to determine if the lack of pollen was limiting seed production. In 2009, I conducted an experiment to determine if clipping and nitrogen fertilization would improve flower and seed production in *S. sericeum*. I tested whether facilitation of insect visitation was occurring via numerical or aggregative responses, and identified potentially facilitating plant species.

Major Results:

Pollinator Research – Common Plants

- Most pollinator taxa were flies (~52%), followed by bees/wasps (~30%), butterflies (~11%) and beetles (~6%).
- Most visits were by flies (~60%) followed by bees/wasps (~39%), butterflies (~1%) and beetles (<1%).
- LPM had more bee/wasp visits than TPP; this is likely due to differences in habitat as TPP has more wetlands nearby. In drier years the abundance of these groups may change.
- Rigid (*Solidago rigida*), Canada (*S. canadensis*) and Showy Goldenrod and Heart-leaved Alexander (*Zizia aptera*) received the most visiting taxa and number of visits.
- The interaction matrix was significantly nested; this means that there is a core of generalist plants and insects that interact mainly with each other, while specialist taxa interact with subsets of generalist taxa.

Pollinator Research – Western Silvery Aster

- S. sericeum* is visited mainly by *Bombus bifarius*, and various sweat bees (Halictidae) and bee flies (Bombyliidae), while *S. nemoralis* is visited by more flower (Syrphidae) and parasitic (Tachinidae) flies.
- The quantity of insect visits to *S. sericeum* is comparable to that of *S. nemoralis* but the quality may be lower, particularly for early blooming capitula as they compete for insect visitors with *S. nemoralis*.
- S. sericeum* is probably a stress-tolerant species that may not be able to exploit fertilizer as effectively as plants with a more competitive strategy. Clipping (mowing) may be detrimental.
- S. sericeum* seeds are attacked by a species of *Anthonomus* weevil that eats its seeds.
- Plants that bloom before *S. sericeum* may facilitate its persistence by providing nectar for shared pollinators before it flowers. These facilitator species, including *Dalea purpurea* and *Heterotheca villosa*, may be useful to grow in prairie restorations with *S. sericeum*.

List of Relevant Research Papers/Reports/Theses/More Information:

- Robson, D.B. 2013. An assessment of the potential for pollination facilitation of a rare plant by common plants: *Symphyotrichum sericeum* (Asteraceae) as a case study. *Botany* 91(1): 1-9.
- Robson, D.B. 2010. Reproductive ecology of the western silvery aster *Symphyotrichum sericeum* in Canada. *Endangered Species Research* 12: 49-55.
- Robson, D.B. 2010. A comparison of flower-visiting insects to rare, *Symphyotrichum sericeum* and common, *Solidago nemoralis* (Asteraceae). *Botany* 88(3): 241-249.
- Robson, D.B. 2008. The structure of the flower-insect visitor system in tall-grass prairie. *Botany* 86(11): 1266-1278.

Next Steps / Upcoming Research:

I am currently working on a paper that identifies the best plants to grow alongside insect-pollinated crops (e.g. canola, sunflower) to better support the native pollinator population. I am hoping to conduct additional pollination research on Hairy Prairie-clover, a nationally rare plant occurring in sandy mixed-grass prairies in MB and SK in 2014.

What else do we need to know about your topic (what should future researchers focus on)?

- Determining if insect composition and abundance varies with changes in weather (e.g. are bees more common in drier years that flies) would be useful to help determine the impact of climate change.
- Testing of the hypothesis that planting species that share pollinators with a rare plant but have a low synchrony with it will increase seed production via a numerical response (i.e. extension of the flowering season).

5. Melissa Pearn

*Pollination and Comparative Reproductive Success of Lady's Slipper Orchids *Cypripedium candidum*, *C. parviflorum*, and Their Hybrids in Southern Manitoba*

Affiliation: Nature Conservancy of Canada, University of Manitoba (graduate)

Phone Number: 204-942-6156

E-mail Address: Melissa.Pearn@natureconservancy.ca; elliemckay@yahoo.ca

Research Partners: Dr. Bruce Ford (University of Manitoba), Dr. Anne Worley (University of Manitoba)

Brief Description of Research Project:

I investigated how orchid biology, floral morphology, and diversity of surrounding floral and pollinator communities affected reproductive success and hybridization of *Cypripedium candidum* and *C. parviflorum*. Reproductive success was determined for parental taxa and hybrids in study plots located at the TGPP and near Brandon. I measured variation in plant characters within and among orchid taxa, compared insect visitation among orchid taxa, and made comparisons between insect body measurements and orchid exit routes (at the Brandon sites) to determine which of these visitors may be considered potential pollinators. I also examined the role of co-flowering rewarding plants, and investigated which, if any, were important for maintaining pollinators in orchid populations, and if the diversity of the surrounding floral communities affected orchid fruit set.

Major Results:

- Co-occurring *C. candidum* and *C. parviflorum* were hybridizing at Brandon sites, but not at the TGPP site.
- Floral dimensions, including pollinator exit routes were smallest in *C. candidum*, largest in *C. parviflorum*, with hybrids intermediate and overlapping with both (mirrored in the number of insect visitors, fruit set, and seed set).
- From the larger pool of observed insect visitors, only a subset of these was considered as potential pollinators at the Brandon sites.
- Potential pollinators included BOTH bees (hymenopterans) and flies (dipterans).
- Exit route size seemed to be involved in restricting the number and diversity of potential pollinators.
- Variation in exit route size among orchid taxa, as well as overlap in spatial distribution and flowering phenology might be contributing to differences in pollination, reproductive success, and hybridization rates among orchid taxa.
- TGPP plants do not overlap spatially, and have minimal temporal overlap in flowering, which may result in reduced or lack of pollinator sharing, potentially explaining the lack of hybridization. By comparison, hybridizing plants at the Brandon sites had overlapping phenology, spatial distribution, floral dimensions, and evidence of pollinator sharing.
- The composition and abundance of co-flowering rewarding plants seems to be important for maintaining pollinators in orchid populations.
- Comparisons between co-flowering plant abundance and orchid fruit set indicated that individual co-flowering species may be facilitators or competitors for pollinator attention, affecting orchid reproductive success.

List of Relevant Research Papers/Reports/Theses/More Information:

Pearn, M.A. 2013. Pollination and comparative reproductive success of lady's slipper orchids *Cypripedium candidum*, *C. parviflorum*, and their hybrids in southern Manitoba. Master Thesis. Department of Biology. The University of Winnipeg. Winnipeg, Manitoba. (http://mspace.lib.umanitoba.ca/bitstream/1993/15341/1/Pearn_Melissa.pdf)

Next Steps / Upcoming Research:

I will be working with Dr. Anne Worley and Dr. Bruce Ford to publish some of the results from my graduate work in conjunction with their own research on these species of lady's slipper orchids. Dr. Worley and Dr. Ford are continuing their genetic and ecological research on *Cypripedium* orchids.

What else do we need to know about your topic (what should future researchers focus on)?

There are many factors affecting the reproductive success and hybridization of these species of orchids – few of which have been researched adequately. Future researchers should focus on:

- Studies spanning various geographic areas (throughout individual species ranges, between species in Asia, Europe, and North America).
- Studies looking at pollen viability, to complement studies of fruit and seed set.
- Changes in the pollinator community throughout the orchid flowering season, impacts of site management (such as mowing or fire regime), and effects of climatic conditions.
- Studies investigating orchid phenology (especially bloom dates) and spatial distribution in conjunction with the variation and composition of the local pollinator communities.
- Sampling of non-orchid pollen collected from orchids and from the bodies of insects observed visiting orchids over several years.
- Experimental research looking at the role played by rewarding co-flowering vegetation in populations of *C. candidum* and *C. parviflorum*, at various spatial scales.
- Long-term monitoring of orchid populations and rates of hybridization.

6. Christie Borkowsky

Western Prairie Fringed Orchid (Platanthera praeclara) Pollination and Nectar Production

Affiliation: Critical Wildlife Habitat Program

Phone Number: 204-425-3229 (seasonal)

E-mail Address: tgpphq@mymts.net

Other Contact Information: Box 24 - 200 Saulteaux Crescent Winnipeg, Manitoba R3J 3W3

Research Partners: A. R. Westwood, University of Winnipeg, Advisor

Major Results:

- Significantly larger number of individual flowers and plants developed seed capsules in the ultraviolet light treatment plots (5.13+/-0.42% of available flowers; 35.12+/-1.74% of total plants) than the control plots (2.78 +/- 0.42% of available flowers; 21.76 +/- 2.58% of total plants).
- Removal of pollinaria were not reliable indicators of pollinator visitation and/or pollination of the flowers
- Nectar sugar concentration decreased by approximately 6% over the flowering season
- Mean sugar concentration was 23.9+/-0.2% over the sampling season, values ranged 13-34%.

List of Relevant Research Papers/Reports/Theses/More Information:

Borkowsky, C. 2006. Enhancing pollination of the endangered western prairie fringed orchid (*Platanthera praeclara*) by sphinx moths (Lepidoptera: Sphingidae) in tall grass prairie in southeastern Manitoba and an examination of orchid nectar production. University of Manitoba. 107pp.

Borkowsky, C. and A. R. Westwood. 2009. Seed capsule production in the endangered western prairie fringed orchid (*Platanthera praeclara*) in relation to sphinx moth (Lepidoptera: Sphingidae) activity. *J. Lep. Soc.* 63: 110-117.

Westwood, A. R., C. L. Borkowsky, and K.E. Budnick. 2011. Seasonal Variation in the Nectar Sugar Concentration and Nectar Quantity in the Western Prairie Fringed Orchid, *Platanthera praeclara* (Orchidaceae). *Rhodora*: 113: 201-219.

