Habitat Occupancy and Detectability of Rusty Blackbirds in Northern New England – The First Look

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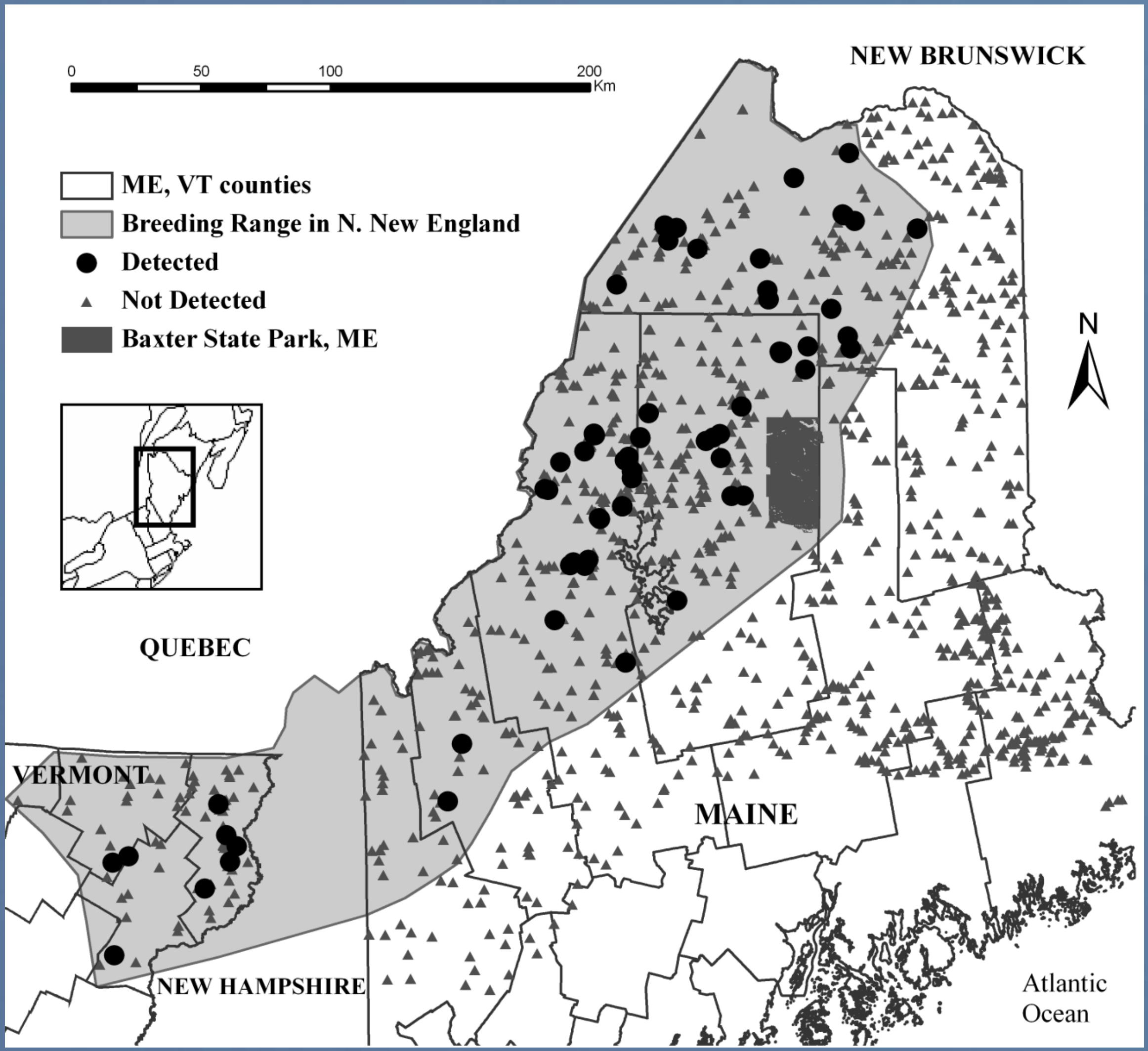
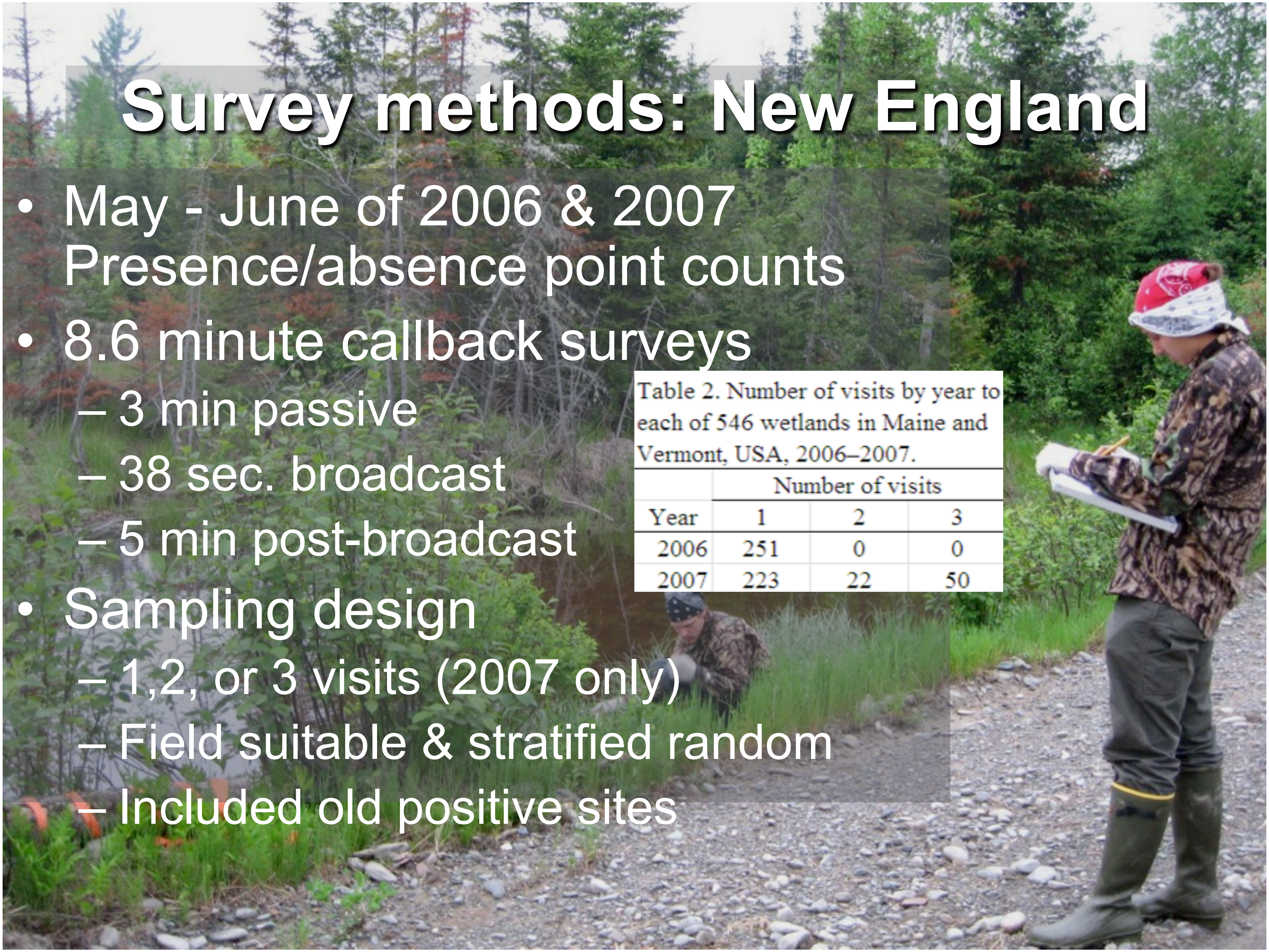
550 Wetlands Surveyed 2006-2007





