# Breeding habitat and vocal behavior of Rusty Blackbirds in Nova Scotia


Cindy Staicer, Alana Westwood,
and Brody Crosby

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Rusty Blackbird Workshop

Smithsonian Migratory Bird Center, Washington D.C.

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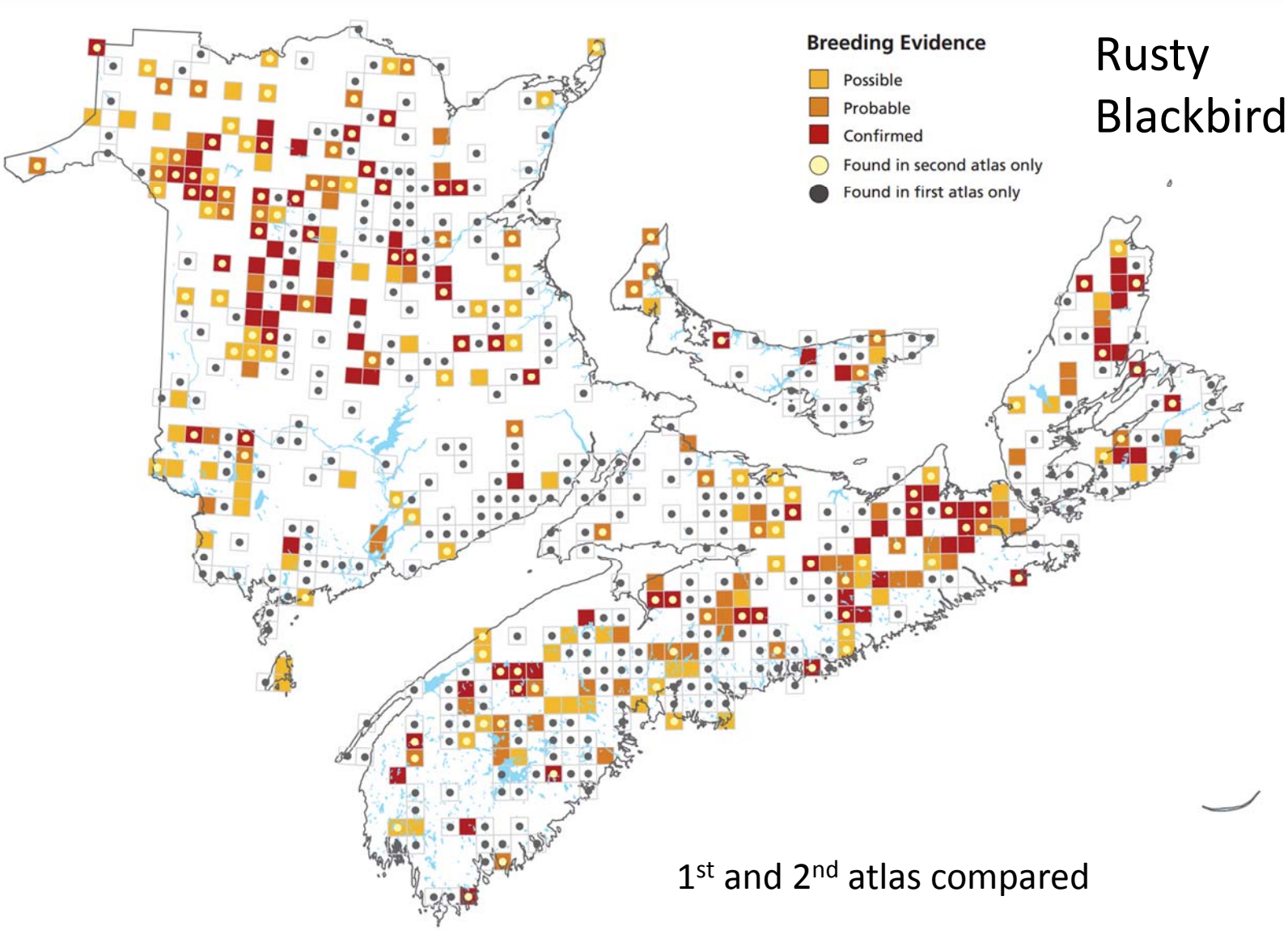
# Maritime Breeding Bird Atlas

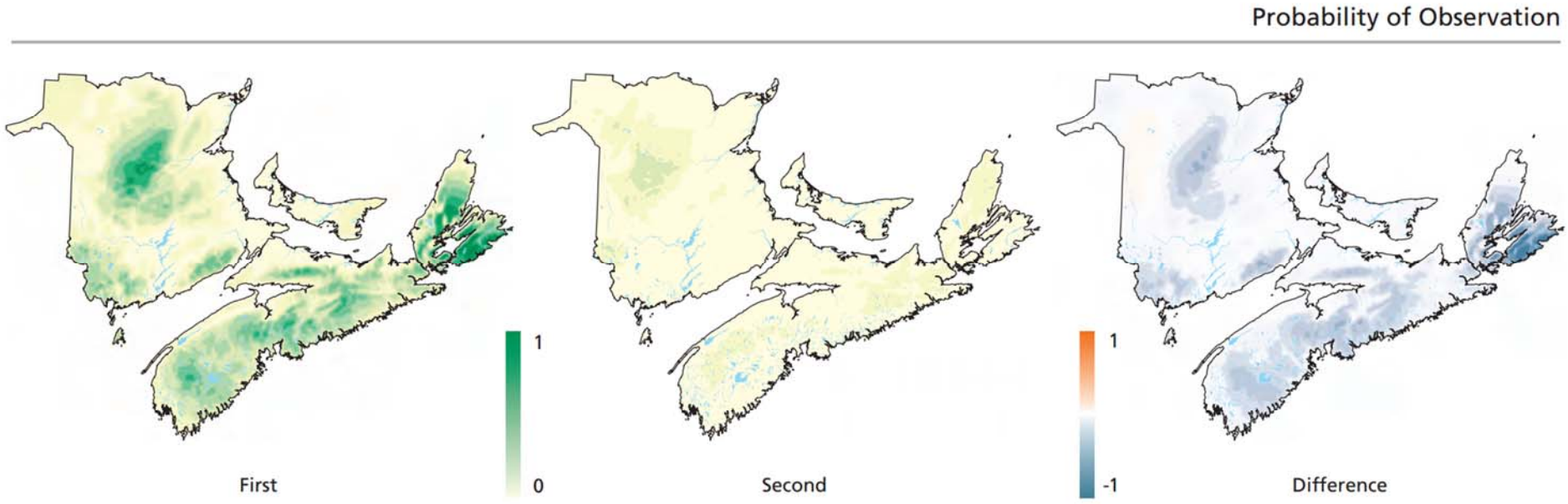



Rusty Blackbird

1st and 2nd atlas compared

http://www.mba-aom.ca/jsp/samples/RUBL_EN.pdf

# Regional declines as estimated from Maritime Breeding Bird Atlas data




1986-1990

2006-2010

http://www.mba-aom.ca/jsp/samples/RUBL_EN.pdf

# Rusty Research Projects

*Staicer, Harper (Honours 2010)*

- Surveys in Keji Park and nearby forestry lands (2010)

*Westwood (PhD 2016)*

- Habitats used in Nova Scotia, and how characterized from a forestry perspective
- Modeling population density