Prairie Ecology and Restoration

7. Stephen Gietz

Native Prairie Evaluation in the Tall Grass Prairie Natural Area

Affiliation: Nature Conservancy of Canada

Phone Number: 204-452-0051

E-mail Address: Stephen.gietz@natureconservancy.ca

Research Partners: Carly Dow (Nature Conservancy of Canada), Cary Hamel (Nature Conservancy of Canada)

Brief Description of Research Project:

The purpose of this study was to collect and compare general information on the presence and quality of native prairie patches in the RM's surrounding the Tall Grass Prairie Preserve, where few studies have been completed. The data collected in this study can be compared to the information in Koper's et al.'s 2006 tallgrass prairie site re-evaluations of Nature Manitoba surveys first conducted in 1987/1988 (see Koper, N., Mozel, K.E., and Henderson, D.C. 2009. Recent declines in northern tall-grass prairies and effects of patch structure on community persistence. *Biological Conservation*, *in press.*), in order to determine any significant changes in overall patch quality. Furthermore, this survey can be used to create a general mapped work plan of higher-quality areas that would be key targets for future NCC conservation initiatives.

Major Results:

- 1122 sites were surveyed (919 ditch populations and 203 field populations)
- Majority of patches fell into the 'C' range of the grading scheme, only one 'A' quality property was found, and only rarely were 'B' quality patches evident
- Results were used to guide systematic searches for new occurrences of prairie Lepidopterans.

List of Relevant Research Papers/Reports/Theses/More Information:

- Final Report on activities and results
- Koper, N., Mozel, K.E., and Henderson, D.C. 2009. Recent declines in northern tall-grass prairies and effects of patch structure on community persistence. *Biological Conservation*, *in press*

Next Steps / Upcoming Research:

- Nothing at the moment

What else do we need to know about your topic (what should future researchers focus on)?

- It is recommended that a fully comprehensive survey of these sites be completed during the summer months of following years in order to gain a better understanding of the quality of these patches of land.
- It may also be useful to consider an alternative form of prairie evaluation. Even though it is helpful to remain consistent throughout different surveys, this grading system for prairie health is fairly subjective and may vary greatly between surveyors.
- These data may be useful to researchers interested in assessing relationships between patch size, landscape context and land use, and condition of prairie patches.

8. John Markham¹ and Ryan Sheffield

Hydrological Niches in Tall Grass Prairie Plant Communities

¹**Affiliation:** Biological Sciences University of Manitoba

Phone Number: 204-474-7180

E-mail Address: john.markham@umanitoba.ca

Brief Description of Research Project:

The lowland condition of the Tall Grass Prairie Preserve results in wet soil conditions in spring that can last much of the growing season. We wanted to determine if water logging of the soil, and drying later in the growing season could act as components of plant species niches and structure communities. Three sites (Doyle, Prairie Shore, and Machnee) were selected with different fire histories containing various patches of dominant grass species. We quantified plant community composition and soil hydrology in of 30 1m x 1m plots at each site. Water content was monitored with a Theta probe and water logging by examining the depth of oxidation of steel pins inserted in the soil. We plotted soil conditions over time and used regression analysis to determine the time required for soil drying and the depth the anaerobic soil layer to reach a threshold value. For each species the mean hydrological niche values were calculated based on the hydrology of the plots where they occurred and weighted by their abundance in plots. Kernel density estimation was used to calculate niche overlap between pairs of species on each site. We also compared the niche conditions of rare versus common species. Common species were defined as those in the upper quartile of frequency abundance and rare species as least frequent up to a similar information content as the common species.

Major Results:

- Compared to other tallgrass communities we have examined, the communities in the Tall Grass Prairie Preserve have a high species richness (81 to 102 species per site) and a large proportion of rare species.
- Although all three sites showed a large degree of overlap, the Doyle site showed much less variation in soil drying (Figure 1). The only site that showed significant correlation between soil anaerobic and drying conditions was Machnee ($r = -0.45$).
- The three most common species (*Andropogon gerardii*, *Calamagrostis stricta* and *Muhlenbergia richardsonis*) showed substantial shifts in their niche positions between sites, matching the most available niche conditions on a site.
- There was little evidence that plants in these communities show significant niche separation. Using both measurements of hydrology (drying and flooding) the proportion of pairs of species that showed significant niche separation varied from 2.7 to 4.9%.
- While common species occupied the center of the available hydrological niche space as expected rare species were found in the least common portions of the niche space (Figure 2).

What else do we need to know about your topic (what should future researchers focus on)?

- The focus of this work was on the community as a whole. We therefore treated species as rare or common with little regard for the ecology of particular species. Future work should focus on the hydrology of particular species.
- The high degree of niche overlap suggests these communities rely on disturbance to limit competitive exclusion. We need to know how a loss of disturbance can result in competitive displacement.

- Even though there is a high degree of niche overlap, rare species seem to occupy rare hydrological niches. We need to know what mechanisms lead to this.

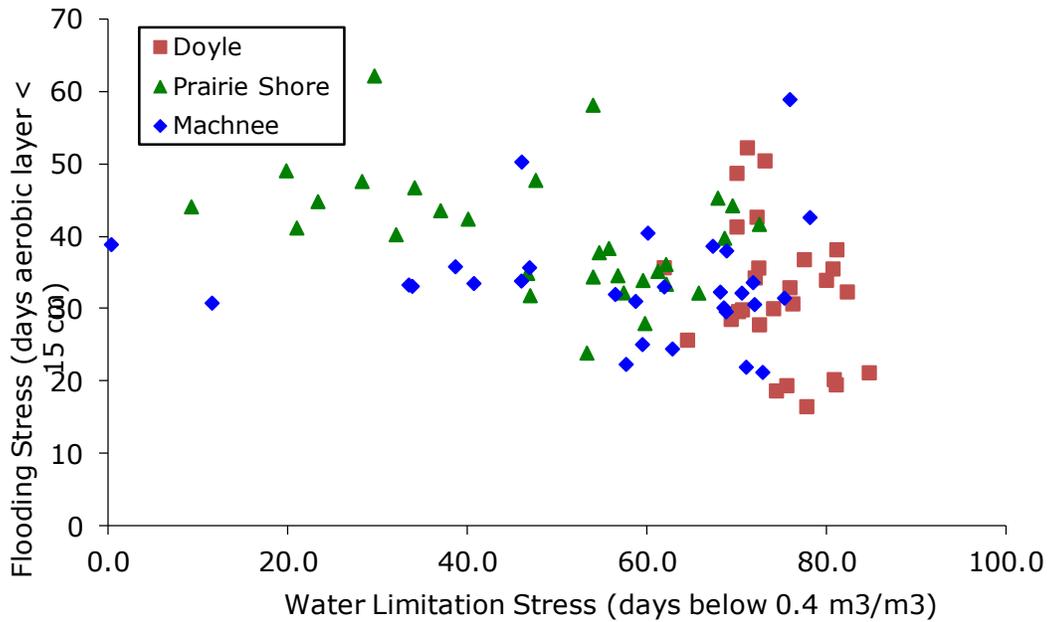


Figure 1. Hydrological niches of each site as defined by flooding stress and surface drying. Each point is a plot.

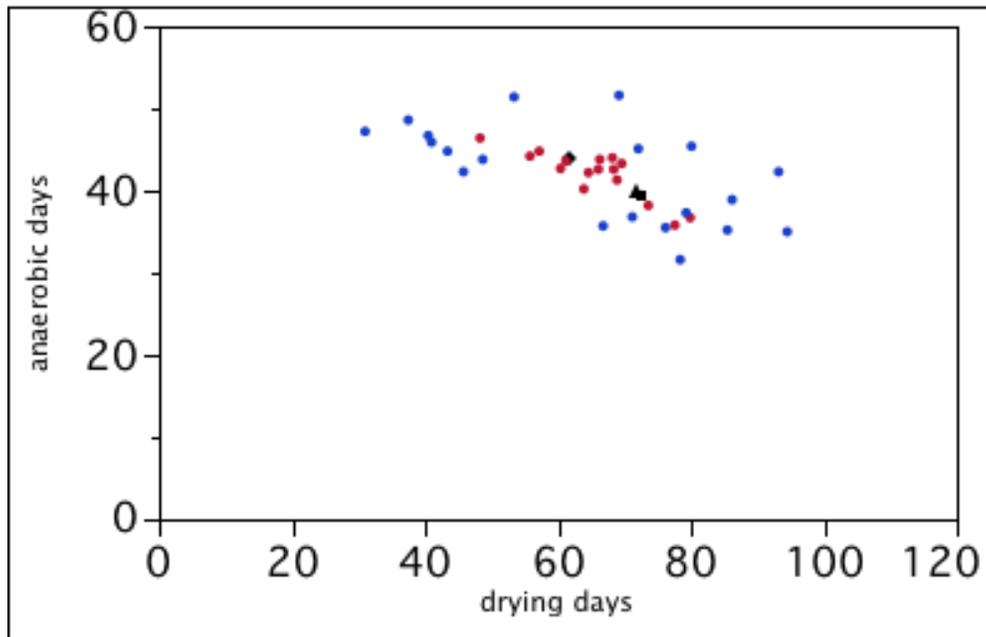


Figure 2. Hydrological niches of common (red) and rare (blue) species on the Doyle site. The other sites showed the same pattern.