Survey methods: New England

- May - June of 2006 & 2007 Presence/absence point counts
- 8.6 minute callback surveys
  - 3 min passive
  - 38 sec. broadcast
  - 5 min post-broadcast
- Sampling design
  - 1,2, or 3 visits (2007 only)
  - Field suitable & stratified random
  - Included old positive sites

Table 2. Number of visits by year to each of 546 wetlands in Maine and Vermont, USA, 2006–2007.

	Number of visits		
Year	1	2	3
2006	251	0	0
2007	223	22	50

Modeling Approach

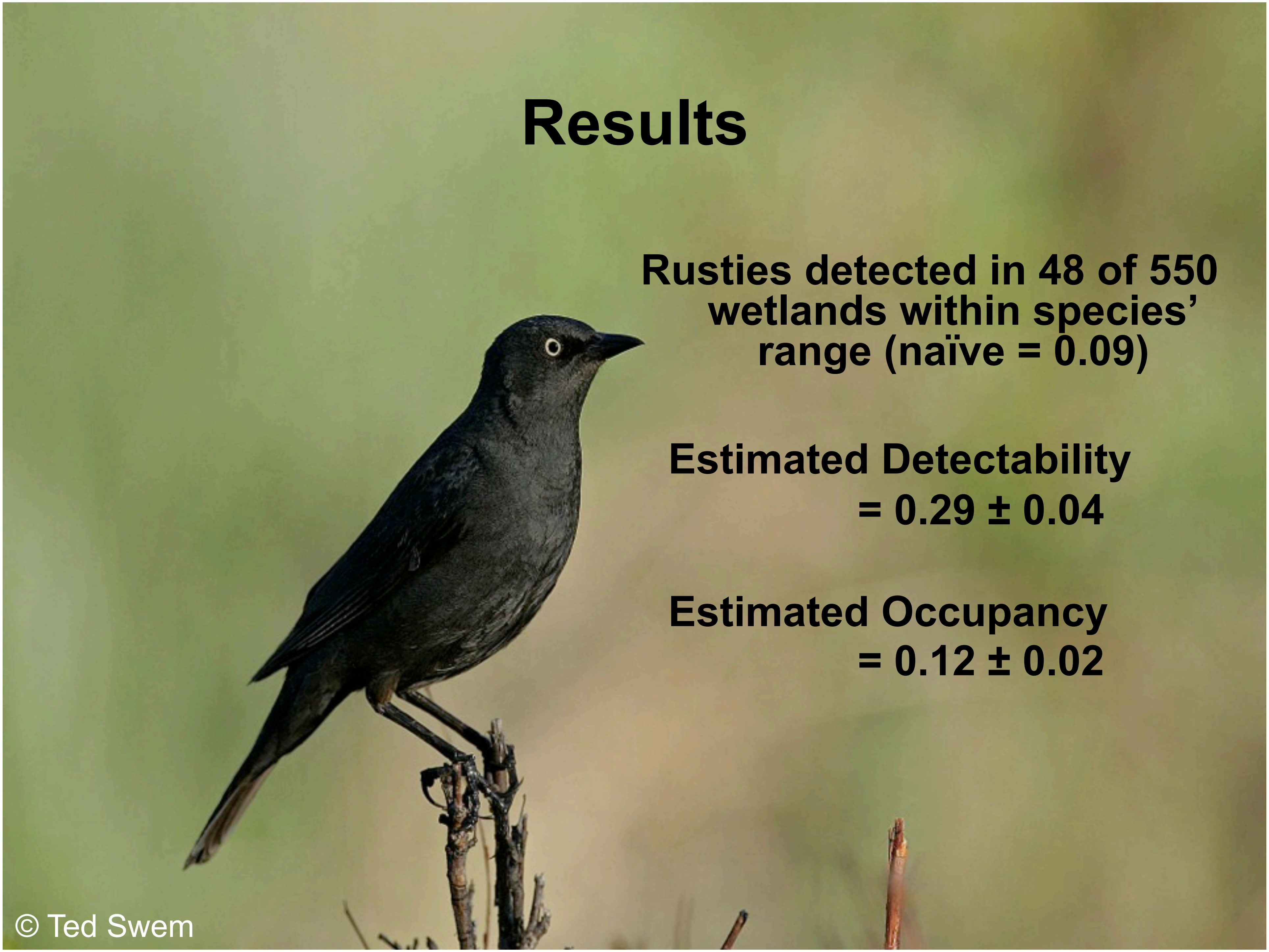
- “Single season” occupancy model
  - Occupancy contingent on detectability
- Survey periods treated as separate samples
  - 3 min passive
  - 38 sec. broadcast
  - 5 min post-broadcast
- Wetland selection (“CHOICE”) accounted for
  - “Driveby” positives included
- Best-fit detectability model as base model for occupancy
- AIC for model selection