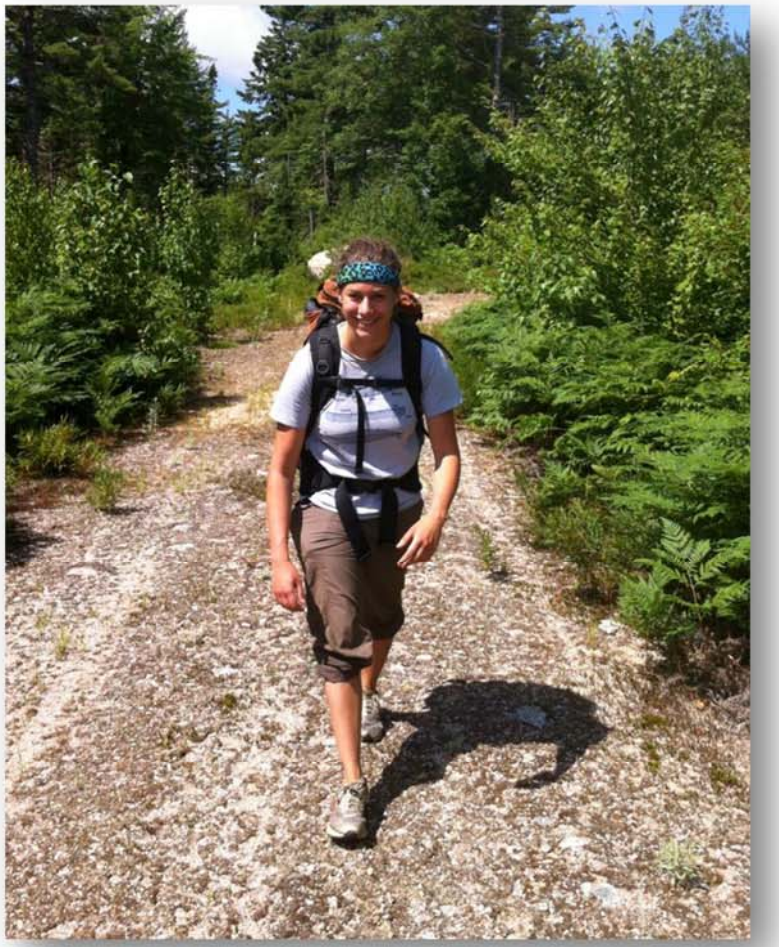
*Ferrari (MEng 2014), Bale (MES 2016)*

- Modeling habitat or probability of occurrence using MaxEnt

*Crosby (Honours 2015), Makrides (Project 2015)*

- Vocal behaviour

# Alana Westwood: PhD project



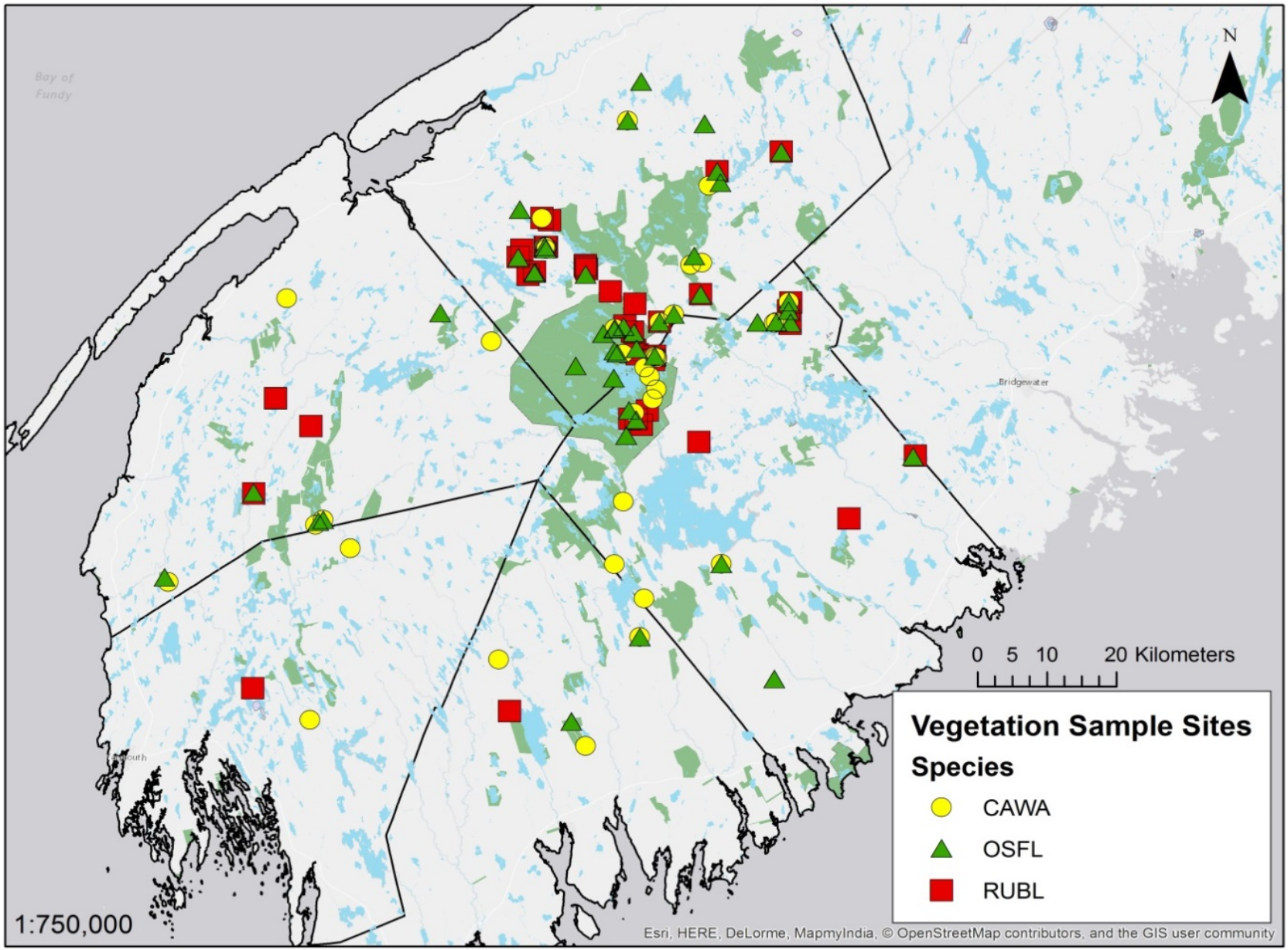



Field surveys in 2012 -2013

# Locating Birds

- Model-based site selection (HSI combined for 3 species)
- Field surveys: Point counts (5 min), followed by playback (30 s) for each species in sequence
- Volunteer data (MBBA, etc.)