9. Chris Hay¹ and Julie Sveinson Pelc²

Assessment of Long-Term Effects of Tallgrass Prairie Restoration Treatments in Southeastern Manitoba, Canada

¹**Affiliation:** Nature Conservancy of Canada

Phone Number: 204-942-6053

E-mail Address: Julie.pelc@natureconservancy.ca

Other Contact Information: n/a

²**Affiliation:** University of Manitoba

Phone Number: 204-668-3520 (cell: 204-612-0793)

E-mail Address: chris.r.j.hay@gmail.com

Other Contact Information: n/a

Research Partners: Dr. Stéphane McLachlan, University of Manitoba; John Morgan, Prairie Habitats Inc

Brief Description of Research Project:

In 1999, a long-term tall grass prairie restoration experiment was established at the Manitoba Tall Grass Prairie Preserve by J. Sveinson (Pelc) and Dr. S. McLachlan of the Environmental Conservation Lab, University of Manitoba with in-kind support from Prairie Habitats Inc. and the Manitoba Tall Grass Prairie Preserve (Sveinson 2003).

A four-times replicated nested experiment was conducted as a split-split-split design. The main factor was herbicide (present and control). The split factors were fertilizer (present and control) and disturbance (mowing, burning and control), these randomly applied within each of the main factor plots. The split-split factor was interseeding (present and control). Two adjacent high-integrity remnants prairies were used as reference site to identify the desirability of treatment-associated changes in vegetation.

The objectives of this experiment were to assess how disturbance, fertilization and interseeding affect aboveground and seedbank plant diversity and species composition, and how these treatment effects would change over the short-term between 1999 and 2003 (Sveinson 2003) and again over a decade later (Hay 2013).

Major Results:

Short -term effects

- Glyphosate had the greatest impact on both native and exotic flora of any treatment over the short-term.
- Native diversity, especially forbs and woody species, decreased substantially when Glyphosate was applied.
- Native graminoids were vulnerable to Glyphosate, especially Big Bluestem (*Andropogon gerardii*).
- Exotic graminoid diversity, including Red Top (*Agrostis stolonifera*) and Canada Bluegrass (*Poa compressa*), was temporarily reduced by Glyphosate. Red Top had fully recovered after three years and in many cases dominated plots treated with Glyphosate.
- Exotic forb diversity generally increased with Glyphosate.
- Burning and mowing had relatively less substantial effects on plant diversity and species composition.
- Disturbance and fertilizer effects were greatest immediately after the treatment application, declining over the three years of the study.

- Although overall diversity of native forbs was unaffected by fertilizer, Lindley's Aster (*Aster ciliolatus*) and Showy Goldenrod (*Solidago nemoralis*) increased in cover with fertilization, suggesting that fertilization may have a role when seeding forbs.
- As seeding was delayed for two years by excess precipitation, the effects of this treatment were not observed over the short-term and were thought to increase over time.

Long-term effects

- Treatment effects have largely dissipated after more than 10 years (no significant long-term effects on diversity measures or guilds of plants, with exceptions...)
- Fertilizer decreased effective species richness of native forbs and woody species (though increased cover of "Shrubby Cinquefoil" *Potentilla fruticosa* and "Lance-leaf Aster" *Symphotrichum lanceolatum*)
- Glyphosate still decreased total graminoid cover (especially "Big Bluestem" *Andropogon gerardii*)
- Relative impact of treatments may vary through time: initially strong effects of herbicide and fertilizer diminished relatively quickly while disturbance and seeding treatments may have retained their weak effects over the long-term (according to multivariate ordination analyses)
- Seeding results are mixed and seem more related to changing site conditions year to year than relative proportion of seed weight in original mix (again suggesting seed mixture should be tailored to site)
- Propagule bank was dominated by exotic graminoids (by far mostly "Red top" *Agrostis stolonifera*)
- Aboveground vegetation returned to dominance of native graminoid "Big bluestem" (*Andropogon gerardii*)

List of Relevant Research Papers/Reports/Theses/More Information:

Sveinson, J and McLachlan, S. 2003. Role of seedbanks in the restoration of tallgrass prairie (Manitoba). *Ecological Restoration*, 21:43-44.

Sveinson, J. 2003. Restoring tallgrass prairie in south eastern Manitoba, Canada. Masters of Science Thesis. University of Manitoba. Abstract and full PDF available online: <http://mspace.lib.umanitoba.ca/handle/1993/3808>

Hay, Chris. 2013. Assessment of Long-term Effects of Tallgrass Prairie Restoration Treatments in Southeastern Manitoba, Canada. Unpublished Honours Thesis project. University of Manitoba.

Next Steps / Upcoming Research:

- We are working with Dr. McLachlan to publish some of the results from this research.
- Apply findings to active restoration projects
- Development a Management Plan for the Saranchuk Property using new management techniques and/or further monitoring (e.g. for Culver's root)

What else do we need to know about your topic (what should future researchers focus on)?

- The role that degraded tallgrass prairies play in the prairie landscape and the value of restoring them
- Role of nearby propagule sources in recolonization of native species in disturbed areas
- Custom seed mixes - how best to design for conditions of different sites and to meet restoration goals
- How long the seed lasts in the soil and germination success of native seed harvest
- Disturbance related flushes of the seedbank
- The insect role in pollination of native species reintroduced to an area through seeding
- Fertilization effects on forbs and woody species

10. David Toop

Hydrogeological Influences on Cypripediums Habitat in Manitoba

Affiliation: Manitoba Conservation and Water Stewardship

Phone Number: 204-945-7402

E-mail Address: david.toop@gov.mb.ca

Research Partners: Native Orchid Conservation Inc. (NOCI)

Brief Description of Research Project:

This project has regional and site components. Work began in 2011 as an aside to an existing groundwater-surface water monitoring program in the Sandilands area when a correlation was noted between groundwater sites and colonies of yellow and showy lady's slipper orchids (*Cypripedium parviflorum* and *Cypripedium reginae* respectively). Field surveys were undertaken in June 2011 (85 sites in Sandilands), 2012 (125 sites in southeast Manitoba) and 2013 (250 sites, central Manitoba, western Saskatchewan, northern Minnesota). The surveys were mostly of roadside ditches, but also included open parkland and woodland and sites within the Tall Grass Prairie Preserve. Additional data were obtained from the NOCI database (80 sites). The survey primarily looked at yellow and showy cypripediums, but included any orchids encountered. Data were recorded for each site, including density, situation, slope and aspect, associated plant species and gps coordinates. Sites from 2011 and 2012 are plotted in ArcGIS and were compared to overlays with soils, surface geology, topography and surface water features. Data from 2013 have not been added yet.

In 2013 additional site specific information was added with the installation of shallow groundwater monitoring wells with spot recordings taken every 2-3 weeks during the frost free period. Wells are located at two sites with *Cyp. Reginae*, one site with *Cyp. parviflorum*, one site with both *parviflorum* and *reginae* and one site with *Cyp. candidum* (Kleefeld). Plans are to collect water samples to analyse for field parameters and laboratory testing of major ions and dissolved metals. The information collected will be compiled and assessed in the coming months.

Major Results:

- Cypripediums showed a preference for topographic lows, where upward movement of groundwater occurs. *Cyp. parviflorum* preferred north facing slopes in incised, moist, non-draining ditches in topographic lows of a scale as small as a few metres. Associated species included willow (almost always), alexander (frequent) and Canada anemone (occasional). *Cyp. reginae* preferred the bottoms of broad, wet, non draining ditches in topographic lows spanning of a few hundred metres or more. Apart from willow, there was no obvious associated flora. *Cyp. candidum* (Kleefeld) occupied a broad ditch with a high water table, calcareous buildup and reducing conditions.
- Regional mapping showed a correlation of orchid sites with surface water features, including wetlands. Regional cypripedium range was influenced by presence of rolling relief to drive groundwater flow, and the presence of glacially deposited coarse-grained calcium-rich soils or overburden.

Reporting of Results:

- Results to date presented at Geological Association of Canada-Mineralogical Association of Canada conference in Winnipeg in May 2013. No formal publication has been made to date.

Next Steps / Upcoming Research:

- This research is still a work in progress, and must be juggled with other duties. Data collection has been the main focus over the summer. Analysis of results will take place over the winter.

What else do we need to know about your topic (what should future researchers focus on)?

- NOCI is introducing an “orchid app” for Android. This allows the user to identify orchid species and to collect and submit a gps reading and notes. The app will be tested and depending on uptake, may be expanded to a more in depth app for Android, or a basic app for Apple.



Symposium participants – Weston Family Tall Grass Prairie Interpretive Centre

11. Cary Hamel

Near-surface groundwater monitoring (in advance of hydrological restoration)

Affiliation: Nature Conservancy of Canada

Phone Number: 204-942-2187

E-mail Address: cary.hamel@natureconservancy.ca

Other Contact Information: phil.gerla@engr.und.edu

Research Partners: Dr. Phil Gerla, University of North Dakota, The Nature Conservancy

Brief Description of Research Project:

In 2011, paired groundwater monitoring wells were installed at five sites where near-surface groundwater flow was thought to be impaired by surface drains (one well on each side of the suspected impairment). Groundwater levels in these wells continue to be recorded regularly over the course of five years. Two of these five monitoring sites have been selected as the locations of hydrological restoration efforts that are intended to increase biodiversity on NCC lands. Once restoration efforts are undertaken, groundwater monitoring will continue so that the effectiveness of restoration efforts can be assessed. Permanent vegetation monitoring plots have been established in association with well sites, and will be annually monitored both before and after hydrological restoration is implemented.

NCCs ongoing analysis of the effectiveness of our current conservation actions in light of climate change have suggested that Preserve wetlands may undergo substantial changes due to predicted increased autumn (+8-17%) and winter (+18-28%) precipitation, with concurrent changes to near-surface hydrology and biodiversity (for example, a potential shift from ephemeral, sedge-dominated wetland swales to a system dominated by marshland).

Major Results:

- One of the sites where the near-surface hydrological regime was assumed to be fragmented, does not in fact appear to be impaired
- At most monitoring locations, marked differences are evident between the paired wells (timing and depth to groundwater, seasonal patterns)
- Vegetation plot size chosen for the study may have been too small to detect changes in the orchid community

List of Relevant Research Papers/Reports/Theses/More Information:

- No reports produced to date

Next Steps / Upcoming Research:

We plan to restore hydrological flow at one site in autumn 2013, and at least one more site the following year. Groundwater and vegetation plots will continue to be monitored, with an analysis and report prepared in approximately 2015.