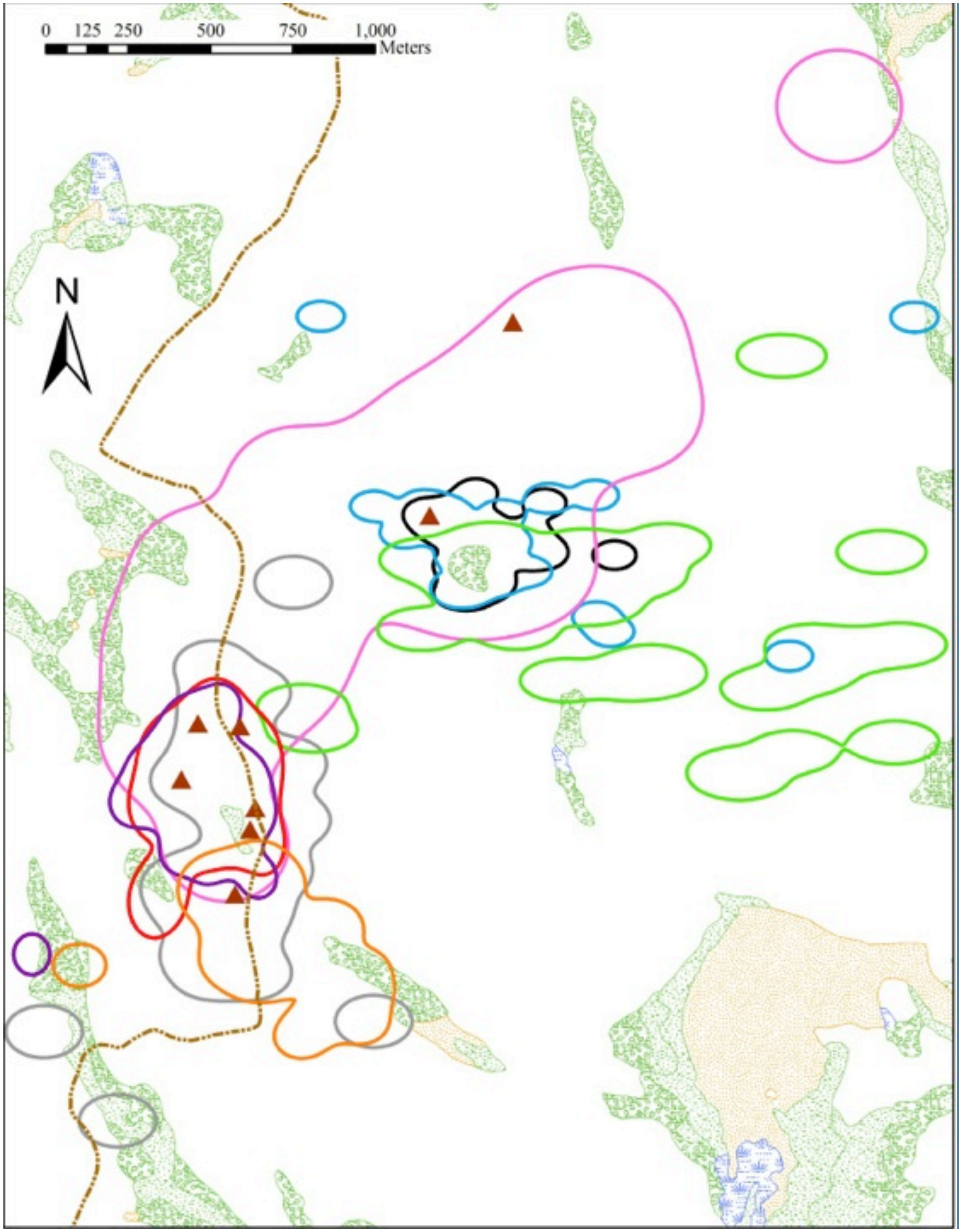
Results

Rusties detected in 48 of 550 wetlands within species' range (naïve = 0.09)

Estimated Detectability = 0.29 ± 0.04

Estimated Occupancy = 0.12 ± 0.02





Why Low Detectability?