# Habitat sample locations

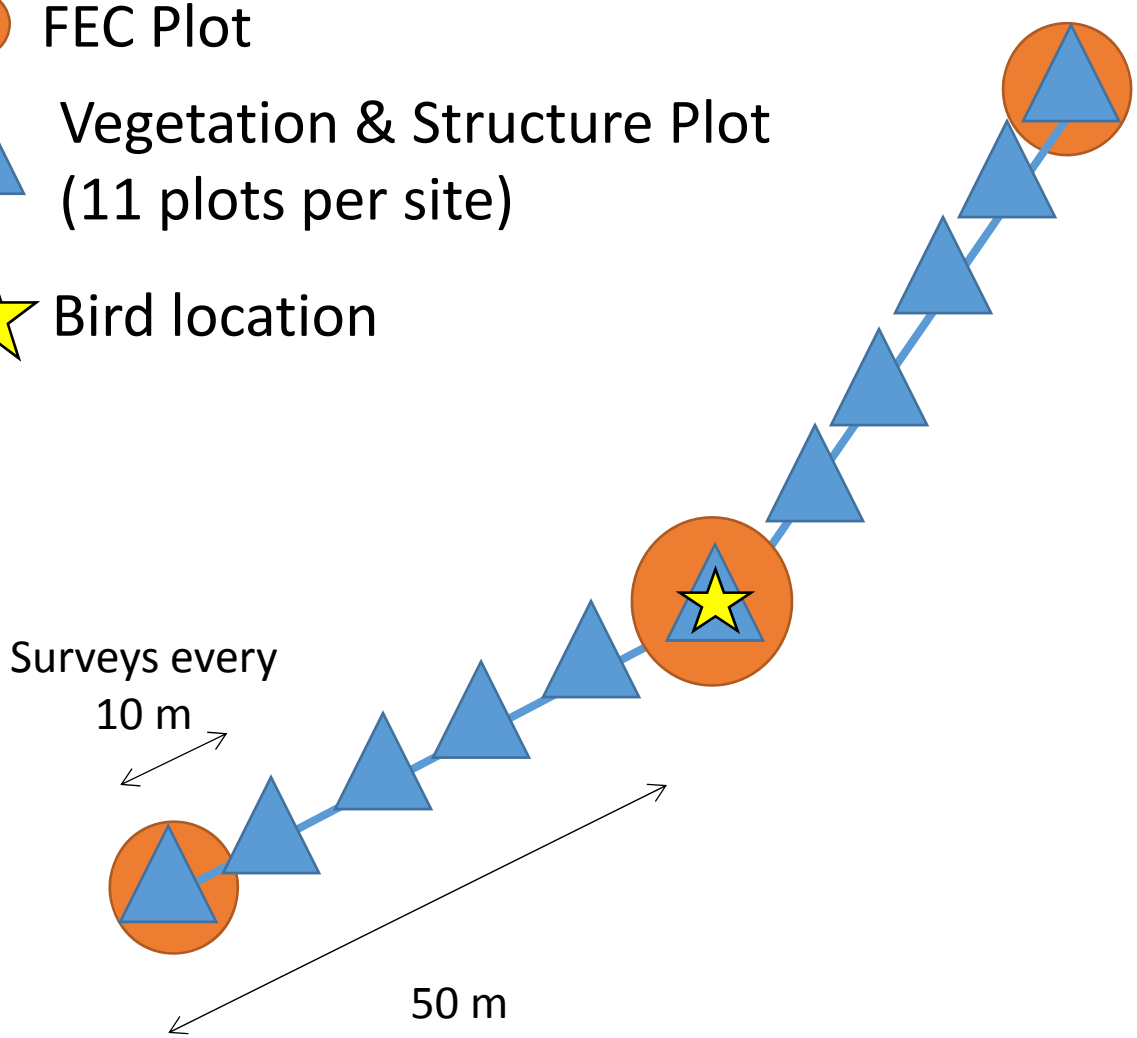


# Vegetation and Forest Ecosystem Surveys

FEC Plot

Vegetation & Structure Plot
(11 plots per site)

Bird location




# Habitat associations

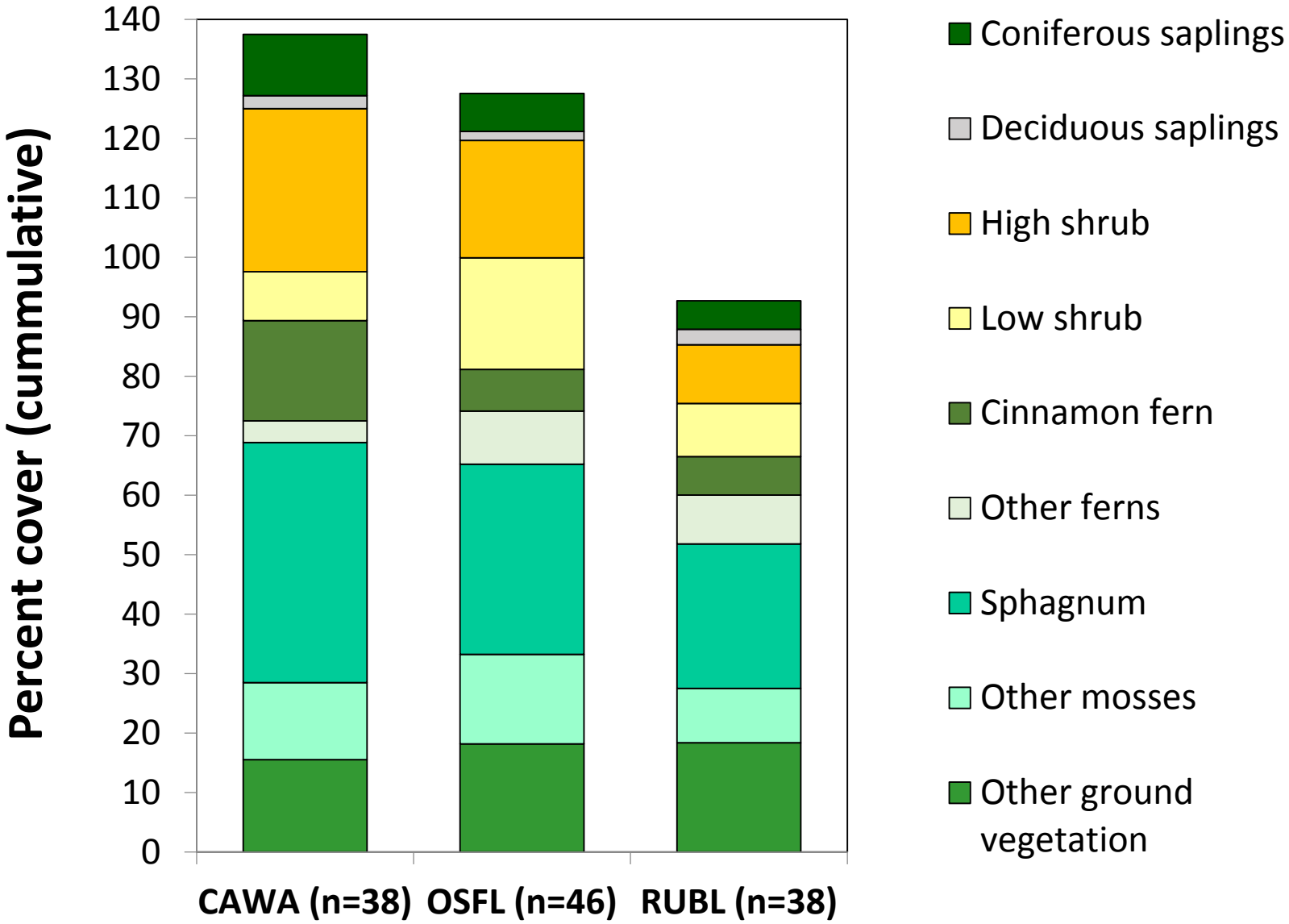
## Questions:

- What are the habitat features of sites these species occupy?
- For each species, how do:
  - Occupied and unoccupied sites differ?
  - Sites in harvested and non-harvested landscapes differ?
- How do the species differ in habitat associations?