What else do we need to know about your topic (what should future researchers focus on)?

- There may be an opportunity for a student to conduct analyses on results to date (hydrological and vegetation) as part of a statistics course/paper.
- A larger scale, mostly GIS-based analysis that examines the annual census of Western Prairie Fringed Orchids will be used to compare to available information on hydrological restoration and impairment (number of drains and elevated roadways intersecting parcels, distance to nearest drain or roadway, class of drain). The results, based on flowering stems across 50+ land parcels, would inform orchid conservation management and hydrological restoration decision making.



Symposium participants exploring the Prairie Orchid Trail

Land Management

12. Cary Hamel

Habitat Conservation & Restoration in Light of a Changing Climate: Adapting Conservation Strategies for the Manitoba Tall Grass Prairie Preserve

Affiliation: Nature Conservancy of Canada

Phone Number: 204-942-2187

E-mail Address: cary.hamel@natureconservancy.ca

Research Partners: Meredith Cornett (The Nature Conservancy (TNC)), Phil Gerla (University of North Dakota), Russ Reisz (TNC), Jon Eerkes (TNC), Julie Pelc (NCC), Marissa Ahlering (TNC), Melanie Dubois (Agriculture Canada), Mae Elsinger (Agriculture Canada), Jaimee Dupont (NCC)

Brief Description of Research Project:

Climate change presents a challenge for managing conservation areas. The identification of threats to the integrity of ecosystems and the development or adaptation of strategies for mitigating these threats is necessary to ensure continued conservation success as long-term temperature, precipitation, and evapotranspiration change. The Nature Conservancy of Canada, The Nature Conservancy and other conservation partners assessed the potential influence of climate change on the biodiversity and ecosystems of the Manitoba Tall Grass Prairie Preserve. The potential continued success of current multi-year conservation plans was reviewed in light of these predicted changes, and a set of adapted strategies designed to increase the likelihood of continued effectiveness was developed. Most strategies are generally modifications from established strategies for mitigating existing threats.

Major Results:

- They way ecosystems are/may respond to a changing climate cannot be generalized across large regions
- Approach adaptation in a scientific, step-wise way – understand species and ecosystems, understand current and projected climate change, make hypotheses of ecosystem change/expression of threats to ecosystems, implement change in an experimental manner, measure results, adapt conservation work as necessary
- Prospects for long-term natural system conservation cannot be examined in isolation of local economic, social context
- Modified ‘climate change adapted’ conservation strategies are already being implemented at the Manitoba Tall Grass Prairie Preserve
- long-term planning, a landscape-scale conservation vision and ecological measures of success are necessary to ensure measurably effective adaptation occurs

List of Relevant Research Papers/Reports/Theses/More Information:

- No reports produced to date
- A 2010 version of this presentation (caution, much has been learned since this presentation was given):
<http://mgug.ca/sites/all/themes/mgug/docs/presentations/AdaptingConservationStrategiesTallgrassAspenParkland.pdf>

Next Steps / Upcoming Research:

- Continue to monitor effectiveness of actions being implemented so far, and continue to monitor species and ecosystems
- Engagement of local agricultural and broader economic and social community
- Potential project on land snail movement in response to climate change at the TGPP

What else do we need to know about your topic (what should future researchers focus on)?

- Other than key Species At Risk, climate change adaptation to date has focussed on ecosystem-level measures of health – in depth examination of individual species will help inform overall conservation strategy development
- Potential response of aquatic biodiversity, especially in lotic systems (e.g. Roseau River), to ongoing climate change is an information gap



Bur Oak (*Quercus macrocarpa*) tallgrass prairie savanna adjacent to the Weston Family Tall Grass Prairie Interpretive Centre

13. Laura Reeves

A comparison of once-over, twice-over and no grazing on vegetation cover, biomass, and species composition.

Affiliation: Critical Wildlife Habitat Program

Phone Number: 204-425-3520

E-mail Address: eatwildedibles@gmail.com

Other Contact Information: info@psbotanicals.com

Brief Description of Research Project:

In 2004, a grazing enclosure was set up in an upland site on SW18-2-7E. The enclosure included ungrazed, grazed twice and control treatments. The site was heavily grazed for 3 years and left ungrazed for 4 years. Vegetation cover and biomass sampling was conducted annually from 2004 - 2011. Biomass samples were separated into several categories – big bluestem, warm season grasses, red top, cool season grasses, sedges and allies, forbs, and litter. An analysis of the data included a comparison of cover and biomass within and between treatments, as well as species composition (number of species, native vs. non-native).

Major Results (*in bullet form*):

Three years of overgrazing resulted in:

- A shift from big bluestem to red top dominance
- A decrease in native forb diversity
- An increase in cover of sedges and allies
- A loss of litter
- An increase in non-native species number and cover

Other findings:

- In both UG and G1 treatments, productivity was solely driven by big bluestem.
- In the G2 treatment, productivity was equally influenced by big bluestem, red top and sedges, even four years after cattle were removed.
- Burning stalls recovery of overgrazed areas because litter removal encourages growth of red top and non-native forbs
- Though the UG and G1 treatments showed similar trends in native species cover and biomass, fluctuations were more dramatic in the G1 treatment, suggesting greater variability in species and ecosystem function over time

What else do we need to know about your topic (what should future researchers focus on)?

More needs to be known about the effects of pugging and soil compaction.

- Effects of grazing wet soils
- Expected soil/vegetation recovery period
- Cumulative impact of yearly grazing on wet soils

14. Russell Reisz

Prairie Management through Conservation Grazing, Controlled Burns and Invasive Species Control

Affiliation: The Nature Conservancy

Phone Number: 218.436.3455

E-mail Address: rreisz@tnc.org

Research Partners: The Nature Conservancy, MN DNR Wildlife and Ecological Water Resources

Brief Description of Research Project:

History - Conservation lands in the eastern portion of the Caribou WMA (immediately south of the Gardenton Pasture) area have a history of grazing by cattle dating back to the 1980's. The current grazed area is about 4,700 acres in 14 rectangular paddocks following section lines. Through 2000 the lands were grazed by a single rancher in whatever manner he pleased (a loose rest/rotation system). When controlled burns were conducted they followed section (paddock) lines and breaks were disced. From 2000-2011 either the north or south set of paddocks was stocked (14 on, 14 off rest/rotation) while the other rested in preparation for a controlled burn. Following a burn the grazing would switch to the other set of paddocks.

Management issues – By 2011 the managers were seeing increases in brush/trees and what was perceived to be a decrease in desired prairie species. Extent of invasive species was largely unknown, it was difficult to burn under the right conditions and in different seasons, there was little to no rest for paddocks and it was felt the upland prairie areas were being grazed too frequently and heavily.

Projected changes – After careful consideration and many discussions with resource specialists, grazing experts and the rancher we decided to begin implementing the following:

- Single herd, once over grazing with multiple rest paddocks (started in 2012)
- Change in paddock shape and size to reflect habitat types (future)
- Addition of additional set of paddocks to facilitate research and management issues (future)
- Changes in infrastructure to protect wildlife and encourage better forage usage (ongoing)
- An effort to conduct total invasive species control on a defined set of species through increased effort (started 2011)
- Increased frequency of controlled burns on the three large units and sub-units within (started 2013)

There are numerous objectives set with the project primarily revolving around the management issues listed above.

Currently we have three levels of monitoring/research associated with the project.

- In 2013 basic level prairie/brush monitoring transects were established in all future paddocks following a protocol agreed to by TNC, MNDNR and USFWS (basic – flora)
- In 2012 Sets of paired plots were placed to track the long-term (10+ yr.) effects of grazing on the native prairie plants (detailed – flora)
- In 2009 a set of transects and plots were established to monitor general plant and bird reactions to management practices (flora and avian – in-between)

Results:

- Rest paddocks are in place
- Increased controlled burn efforts on sub-units
- Qualitative positive response to change in grazing
 - are seeing more forbs and grasses completing life cycles
 - there is increased heterogeneity across pasture
- The producer (who was not 'enthusiastic' about changes) is becoming more accepting. The cattle are not 'bucking the system' as he thought they would
 - For the last two years we have been able to keep good water and forage available to this rancher while we have had to kick other ranchers off their leases due to lack of forage under rest/rotation

List of Relevant Research Papers/Reports/Theses/More Information:

- Hope to have the 3-5 plan completed by spring of 2014

Next Steps / Upcoming Research:

Plan to finalize infrastructure plans and start installing new fence, use area and water systems in 2014.

Transects and plots resampled according to schedule.

What else do we need to know about your topic (what should future researchers focus on)?

You folks tell me!

15. Julie Sveinson Pelc

Characterization of Wildfire Event in the Tall Grass Prairie Region of Manitoba

Affiliation: Nature Conservancy of Canada

Phone Number: 204-942-6053

E-mail Address: Julie.pelc@natureconservancy.ca

Research Partners: Jordan Becker, Cary Hamel and Tim Teetaert, Nature Conservancy Canada
Russell Reisz and Jon Eerkes, The Nature Conservancy - Minnesota

Brief Description of Research Project:

In response to wildfires in the Tall Grass Prairie Region of south-eastern Manitoba in the fall of 2011 and 2012, NCC developed a plan to measure the fire's impact on native vegetation communities, Species at Risk habitat, and woody species encroachment. The precise boundary of the fire, as well as the unburned areas within this boundary, was mapped at a fine scale. A number of parameters were measured along transects to determine the fire effects on the soil litter (duff) layer and woody species. Characterization of wildfires, including mapping their extent and monitoring their effects on plant communities, is an important aspect of the decision making process required for management of fire-adapted ecosystems.