## Overall conclusions

- Habitat of the 3 species overlaps, mostly similar between harvested and harvested landscapes, concentrated into a few wet forests types, identifiable by forestry ground surveys
- Suggest they could be managed as a suite

# Vegetation cover

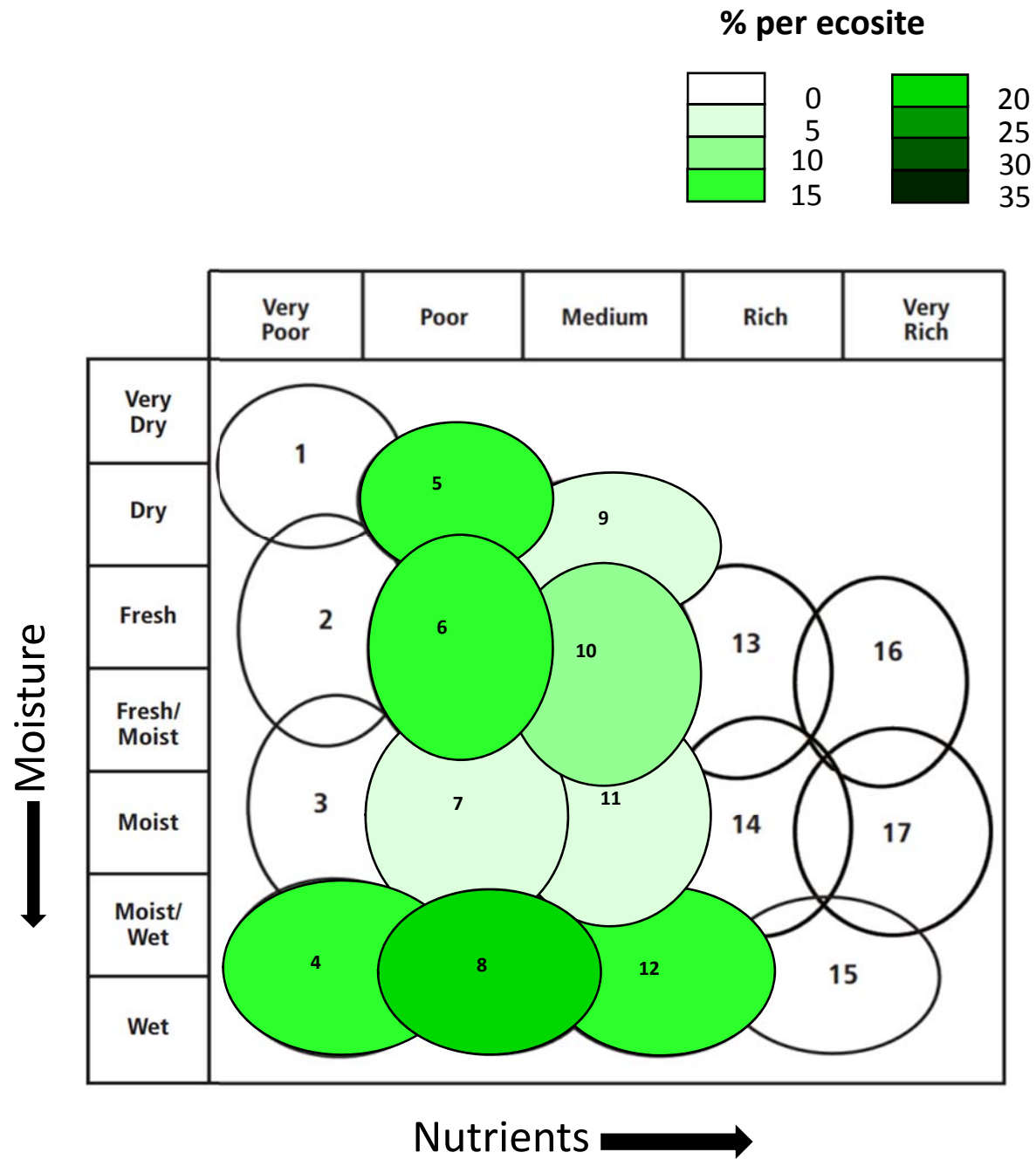


# Site Conditions

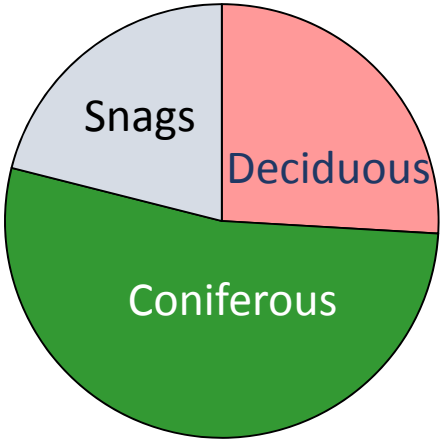
**Ecosites:**

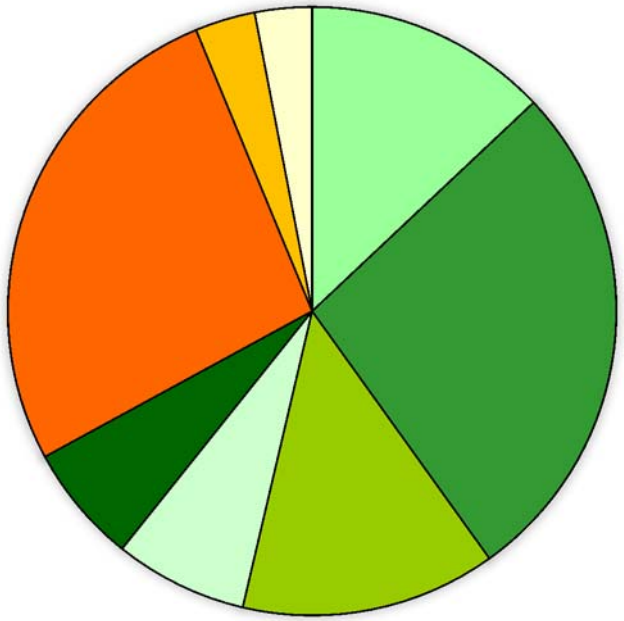
- Soil moisture and nutrient regimes
- 17 types in NS
- RUBL sites were mostly on wet and/or poor soils
- Six ecosites (AC4, AC5, AC6, AC8, AC10, and AC12) accounted for 87% of RUBL sites.