Major Results:

- Fuel load and weather conditions affect how a fire behaves and the area of land it affects
- Data suggests that the fire behaved differently depending on the moisture regime, community type, and vegetation of the site.
- Fire often skips and a mosaic of burned and unburned land is left following a fire. Approximately 90-95% of the area burned with patches of refugia scattered through the burned area.
- Burn severity on substrate measured by depth of duff and % burned was not consistent across the burned area.
- Difficult to determine woody species kill immediately after a fire.
- The fire effects on woody species varied, but in the majority of plots, greater than 50% of woody species were scorched (measure of kill).
- Char degree on woody species appeared to be random and not consistent across the burned area.
- Fire effects data is useful in understanding how fire behaves and how it affects the landscape.
- Knowledge of fire behaviour helps direct future fire planning.
- Can be incorporated into ongoing Species at Risk (SAR) monitoring.
- Fine-scale fire extent can be used to explain the patterns observed in other science-based projects located within the fire boundary.

List of Relevant Research Papers/Reports/Theses/More:

- No reports produced to date

Next Steps / Upcoming Research:

- The collection of fire effects data represents the first step towards the development of a more extensive, long-term fire monitoring database that will aid in understanding how fire behavior differs amongst vegetation communities and between seasons.

- Combined with ongoing measures of Species at Risk occurrence patterns and abundance, natural area management staff can utilize this knowledge to more effectively direct prescribed fire planning and management of conservation lands.
- We plan to continue measuring prescribed and wildfire effects to help inform future management decisions and characterize fire.
- Measure the effectiveness of our Prescribed Fire Program in achieving burn plan objectives to Burn 90% of prairie habitat to remove duff, invigorate native species, decrease woody species and control cool season exotic grasses.
- NCC and partners have a number of ongoing research projects throughout the Tall Grass Prairie natural area. It is important to understand which of those areas may have been affected by fire and those that were not affected by fire. Knowing this information will likely aid in interpreting information and results obtained from other research projects that may have been affected by this wildfire.

What else do we need to know about your topic (what should future researchers focus on)?

- Conduct an analysis on data collected to date to determine if the parameters being measured are appropriate to measure the effective of our Fire Program fulfilling its objectives.
- Determine vegetation community level effects with transect data.
- Examine long-term changes in vegetation communities, specifically those dominated by woody species, in response to fire using a GIS-based analysis.
- Evaluate the monitoring methods to determine where transect data needs to be collected.
- Incorporate weather conditions in characterizing fire.

16. Lionel Leston

Transmission Lines as Tall-grass Prairie Habitats: Local Mowing, Spraying, and Surrounding Urbanization as Determinants of Wildlife Richness and Abundance

Affiliation: Natural Resources Institute, University of Manitoba

Phone Number: 204-898-4981

E-mail Address: llestonraptor@live.com; umleston@cc.umanitoba.ca

Research Partners: Manitoba Hydro

Brief Description of Research Project:

To manage underused urban grassy spaces like transmission lines as tall-grass prairie habitats or other endangered ecosystems, ecologists need to know how mowing, spraying and surrounding urban lands affect species richness and numbers of plants and animals along transmission lines. I conducted plant and animal surveys along 48 transmission lines in Winnipeg, Manitoba in 2007-2009 to answer these questions. I also arranged for the mowing regime to be adjusted at eight sites between August, 2008 and August, 2009, to see how a one-year change in mowing frequency affected species richness and abundance.

Major Results:

- While plant species richness was lower along frequently mowed and sprayed lines, plant species richness was more affected by urbanization than by mowing.
- Grassland bird numbers along lines were generally more affected by land use than mowing, declining with increasing urbanization, and for some species, increasing woodland near transmission lines.
- Arthropod biomass in pitfall traps and lepidopteran biomass in sweep nets were more affected by mowing than urbanization, generally being most abundant along infrequently mowed transmission lines (mowed once a year).
- Butterfly species richness was not strongly related to mowing or urbanization, but increased with plant species richness along transmission lines.
- A one-year change in mowing frequency had few effects on plant or animal species richness and abundance, suggesting that the observed mowing effects from the larger study take place over longer than a year.
- One consistent effect of the change in mowing frequency was that halting mowing at previously mowed lines was accompanied by an increase in lepidopterans, which also decreased with mowing at previously unmowed lines.

List of Relevant Research Papers/Reports/Theses/More Information:

Leston, L. 2013. *Transmission Lines as Tall-grass Prairie Habitats: Local Mowing, Spraying, and Surrounding Urbanization as Determinants of Wildlife Richness and Abundance*. PhD Thesis. Natural Resources Institute. The University of Winnipeg. Winnipeg, Manitoba. (MSpace): <http://hdl.handle.net/1993/21689>.

Next Steps / Upcoming Research:

I will be working with Dr. Nicola Koper to publish some of the results from my graduate work and other prairie research conducted in the Koper lab. I would also like to explore my data further, using mixture models to model detectability of birds at different sites to better estimate bird densities.

What else do we need to know about your topic (what should future researchers focus on)?

The one-year mowing experiment in my study was simplistic and perhaps too short, but is one of the only examples of an urban wildlife habitat experiment that I found in the literature. With sufficient grants and permission, I would focus on:

- a longer habitat experiment (4-5 years), because one study of controlled burns* suggests that this period is required for some effects of habitat manipulation on grassland wildlife like birds to be observed.
- the effects of reintroducing plant species (especially tall-grass prairie plants) to urban transmission lines.
- a wider variety of management treatments: mowing to infrequent mowing (once/year or once/2 years) to frequent mowing (twice/year); mowing with and without spraying; broadcast versus spot spraying of herbicide; controlled burns.
- effects of a patchwork of habitats within a transmission lines versus uniform management of a transmission line.
- additional dependent variables: reactions of adjacent landowners to management decisions (i.e. concerns about weeds or unmowed vegetation); rates of carbon sequestration in grassland soils.
- I would select as many sites as possible from my PhD study because of the associated baseline data.
- This proposed long-term experiment can be linked to a public tall-grass prairie restoration campaign in Winnipeg.

* Petersen, K. L. and L. B. Best. 1999. Design and duration of perturbation experiments: implications for data interpretation. *Studies in Avian Biology* 19: 230-236.

17. Julie Sveinson Pelc

Tall Grass Prairie Roadside Invasive Species Survey

Affiliation: Nature Conservancy of Canada

Phone Number: 204-942-6053

E-mail Address: Julie.pelc@natureconservancy.ca

Research Partners: The Nature Conservancy – Minnesota, Invasive Species Council of Manitoba, Manitoba Tall Grass Prairie Preserve

Brief Description of Research Project:

Tall Grass Prairie Natural Area Roadside Weed Surveys took place in July 2010 and 2012 (limited surveys were conducted in 2007 to 2009). Teams of 2 or 3 looked for eight key invasive weeds while driving slowly (40 to 50 km/hr) along the mile roads within the Tall Grass Prairie Natural Area. When an invasive species was spotted, team members recorded GPS waypoint, Species, Patch Size (estimate in meters), Patch Density (e.g. rare, single patch, several patches, continuous, etc...), adjacent land use (e.g. Agriculture, Ranching, Conservation, Yardsite, Gravel pit, etc...) and general comments. Waypoints were saved and the track on the GPS was turned on while surveying. The species being looked for were Leafy Spurge (*Euphorbia esula*), Common St. John's Wort (*Hypericum perforatum*), Bird's-foot-trefoil (*Lotus corniculatus*), Purple Loosestrife (*Lythrum salicaria*), Spotted Starthistle/Knapweed (*Centaurea biebersteinii*), Common Tansy (*Tanacetum vulgare*), Common Reed (*Phragmites australis*), and Tall Buttercup (*Ranunculus acris*). Additional invasive species were noted as found. Preliminary data analysis was conducted to identify weed problems and infestation trends.

Major Results:

- Most common species was Bird's Foot Trefoil which tends to form continuous stretches along roadsides especially when located next to a forage pasture where it was planted.
- Leafy spurge infestations are localized but more widespread than originally thought.
- An expanded infestation of Spotted Knapweed was spotted and reported to the Manitoba Early Detection and Rapid Response (EDRR) Working Group for Knapweed. Reporting to the working group resulted in rapid response to this new invader.
- Some species are easier to identify when driving and in flower. There was surveyor bias where more experienced surveyors were able to cover more area and identify species when driving.

List of Relevant Research Papers/Reports/Theses/More Information:

- No reports produced to date

Next Steps / Upcoming Research:

- Develop a methodology for patch size and density that is repeatable so subsequent years can be used to verify the increase or decrease of weedy species. Including following the same tracks, and the same time of year.
- Meet with the Weed Supervisor for the Rural Municipalities and compare data including location maps and treatments. Also consider treatments – mowing and herbicide in surveys.

- Multiple times of year should be utilized to account for different flowering times for invasive species. This is especially important for identifying native Reed Grass and the invasive species which is easiest to identify in the fall.
- Leafy spurge continues to be a problem. Additional analysis looking at the relationships between Leafy Spurge and habitat types, soil types, and adjacent property types could be performed.
- Survey adjacent Conservation Lands for invasive species infestation based on roadside infestation.
- Compare data collected for Leafy Spurge in 2007 to 2009 with 2010 and 2013 in relation to treatments to determine effectiveness.
- Review preliminary analysis and conduct an analysis with recent data from 2013.

What else do we need to know about your topic (what should future researchers focus on)?

- Knowing that funds are limited, which species should we focus our control efforts on based on the threat to natural areas?
- Conduct detailed scientific risk assessments on key invasive species.
- Explore St. John's Wort treatment options to determine the effectiveness of current methods and identify future direction.
- The role of native species in restoring natural areas infested by invasive species (e.g. old yardsites or disturbed areas).

Monitoring and Data Management

18. Dr. Robert E. Wrigley

Mammal and Arthropod Studies at the Tall-grass Prairie Preserve

Affiliations:

- Retired animal ecologist. Formerly Curator of Birds and Mammals and Museum Director of the Manitoba Museum, Director of the Oak Hammock Marsh Interpretive Center, General Curator of the Assiniboine Park Zoo.
- NCC Manitoba Board member and Chair of the Scientific Advisory Committee.

Contact Information: 204-831-5209; robertwrigley@mts.net

Partners: Jack Dubois and Herb Copland assisted with the mammal research while employed by the Manitoba Museum.

1. Pocket Gopher Distribution and Ecology in Southern Manitoba

Description:

The distributions and ecology of Manitoba's two species of pocket gophers (*Geomys bursarius* and *Thomomys talpoides*) were studied by means of trapping these subterranean rodents.

Results:

- While the Northern Pocket Gopher ranges widely in southern and western Manitoba, and occupies a range of prairie and woodland soils and habitats, the Plains Pocket Gopher is found in the province (and in Canada) only south of the Roseau River, in rich soils of the tall-grass prairie.
- The range of the Northern Pocket Gopher is reported east of the Red River for the first time, and it is expanding its range eastward by taking advantage of grassy road banks through formerly uninhabitable forests and flood-prone areas.
- It is speculated that the Northern Pocket Gopher (more northerly adapted) arrived in this area first as prairie advanced following the retreat of the Wisconsinan Glacier and Glacial Lake Agassiz, followed by the Plains Pocket Gopher.
- The larger Plains Pocket Gopher excludes the Northern Pocket Gopher through aggressive interaction; the two species were found no closer than 1.6 km (at five sites).
- Big Bluestem rootstocks were found in a food-storage chamber of the Northern Pocket Gopher.
- Both pocket gophers are attracted to cultivated lands, especially alfalfa fields, and may reach numbers sufficiently high to merit control measures due to crop loss and damage to farm machinery from earth mounds.
- It should be emphasized that the Plains Pocket Gopher occurs in Canada only in a small area of the Tall-grass Prairie community of southern Manitoba. The TGP Preserve provides an important refuge from ongoing trapping/poisoning pressure on agricultural land.

2. Habitat, Abundance and Distribution of Six Species of Shrews in Manitoba

Description:

The ecology of five species of shrews was examined through a trapping program (with Museum Special and pitfall traps) set in numerous lines in a variety of habitat types, and in two-hectare quadrates to provide quantitative data on species abundance.

Results:

- Five species of shrews occur in the region of the Tall-grass Prairie Preserve -- the 3-g American Pygmy Shrew (*Sorex hoyi*), 4-g Cinereus Shrew (*Sorex cinereus*), 8-g Arctic Shrew (*Sorex arcticus*), 14-g Northern Water Shrew (*Sorex palustris*), and 22-g Northern Short-tailed Shrew (*Blarina brevicauda*).

-The four *Sorex* shrews are transcontinental Boreal species, while the Short-tailed Shrew is an Eastern Deciduous Forest species.

-These species often occur in the same variety of habitats, and the separation in size appears to reduce competition through food-size selection in these predominantly insectivores.

-The most-productive shrew habitat is Grass-Sedge Marsh and Willow-Alder Fen -- both of which are common habitats in the TGP Preserve.

-Other productive habitats include moist Tall-grass and Mixed-Grass Prairie, Willow-Alder Shrub, Aspen-Balsam Poplar Forest, White-Spruce-Poplar Forest, and Black Spruce-White Cedar Swamp.

-It appears that the importance of vegetative type and cover to shrews is mainly through the maintenance of relatively high moisture levels in the microhabitat and the support of abundant invertebrate and plant foods.

-By far the most abundant is the Masked Shrew (70.1 % of captures), rivaling the numbers of the Southern Red-backed Vole, Meadow Vole, and Deer Mouse.

-The Northern Short-tailed, Arctic, and Water Shrew are common (11.2 %, 9.5% and 7.4 % respectively).

-Two-hectare quadrat studies in a variety of habitats yielded a range of 1-86 Cinereus Shrews, 1-16 Northern Short-tailed Shrews, 1-10 Arctic Shrews, 1-4 Pygmy Shrews, and 1-3 Water Shrews.

-While not part of this study, it should be noted that another insectivorous small mammal -- the Star-nosed Mole (*Condylura cristata*) -- reaches its western limits of distribution in the Tall-grass Prairie Preserve. Manitoba's sixth species of shrew -- the rare Montane Shrew (*Sorex monticolus*) -- is found at its eastern limits in Boreal Forest from Riding Mountain to Thompson.

3. Distribution and Ecology of Six Rare Species of Prairie Rodents in Manitoba

Description:

Numerous prairie species of mammals reach their northern distributional limits in southern Manitoba and little is known about their occurrence, habitats and life histories in this region. Most of these species were known from fewer than one-dozen specimens in only a few locations before the present research. Three of these rare prairie rodents (Prairie Vole, Plains Pocket Gopher and Eastern Fox Squirrel) have occurred in the TGP Preserve area and were studied using a comprehensive trapping program and an examination of changing agricultural practices.

Results:

-In Manitoba, we found that the Prairie Vole (*Microtus ochrogaster*) inhabits mesic to xeric, sandy Mixed-grass Prairie and Aspen-Oak Savanna, and becomes increasingly rare and present in small disjunct populations towards the east in south-central Manitoba. In his 1946 paper on mammals along the International Boundary, J.D. Soper recorded the Prairie Vole's disjunct presence at Fort Whyte and Ridgeville (on Highway 218 west of Tolstoi) -- the latter being the only record east of the the Red River Valley. We determined that this species has been eliminated from both these limital locations by housing development and agriculture. It likely occurred in the TGP Preserve on well-drained sandy ridges with a cover of short prairie grasses, and in Aspen-Oak Savanna. The nearest current peripheral locations are the St. Claude and Portage sandhills, over 120 km to the northwest.

-The Eastern Fox Squirrel (*Sciurus niger*) was first reported in Canada at the St. Claude Sandhills in 1972, and it spread rapidly up the Red River Valley and then throughout southern Manitoba and into adjacent Saskatchewan (Wrigley et al, 1973). Consultation with the Department of Agriculture revealed that corn became widely planted in the early 1970s, and this source of readily available food likely enabled the Eastern Fox Squirrel to survive the long winters north of its original range in Minnesota and North Dakota. I am not aware of any specimens taken or observed in the TGP Preserve, but it likely occurs here in riparian forest and Oak-Aspen Savanna.

-The Northern Grasshopper Mouse (*Onychomys leucogaster*) is rare and highly localized on sandy prairie in southwestern Manitoba, and was recorded many decades ago at Pembina, North Dakota and Karlstad, Minnesota -- both locations close to the TGP Preserve. It is therefore possible that it may now occur, or have occurred in the past, within the Preserve area, in xeric, sandy prairie sites.

4. A Checklist of the Mammals of the Tall-grass Prairie Preserve Area, Manitoba

Description:

The following checklist was prepared using a number of historical documents and extensive field studies (1970-1983) while Wrigley and his colleagues were employed by the Manitoba Museum of Man and Nature.

Results:

-61 species of mammals have inhabited the TGP Preserve area during historical times.

-6 additional species are potential (unlikely, but with nearby records) -- Prairie Shrew, White-footed Mouse, Southern Bog Lemming, Eastern Heather Vole, Woodland Jumping Mouse and Northern Grasshopper Mouse.

-4 extirpated species are Wolverine, Mule Deer, Caribou, and American Bison. Possibly the Grizzly as well, with former records at Red River Settlement (Winnipeg), North Dakota, and northern Minnesota.

-8 species are recent immigrants (arising from landscape alteration or release) -- Eastern Cottontail, White-tailed Jackrabbit, Eastern Gray Squirrel, Eastern Fox Squirrel, Brown Rat, House Mouse, White-tailed Deer and Gray Fox.

-At least 16 species are rare.

-Species may be classified as to their origin -- Grassland Biome, Boreal Coniferous Forest Biome, Eastern Deciduous Forest Biome, and Widespread.

CHECKLIST:

Cinereus (Masked) Shrew

Water Shrew

Arctic Shrew

Pygmy Shrew

Northern Short-tailed Shrew

Star-nosed Mole

Little Brown Bat

Northern Long-eared Myotis

Big Brown Bat

Silver-haired Bat

Red Bat

Hoary Bat

Snowshoe Hare

Eastern Cottontail

White-tailed Jackrabbit

Least Chipmunk

Eastern Chipmunk

Woodchuck

Richardson's Ground Squirrel

Franklin's Ground Squirrel

Thirteen-lined Ground Squirrel

Eastern Gray Squirrel

Eastern Fox Squirrel

Red Squirrel

Northern Flying Squirrel

Northern Pocket Gopher

Plains Pocket Gopher

American Beaver

Deer Mouse

Southern Red-backed Vole

Meadow Vole

Prairie Vole

Muskrat

Norway Rat
House Mouse
Meadow Jumping Mouse
North American Porcupine
Coyote
Gray Wolf
Red Fox
Common Gray Fox
Black Bear
Raccoon
American Marten
Fisher
Ermine
Least Weasel
Long-tailed Weasel
American Mink
American Badger
Striped Skunk
Wolverine
Northern River Otter
Bobcat
Canada Lynx
Cougar
American Elk
Mule Deer
White-tailed Deer
Moose
American Bison

5. Arthropod Studies at the Tall-grass Prairie Preserve

Description:

Wrigley has collected insects, spiders and ticks in and near the Preserve on four trips over the last six years, totaling about 200 specimens, which have been prepared, identified, and donated to the Wallis-Roughley Museum of Entomology at the University of Manitoba. He plans to conduct further studies, since this region of the province has received little attention. Certain taxa, such as beetles, dragonflies and damselflies, feature many species that barely enter the southeastern corner of the province, so there is the possibility of adding new species records for Manitoba. Many of these are likely to be rare and should be viewed for conservation status.