**Soil type:** 50% of sites on Organic

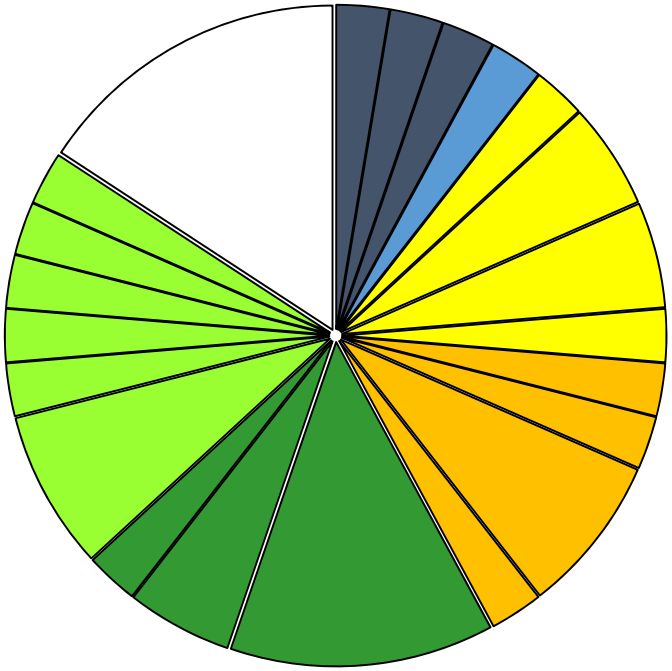


# Trees in the FEC centre plot



# Vegetation types according to FEC plots



IH1 IH2 IH7 MW2

SH1 SH4a SH5 SH6

SP4 SP4a SP5 SP9

WC1 WC7 WC7A WD2

WD3 WD4 WD4A WD6

WD8 NONE ← too open (too few trees to establish FEC plot)

**Main vegetation groups:**

| | |
|---|---|
| Wet deciduous | 28% |
| Wet coniferous | 21% |
| Spruce-Pine | 25% |

# Multivariate analyses of vegetation data

**Indicator species analysis**

- *Presence* of Rusties: larger and more variable amounts of open water and mud.
- *Absence*: higher shrub cover, more deciduous shrub cover.
- In *harvested* landscapes, RUBL sites were indicated by more lambkill than were sites in *unharvested* landscapes.

**Classification Regression Trees**

- Occupied sites 95% correct, unoccupied sites 41% correct
- All with open water > 11% were occupied
- 40% of sites with <5.5% spruce cover were occupied, as compared to only 6% with >5.5% spruce cover

# Species distribution model (MaxEnt) for Southwest NS

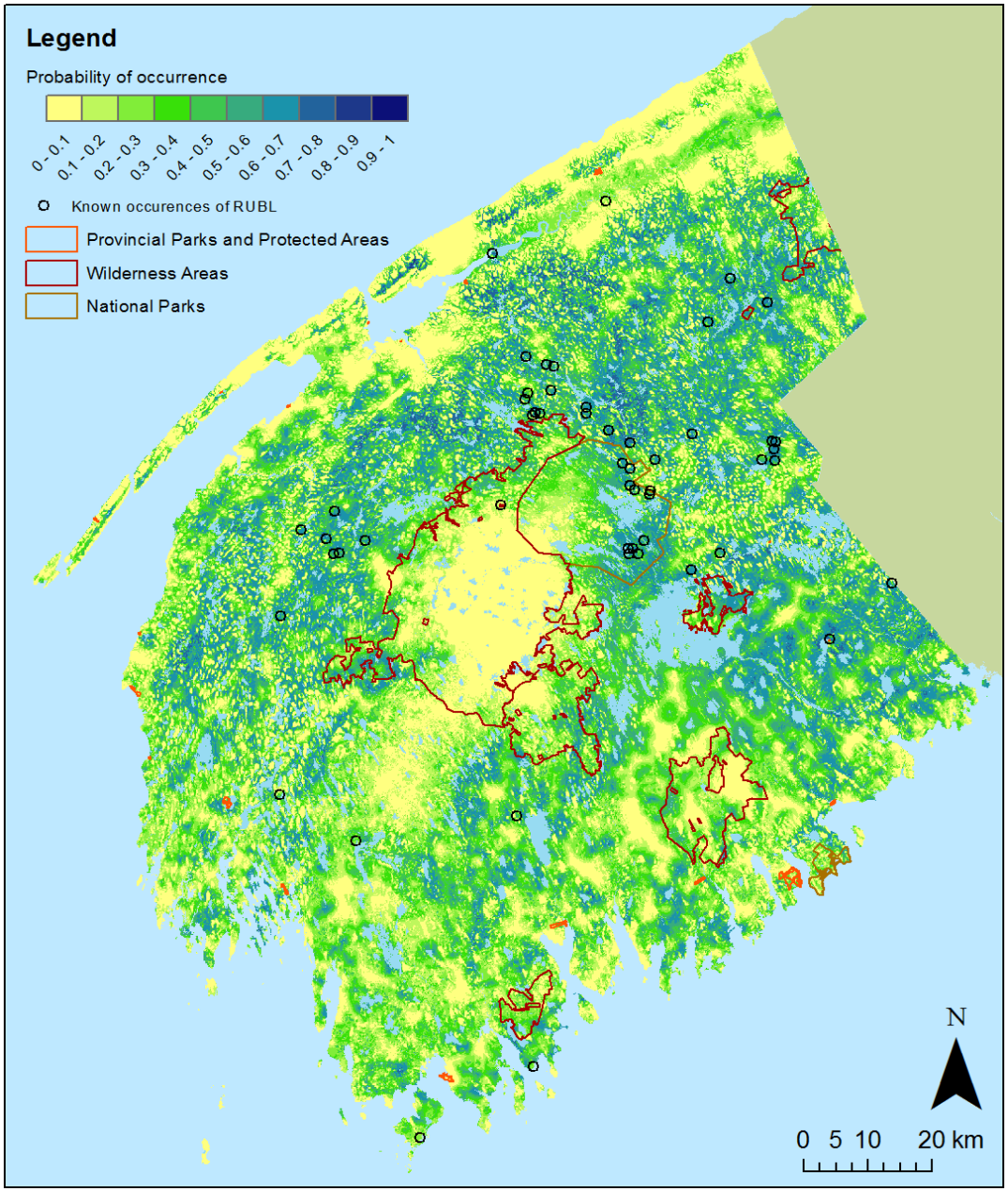
*Clara Ferrari, AgroParisTech*
*and Dalhousie University 2014*

based on 51 occurrences
from 2006-2014, ≥ 500 m apart

**AUC:** 0.82
**COR:** 0.084

**Most important explanatory variables**

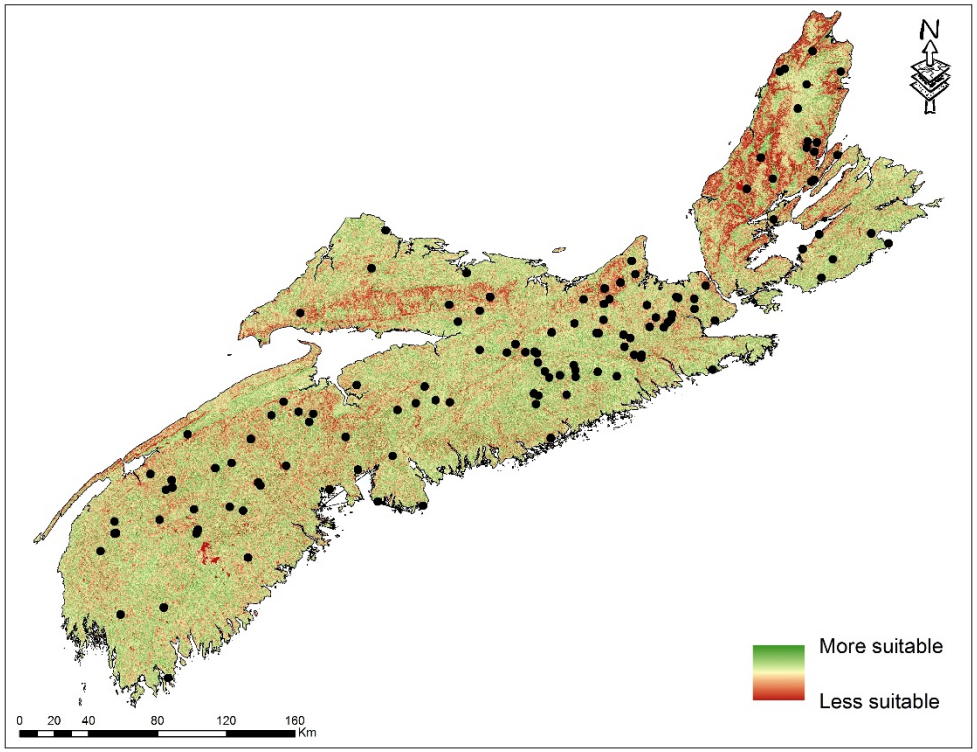
1. Depth to water table (43%)
2. Distance from (>1 km) low shrubs (blueberry; 23%)
3. Distance from agricultural areas (19%)
4. Proximity to waterways (9%)
5. Proximity to clearcuts (6%)

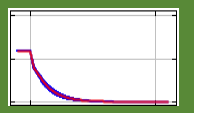
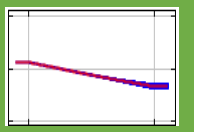
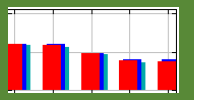
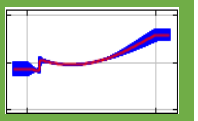
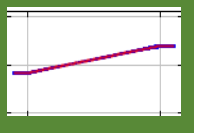


# Rusty Blackbird Gen 3 Model

*Shannon Bale, School for Resource & Environmental Studies, Dalhousie, 2016*

- based on 131 detections, ≥ 500 m apart




| Variable | % Contri-bution | Permutation Importance | Response Curve |
|---|---|---|---|
| Depth to watertable | 49.6% | 32.9% |  |
| 1st story height (Mean) | 15% | 16.9% |  |
| TPI | 14.1% | 18% |  |
| Landscape complexity | 10.8% | 17.4% |  |
| 1st story height (STDev) | 10.5% | 14.8% |  |

Train Gain: 0.2428 +/- 0.008
$AUC_{train}$: 0.7226 +/- 0.004
$AUC_{test}$: 0.6715 +/- 0.034
$AUC_{diff}$: 0.0511

LPT Omission: 0%
10PT Omission: 10.4%

# Typical natural habitats in southwestern NS


**Rusty Blackbird**
*(Euphagus carolinus)*

# Alana Westwood's models

- Poisson log-linear models using a branching hierarchy model-building process; data from BAM point count database
- 8 stages: wetness; forest cover; forest structure; landscape complexity, anthropogenic disturbance; distance from roads; landscape connectivity; protection status.
- 3 subsets: WETNESS; WETLANDS; WETNESS x Forest
- Best for RUBL: WETNESS, SD of Depth to Water Table, and CASFRI cover types & proportions, both at the 250-m scale
- However, predicted densities deemed unreliable for RUBL (few training data, 77 sites)

# Vocal behaviour pilot study


Features relevant to species at risk conservation include diurnal and seasonal variation in vocal activity and individual specific vocalizations.



- If rates of vocalizing change through the day or season, then certain times will be better for detecting and monitoring the species, also may indicate breeding status.
- If songs serve as an individual signature, it may be possible to monitor the presence of individuals by recording their songs and comparing to catalogues of known males.

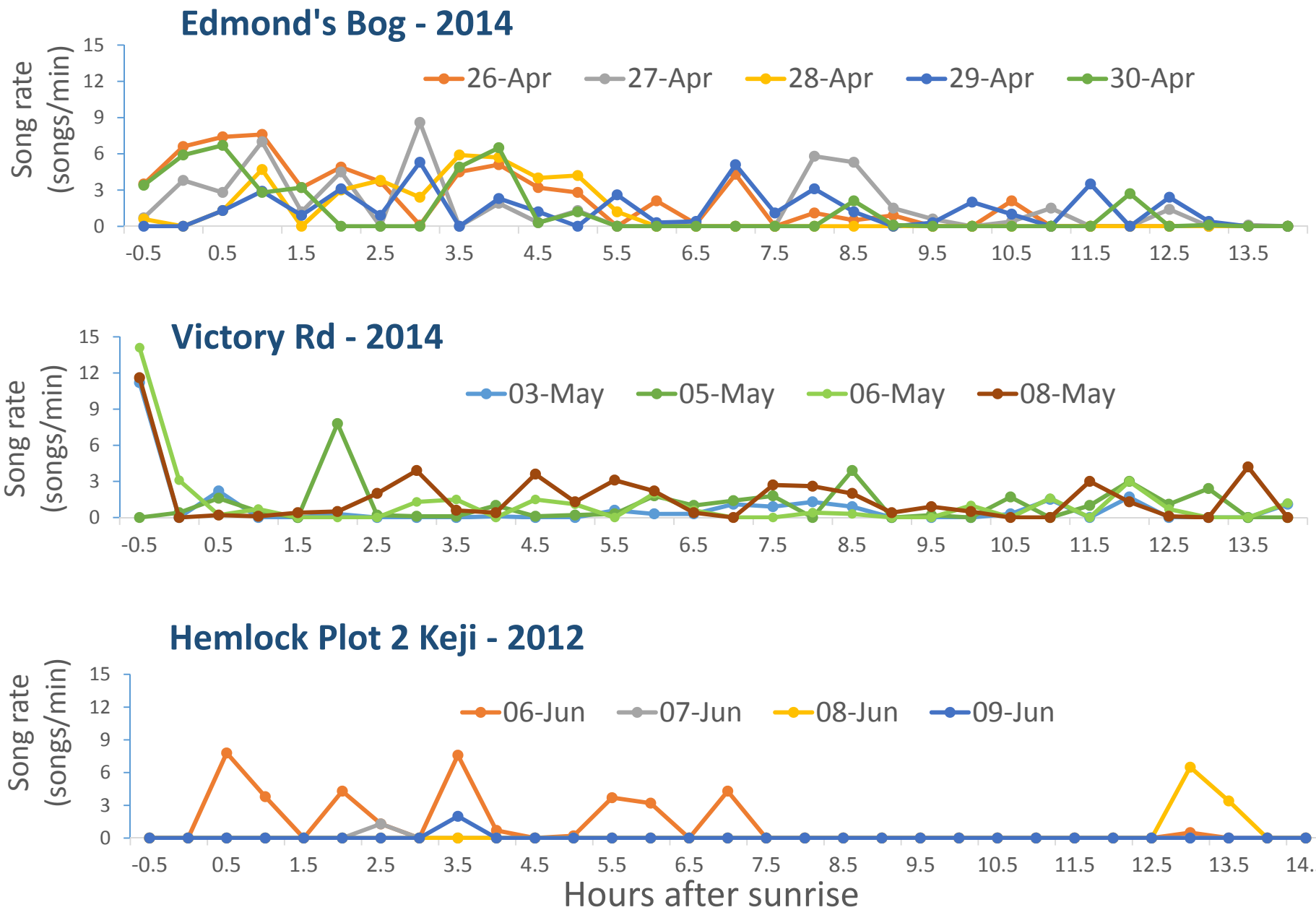
# Recording methods

## Vocal activity

In 2012-2014, used a Song Meter 2 (SM2, Wildlife Acoustics), programmed to record the first 10 min every half hour from sunrise - 30 min to sunset + 30 min.