Publications and Reports:

Wrigley, R.E. 1970-1983. Field notebook on the mammals of Manitoba. Manitoba Museum.

Wrigley, R.E. 1971. Manitoba pocket gophers. *Zoolog* 12 (2):4-7.

Wrigley, R.E., and J.E. Dubois. 1973. Distribution of the pocket gophers *Geomys bursarius* and *Thomomys talpoides* in Manitoba. *The Canadian Field-Naturalist* 87(2): 167-169.

Wrigley, R.E., H.E. Drescher, and S. Drescher. 1973. First record of the Fox Squirrel in Canada. *Journal of Mammalogy* 54: 782-783.

Wrigley, R.E. 1979. History of the mammal fauna of southern Manitoba. *Manitoba Nature* 20 (1): 3-17.

Wrigley, R.E., J.E. Dubois and H.W.R. Copland. 1979. Habitat, abundance, and distribution of six species of shrews in Manitoba. *Journal of Mammalogy* 60 (3): 505-520.

Wrigley, R.E., J.E. Dubois and H.W.R. Copland. 1991. Distribution and ecology of six rare species of prairie rodents in Manitoba. *The Canadian Field-Naturalist* 105 (1): 1-12.

Wrigley, R.E. 2007. Zoological Editor and Author. *The encyclopedia of Manitoba*. Great Plains Publications. 814 pp.

Wrigley, R.E. 2013. A checklist of the mammals of the Tall-grass Prairie Preserve area, Manitoba.

Focus of Future Research:

While the mammalian fauna of this region of Manitoba is reasonably well known, the arthropod fauna has only recently attracted the attention of researchers, who have focussed attention mainly on skippers, moths, ground beetles, and leaf hoppers. There are likely over 10,000 species of insects, spiders, and other arthropods present in various habitats of the Tall-grass Prairie Preserve. They play major roles in the ecology of the area and therefore provide an unending source of research projects. This enormous diversity presents the challenge of how to manage the Preserve's ecosystems in as natural state as possible, without losing species, and in light of a warming climate.

Timothy Tear et al (2005) in a paper in *Bioscience* entitled, "Recurrent Problem of Setting Measurable Objectives in Conservation", stated that; "We need to identify crucial gaps in our science, including limited knowledge of species distributions and of large-scale, long-term ecosystem dynamics, that must be filled if we hope to do better than setting conservation objectives through intuition and best guesses." My studies on mammals and arthropods are hopefully a contribution to the exciting fields of ecology and wildlife conservation.

19. Robert E. Jones¹ and Christie Borkowsky²

Monitoring Avian Productivity and Survivorship (MAPS) at the Tall Grass Prairie Preserve

¹**Affiliation:** Retired –Wildlife Biologist and Critical Wildlife Habitat Program

Phone Number: 204-239-1803

E-mail Address: bjonesph@mymts.net

² **Phone Number:** 204-425-3229 (seasonal)

E-mail Address: tgpphq@mymts.net

Research Partners: Delta Marsh Bird Observatory and the Critical Wildlife Habitat Program.

Brief Description of Research Project:

The MAPS program was initiated by the Institute for Bird Populations (IBS) to secure critical population parameters on certain land bird species that were declining in North America. With over 1000 stations in North America from 1996 to date, the program monitors the demographic parameters of more than 100 birds species.

The Tall Grass Prairie Preserve study site is a 40 acre area with good vehicle access under most conditions and the time of selection was considered to be typical of the North Block of the Preserve.

At the time of initiation the habitat description suggested that 60% of the habitat was prairie grasses with a strong component of sedges, 25 % Oak Savannah and 15 % willow shrubland. Over the years of the study both the wet meadow plants and shrub component have increased. The area was burned in 1989 prior to its purchase by Manitoba Nature, burned again in 2002 as part of the management program and again in 2013 by a wild burn.

MAPS protocol is followed with 10 mist net capture location on the 40-acre site. The nets are operated 4 to 6 times during the nesting season for 6 hour periods between June 10 and Mid-August. Netted birds are transported to the banding site where they are identified, banded, sexed, aged and weighed before being released. Peter Pyles (1997) Identification Guide to North American Birds is followed to identify and classify birds to age and sex.

Results:

- Capture of over 1800 birds of 61 species over the fifteen years we have run this program.
- Over the years of the study the bird composition has gradually changed from prairie bird species to those of a shrubby marshland.
- The major species captured have been the Clay-colored Sparrow, Common Yellowthroat, Least and Trails flycatchers. All of these birds have provided indication of productivity on the site and with recaptures over the years we get an indication of the survivorship of the birds.
- Additional information on the relative abundance of birds has been obtained through a series of point counts that have been run regularly through the years and a breeding bird survey through the area.

Next Steps:

This project will continue through at least one more year and hopefully for years beyond that.

20. Ron Bazin

Least Bittern Surveys in Southern Manitoba in Support of Recovery Planning and Critical Habitat Identification

Affiliation: Canadian Wildlife Service

Phone Number: 204-984-0863

E-mail Address: ron.bazin@ec.gc.ca

Other Contact Information: 150 - 123 Main Street, Winnipeg, MB R3C 4W2

Brief Description of Research Project:

Least Bittern surveys were conducted throughout southern Manitoba by the Canadian Wildlife Service using a standardized survey protocol between 2004 and 2008. The primary objective of the study was to obtain additional information on Least Bittern occurrence in Manitoba to assist with species recovery planning and the identification of critical habitat across Canada. The survey protocol that was developed for this work follows closely the Standardized North American Marsh Bird Monitoring Protocols developed by the U.S. Geological Survey such that data collected using the Least Bittern protocol can be incorporated directly into any larger national or continental marsh bird database. Furthermore the methods used to identify critical habitat for this species require breeding evidence information utilized by breeding bird atlases, thereby allowing data from those initiatives to be used to support additional identification of critical habitat in Canada.

Major Results:

- Least Bittern occurrence was observed in a number of new locations in southern Manitoba, primarily in southeastern Manitoba and the northern Interlake.
- Survey data were used to identify 10 critical habitat sites in Manitoba (Brokenhead Swamp, Buffalo Lake, Fish Lake, Little Birch Lake West, Little Birch Lake East, Rat River Swamp West, Rat River Swamp Centre, Rat River Swamp East, Sleeve Lake and Unnamed Lake)(see Recovery Strategy for more details).
- The Rat River Swamp was identified as the key breeding location for Least Bitterns in Manitoba.

List of Relevant Research Papers/Reports/Theses/More Information:

- Recovery Strategy for the Least Bittern (*Ixobrychus exilis*) in Canada (http://www.sararegistry.gc.ca/virtual_sara/files/plans/rs_least_bittern_e.pdf)
- Jobin, J, R. Bazin, L. Maynard, A. McConnell and J. Stewart. 2011. Least Bittern (*Ixobrychus exilis*) survey protocol. Waterbirds 34(2): 225-233.

Next Steps / Upcoming Research:

Recovery implementation for Least Bitterns in Canada will commence shortly following the development of a National Least Bittern Action Plan.

What else do we need to know about your topic (what should future researchers focus on)?

- The national Least Bittern survey protocol is available for anyone who wishes to conduct surveys for this species in Canada. Use of the national standardized protocol will allow for the collection of data that can then be used directly to identify future areas of critical habitat and aid in other recovery implementation activities.
- Also see Recovery Strategy for list of research requirements for this species.

21. Stephen Gietz

GIS Datasets Available to Researchers

Affiliation: Nature Conservancy of Canada

Phone Number: 204-452-0051

E-mail Address: stephen.gietz@natureconservancy.ca

Brief Description of Research Project:

With GIS becoming more prevalent, NCC has accumulated a number of GIS datasets that may be of use to research initiatives. Some of the datasets include prior research sites, fire history, vegetation classifications, and management units. These datasets, among others are available with a datasharing agreement. Contact Stephen Gietz for more information as well as a complete list of available datasets.

Available GIS Datasets:

Tall Grass Prairie Research Database – a list of sites used for current/previous research.

- Author, Agency, Project Name, Research Type, Year

Fire History – a database of fires that have occurred on Preserve Properties.

- Burn Year, Burn Type, Agency, Comments, Area

Vegetation Communities (NCC Lands)

- Veg Community Name, Community Classification, Comments, Area, Surveyor, Survey Date, Classification System

Native Prairie Evaluation Sites & Grades

- Identifier, Coordinates, Direction, Location, Rank, Comments

NCC Boundaries

- Project Name/ID, Acquisition Year, RM, Area, Comments

Fire Effects – assessment of the impacts of fire

- See methods document

Grazing Assessments – assessment of the impacts of grazing

- See methods document

Management Units – areas where agricultural techniques are used for management.

- Grazing, Haying, Forage Harvest, Fire

Invasive Species – invasive plant locations

- Common Name, Scientific Name, Weed Classification, Surveyor, Survey Date, Management, Land Use, Area, Distribution, Canopy Cover, Growth Stage, Comments, Coordinates

This is not a comprehensive list of GIS datasets available. Contact Stephen Gietz at NCC for other data sets that are available. Data sets are available with a signed Data Sharing Agreement in place.