## Song structure

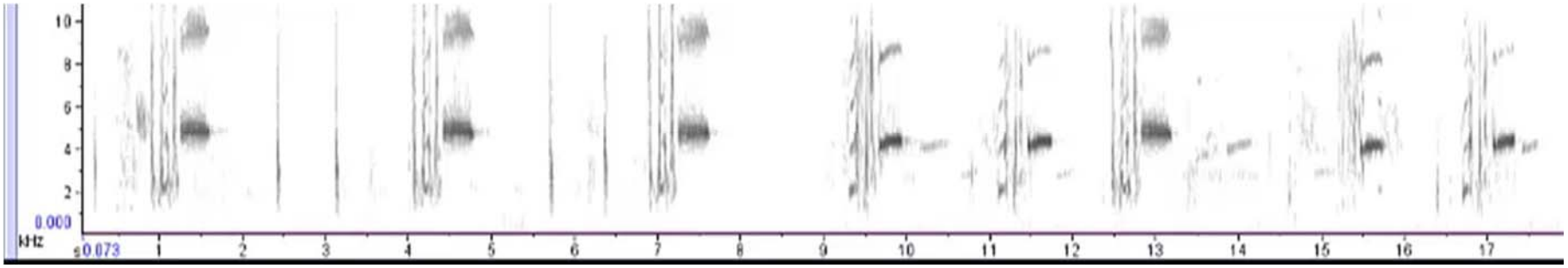
From 24 April-14 May 2014, Brody Crosby and Clara Ferrari observed two pairs to get higher quality recordings using a parabolic microphone.


Edmond's Bog - 2014
Song rate (songs/min)
26-Apr
27-Apr
28-Apr
29-Apr
30-Apr
Victory Rd - 2014
03-May
05-May
06-May
08-May
Hemlock Plot 2 Keji - 2012
06-Jun
07-Jun
08-Jun
09-Jun
Hours after sunrise

# Rusty Blackbird Songs and Calls

**Source: Stokes CD (same used for playback)**

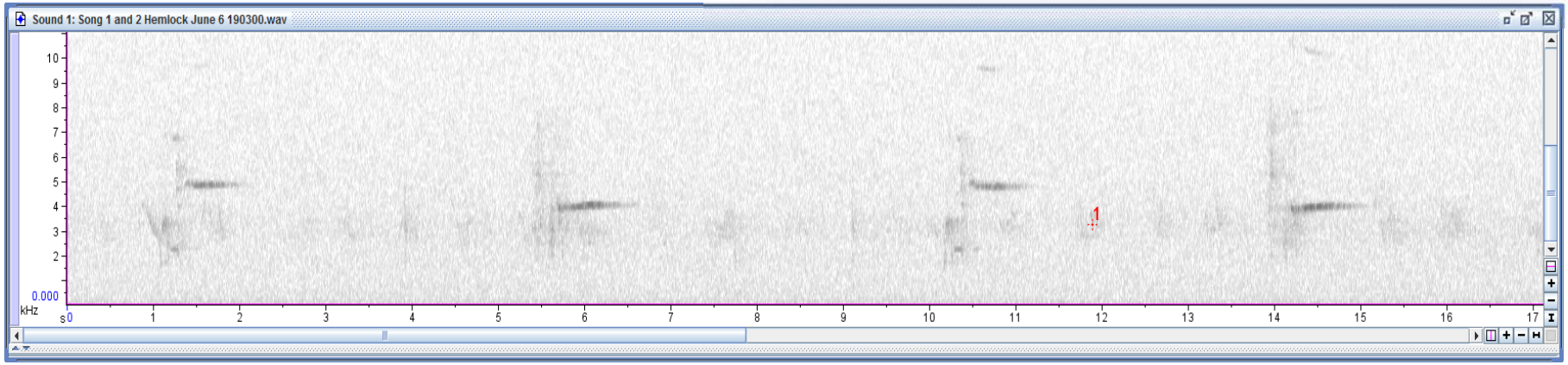
Song Calls Song Calls Song




Song: Noisy, complex introductory notes finishing with a loud, carrying whistle (5 kHz)

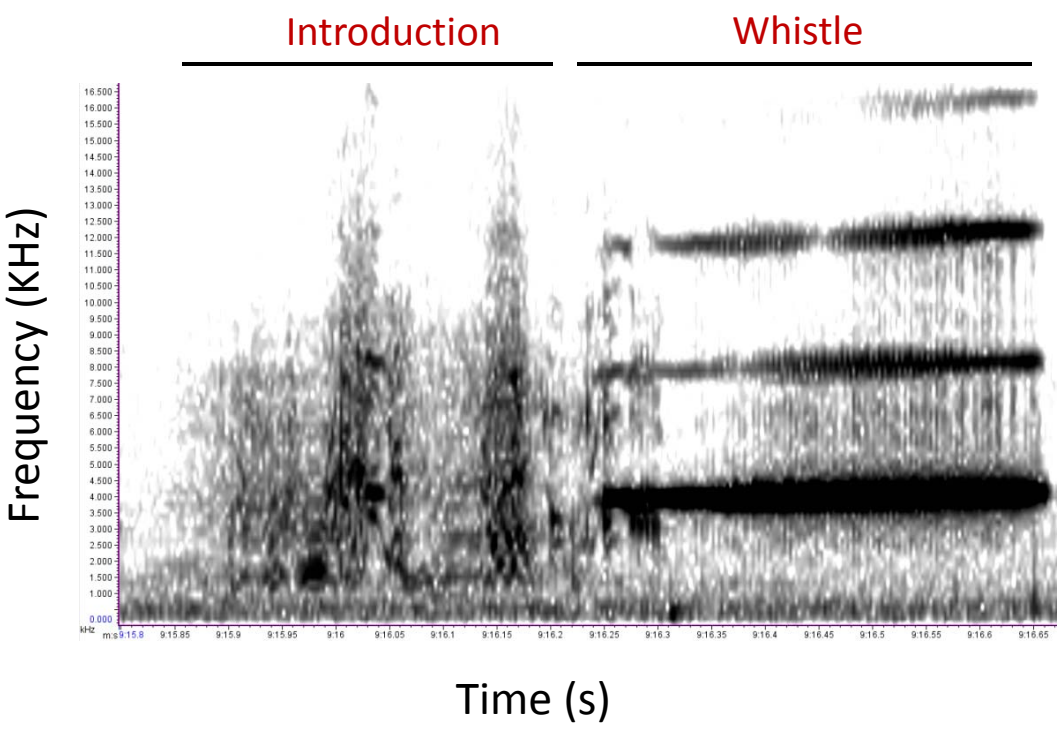
Note two song types

Rusty Blackbird at swamp in Hemlock Forest, Kejimkujik National Park – songs captured by remote recorder




Again, note two song types

# Rusty Blackbird song




**Measurements**

Duration of
- whole song
- whistle

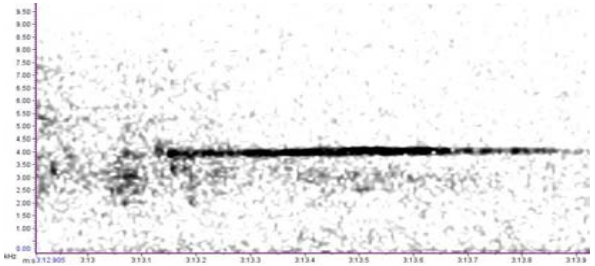
Frequency of whistle
- start
- end

Frequency of peak energy (from power spectrum)