22. Chris Friesen and Colin Murray

The Conservation Data Centre's Work Flow: Species-at-Risk Surveys to Developing Conservation Oriented Information Products

Affiliation: Manitoba Conservation Data Centre, Wildlife Branch, Manitoba Conservation

Phone Number: 204-945-7747

E-mail Address: chris.friesen@gov.mb.ca

Other Contact Information: <http://www.gov.mb.ca/conservation/cdc/index.html>

Research Partners: Habitat Stewardship Program-Canadian Wildlife Service, Canadian Wildlife Service, Parks Canada, Nature Conservancy Canada-Manitoba, Manitoba Habitat Heritage Corporation, Manitoba Conservation.

Brief Description of Research Project:

In Manitoba, species-at-risk (SAR) surveys have been conducted by Conservation Data Centre (CDC) staff annually since 2001. Surveys have included terrestrial plants, Lepidoptera, and reptiles. Multi-year and multi-SAR survey data, obtained from CDC surveys and numerous other agencies and research projects, is added to the Conservation Data Centre's Biodiversity Geospatial Database using a rigorous and standardised data input methodology. SAR occurrence data is then extracted to produce conservation oriented information products.

An example is the production of SAR right-of-way maps by rural municipality. Rural road right-of-ways are a major refuge for species-at-risk (SAR) occurrences and therefore require our protection and monitoring. These maps show the general locations of SAR occurrences along road right-of-ways by mile road segment and by species. The maps also contain management guidelines detailing, among other practices, appropriate mowing, and herbicide application dates with the goal of preserving SAR occurrences along these right-of-ways. End consumers of these maps are the managers and work crews tasked to maintain the right-of-ways and Natural Resource Officers who enforce the Species-at-Risk Act.

Major Results:

- Authoritative, single desk access, of SAR data in Manitoba.
- Leveraged to create value added conservation oriented information products to guide development and conservation efforts.
- Assess conservation status of species and SAR trends.

List of Relevant Research Papers/Reports/Theses/More Information:

Publications by the Conservation Data Centre can be accessed here: <http://www.gov.mb.ca/conservation/cdc/pubs.html>

Next Steps / Upcoming Research:

- Devote more time to research more specific questions of a species at risk.
- Perform more rigorous monitoring programs.



RESOURCES

The following materials were made available to participants at the symposium. They have been included in these proceedings as a resource for future Manitoba Tall Grass Prairie Preserve researchers.

Local Amenities

Neighboring Communities: Vita: 15 minutes east
Tolstoi: 10 minutes southwest
Roseau River: 10 minutes northwest
St. Malo: 25 minutes northwest
Grunthal: 30 minutes north
Sarto: 35 minutes north

Accommodations:

Vita Hotel – Vita (204-425-3405)
Country Relax'n Bed and Breakfast – Roseau River (204-427-2296)
Auberge St. Malo Hotel – St. Malo (204-347-5105)
Rainbow Ridge Ranch Bed and Breakfast – Grunthal (204-434-6177)
Thistle Lane Guesthouse Bed and Breakfast – Grunthal (204-424-6192)

Banking Institutions:

Access Credit Union - Vita (204-425-3351) Mon-Thurs 9:30am-12:30pm/1:30pm-4:30pm, Fri 9:30am-12:30pm/1:30pm-5:00pm
Caisse Poulair Groupe Fanancier LTEE – St. Malo (204-347-5533) Mon-Thurs 9:00am-4:00pm, Fri 10:00am-6:00pm
Access Credit Union – Grunthal (204-434-6338) Mon-Thurs 9:30am-4:30pm, Fri 9:30am-5:00pm, Sat 9:30am-3:00pm

Bakeries:

Grunthal Bakery – Grunthal (204-434-6969) Mon-Wed 8:30am-5:00pm, Thurs-Fri 8:30am-6:00pm, Sat 8:30am-4:00pm

Gas Stations:

Can Am Country Corner – Stuartburn (Corner of Hwy 201 and 59) (204-427-2002) Mon-Fri 6:00am-8:00pm, Sat 7:00am-8:00pm, Sun 8:00am-8:00pm

Smook Co-op Gas Bar – Vita (204-425-3997) Mon-Fri 6:45am-9:00pm, Sat 7:00am-8:00pm, Sun 8:00am-8:00pm

Grunthal Co-op Gas Bar – Grunthal (204-434-6900) Mon-Fri 6:00am-9:00pm, Sat 7:00am-8:00pm, Sun 12:00pm-8:00pm

Petro Canada and Oaklane Grocery – Grunthal (204-434-6788) Mon-Fri 6:00am-10:00pm, Sat 6:30am-10:30pm, Sun 8:00am-10:30pm

Groceries:

Derewianchuk and Sons Superette – Vita (204-425-7761) Mon-Sat 7:30am-6:00pm

Tolstoi Supermarket – Tolstoi (204-427-2155) Tues-Sat 12:00pm-7:00pm, Sun 12:00pm-6:00pm

Co-op Industrielle De St. Malo – St. Malo (204-347-5472) Mon-Sat 8:00am-9:00pm, Sun 9:30am-6:00pm

Grunthal Grocery – Grunthal (204-434-6017) Mon-Sat 8:00am-8:00pm, Sun 8:00am-6:00pm

Sarto General Store – Sarto (204-434-6962) Mon-Sat 8:00am-9:00pm, Sun 12:00pm-6:00pm

Hardware Stores:

Reimer Lumber and True Value – Roseau River (204-427-2434) Mon-Fri 8:00am-5:00pm, Sat 8:00am-2:00pm

Co-op Industrielle De St. Malo – St. Malo (204-347-5472) Mon-Sat 8:00am-9:00pm, Sun 9:30am-6:00pm

Grunthal Lumber – Grunthal (204-434-6340) Mon-Fri 7:00am-6:00pm, Sat 8:00am-1:00pm

Pharmacy/Drug Store:

Dueck Drug Store – Vita (204-425-3473) Mon-Sat 9:00am-5:00pm

Grunthal Pharmacy – Grunthal (204-434-6923) Mon-Fri 9:00am-5:00pm

Restaurants:

Can Am Country Corner – Stuartburn (Corner of Hwy 201 and 59) (204-427-2002) Mon-Fri 7:00am-8:00pm, Sat 7:00am-8:00pm, Sun 8:00am-8:00pm

Bente's Restaurant – Vita (204-425-7997) Wed-Sun 11:00am-6:00pm

Vita Hotel – Vita (204-425-3405) Mon-Fri 8:30am-7:00pm, Sat 9:30am-7:00pm

Auberge St. Malo Hotel – St. Malo (204-347-5105) Mon-Thurs 8:00am-8:00pm, Fri-Sat 8:00am-9:00pm, Sun 12:00pm-6:00pm

Chicken Chef – St. Malo (204-347-5885) Mon-Sun 12:00pm-3:00pm, 6:00pm-11:00pm

Bistro 146 – Grunthal (204-434-6782) Mon-Tues 8:00am-5:00pm, Wed-Fri 8:00am-10:00pm, Fri-Sat 8:00am-2:00am

Patio Grill – Grunthal (204-434-6058) Mon-Thurs 6:00am-9:00pm, Fri-Sat 6:00am-11:00pm, Sun 11:00am-11:00pm

Peppie's Pizza – Grunthal (204-434-9996) Mon-Sun 11:00am-10:00pm

Red Wing Diner – Grunthal (204-434-9989) Mon-Sun 6:00am-8:00pm

Key Manitoba Research Questions

Informed and defensible land-use and biodiversity conservation management decisions depend on the incorporation of the best available science, expert opinion and community values. NCC conducts multi-scale planning designed to conserve the most important and viable natural areas while still respecting local and provincial economies and local communities. One of the outcomes of this planning process is the identification of key knowledge gaps.



NCC Manitoba is interested in participating in research partnerships designed to address these knowledge gaps. NCC is interested in forging/strengthening research projects in its priority natural areas and on its properties, and where projects align with NCC's conservation goals, NCC will consider supporting researchers through in-kind data, expertise, lodging, access to lands, and if congruencies are high and resources allow, funds. Researchers interested in partnering with NCC on projects listed below should contact the Manitoba Region's Conservation Science Manager to discuss their proposed project.

Note that this list is valid as of June 2014, and will change as knowledge gaps are addressed and new information gaps arise. The most up-to-date list as well as contact information is here: <http://www.natureconservancy.ca/en/where-we-work/manitoba/our-work/key-ncc-manitoba-research.html>

- Association between grazing and vascular plant biodiversity in the sandhills of extreme southwestern Manitoba
- Biodiversity of non-active gravel extraction sites and trails, and implications for conservation land management
- Classification and management of alvar communities in the Interlake region
- Climate change adaptation of strategic biodiversity conservation actions
- Comparison of biodiversity benefits or establishing various perennial grassland types (tame, locally-sourced seed, non-locally sourced seed)
- Condition of lotic aquatic systems in the Whitemouth River Watershed
- Condition of permanent and semi-permanent wetlands in extreme southwestern Manitoba
- Examination of factors influencing long-term economic sustainability of local plant community restoration industry
- Extent and condition of fescue prairie and mixed-grass prairie in the Riding Mountain Aspen Parkland
- Extent and condition of tall grass prairie and other native grasslands in the south Interlake
- Extent, landscape patterns and condition of ephemeral and temporary wetlands in extreme southwestern Manitoba
- Fire ecology of native mixed-grass prairie in extreme southwestern Manitoba
- Hydrology of extensive wetland complexes in the Tall Grass Prairie ecoregion
- Integrating socio-economic-environmental knowledge in the Tall Grass Prairie
- Large mammal ecology in the Tall Grass Prairie
- Life history of Poweshiek skipperling
- Mapping remnant mixed-grass prairie in extreme southwest Manitoba
- Peatland community restoration techniques in the Whitemouth River Watershed
- Relationship between land use matrix, land management and pollinator diversity abundance
- Relationship between leafy spurge, species at risk distribution and abundance and control techniques
- Status of sandhill prairie and sand blowouts in extreme southwestern Manitoba
- Status of species at risk in key NCC work areas