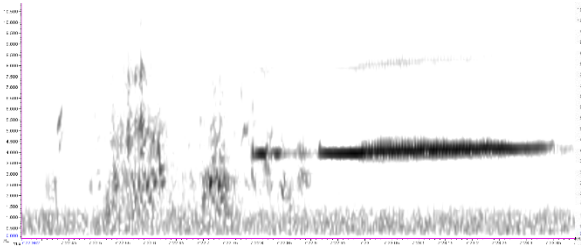
# Song structure

- All three males sang two song types

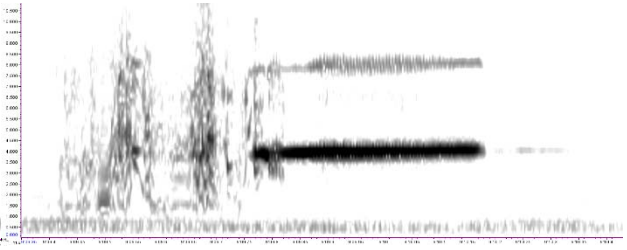
**Song type 1, Hemlock Plot**



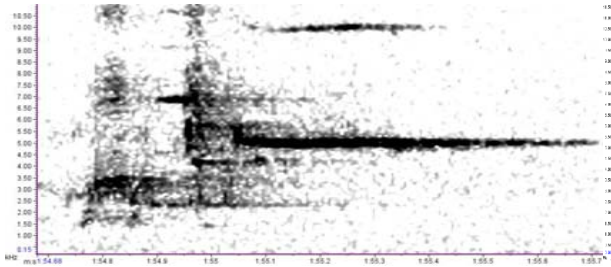
**Song type 1, Edmonds Bog**



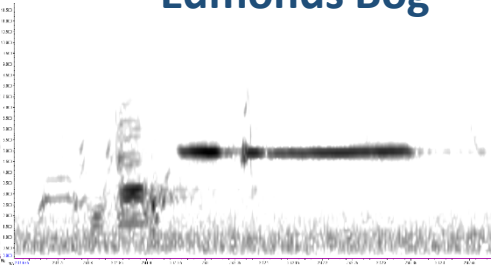
**Song type 1, Victory Rd**



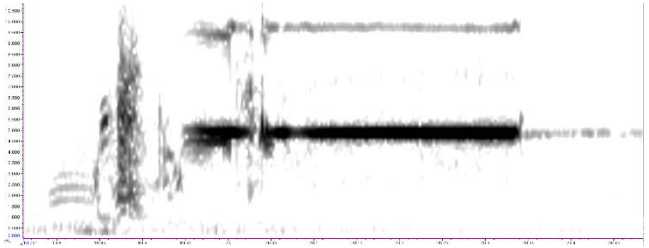
**Song type 2, Hemlock Plot**



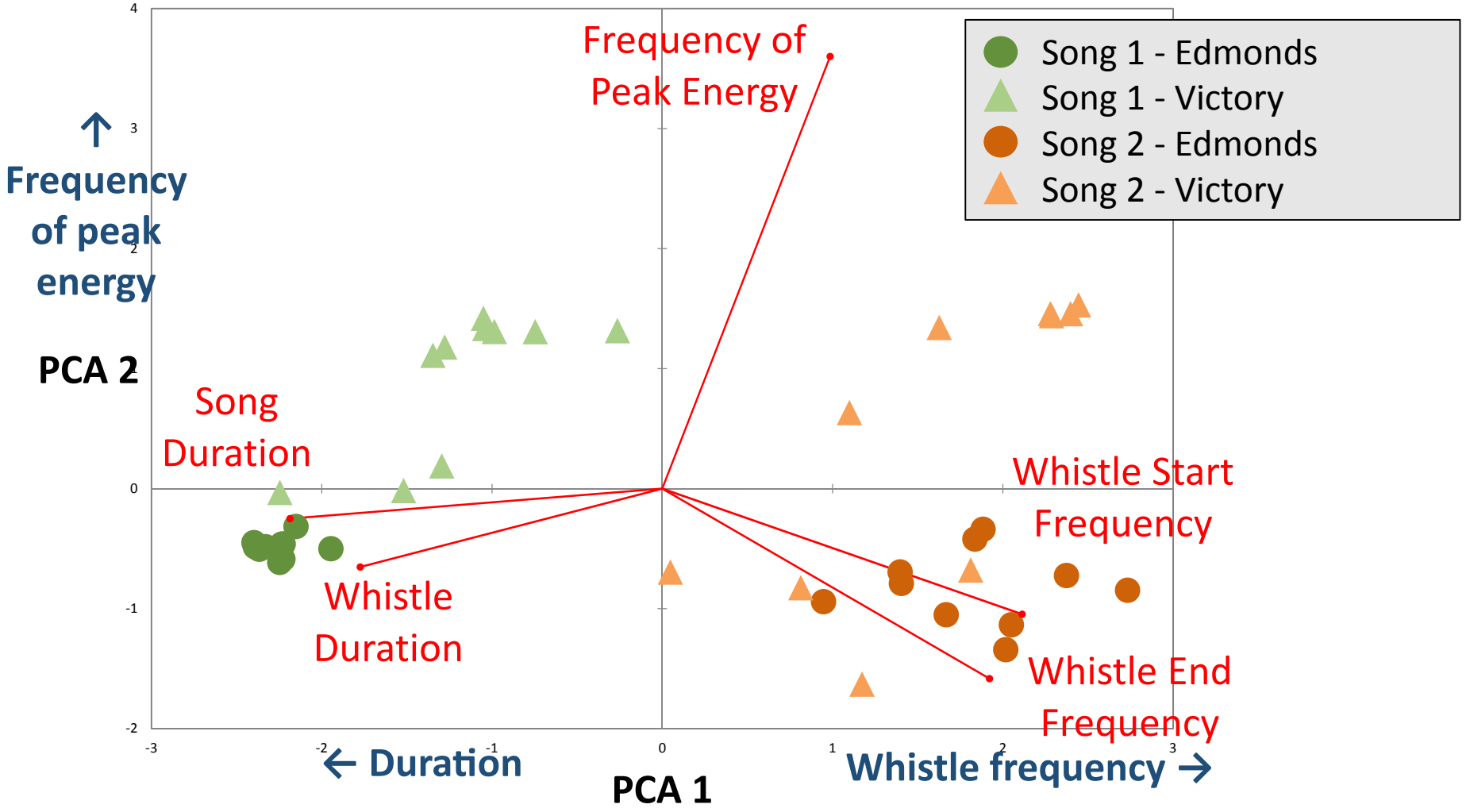
**Song type 2, Edmonds Bog**



**Song type 2, Victory Rd**



# Individual signatures?



# Future field plans

- Forested Wetlands in NS, NB, PEI, NF (2017-2018)
  - Characterize the fine-scale and landscape configuration of wetland habitats used by RUBL
- Surveys for RUBL and other SAR in 2017
  - Re-survey sites where birds were found across NS in the MBBA (2006-2010) and more recently to determine which sites still have birds
  - Survey sites of predicted occurrence in MaxEnt models
- Vocal behaviour
  - Individual identification by songs
  - Male vs. female song

# Acknowledgements



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Mersey Tobeatic Research Institute

Parks Canada Parcs Canada


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