0.29 ± 0.04

Nests

Home Range:

- PkPk
- YeRd
- OrOr
- OrGr
- PuPu
- RdRd
- YeBk
- OrPu

NWI Wetland Class:

- Emergent
- Forested
- Scrub/shrub
- Unconsolidated bottom
- Forest Road

Detectability Model Set

Model	-2 Log-likelihood	K	AIC	ΔAIC	w_i
Ψ^b(CHOICE), p^b(WIND + DATE + PLAYBACK)	495.6	8	511.6	0.0	0.99
Ψ(CHOICE), p (WIND + DATE)	509.6	6	521.6	9.9	0.01
Ψ(CHOICE), p (DATE)	512.8	5	522.8	11.1	0.00
Ψ(CHOICE), p (DATE^2)	512.6	6	524.6	13.0	0.00
Ψ(CHOICE), p (PLAYBACK)	520.5	6	532.5	20.9	0.00
Ψ(CHOICE), p (PLAYBACK + SHRUB + PRECIP)	515.4	8	531.4	19.8	0.00
Ψ(CHOICE), p (WIND)	529.3	5	539.3	27.6	0.00
Ψ(CHOICE), p (WETAREA x PLAYBACK)	504.6	15	534.6	23.0	0.00
Ψ(CHOICE), p (WETAREA x WIND)	514.2	11	536.2	24.5	0.00
Ψ(CHOICE), p (SKY, SHRUB)	521.1	7	535.2	23.6	0.00
Ψ(CHOICE), p (.)	532.8	4	540.8	29.1	0.00
Ψ(CHOICE), p (WETAREA)	521.5	7	535.5	23.9	0.00
Ψ(CHOICE), p (SHRUB)	529.3	5	539.3	27.7	0.00
Ψ(CHOICE), p (SKY + WETAREA)	517.6	9	535.6	23.9	0.00
Ψ(CHOICE), p (SKY)	527.0	6	539.0	27.3	0.00
Ψ(CHOICE), p (PRECIP)	532.4	5	542.5	30.9	0.00
Ψ(CHOICE), p (PRECIP + SHRUB)	527.6	6	540.2	28.5	0.00
Ψ(CHOICE), p (MIN^2)	532.7	6	544.7	33.0	0.00

[a] K, no. of parameters; ΔAIC, difference in AIC relative to the best-fit model; w_i, Akaike weight.

[b] Ψ,occupancy; p, detectability.

Occupancy Model Set

Model	-2 Log-likelihood	K [a]	AIC	ΔAIC	w_i
ψ(SOFTWD_UP + BEAVER + PUDDLES) [b]	471.7	11	493.7	0.0	0.47
ψ(SOFTWD_UP + BEAVER + PUDDLES + YEAR)	470.9	12	494.9	1.2	0.26
ψ(SOFTWD_UP + PUDDLES)	476.2	10	496.2	2.6	0.13
ψ(SOFTWD_UP + PUDDLES + WETAREA)	471.4	13	497.4	3.7	0.07
ψ(SOFTWD_UP + BEAVER + PUDDLES + ROAD)	469.9	15	499.9	6.3	0.02
ψ(PUDDLES + YNGSF)	480.8	10	500.8	7.1	0.01
ψ(MUD + HARVEST5TO15)	481.0	10	501.0	7.3	0.01
ψ(PUDDLES + YNGSF +YEAR)	479.2	11	501.2	7.5	0.01
ψ(WETAREA + MUD + BEAVER)	476.3	13	502.3	8.7	0.01
ψ(YNGSF + MUD)	483.0	10	503.0	9.4	0.00
ψ(WETAREA + MUD + BEAVER + COGR)	476.0	14	504.0	10.3	0.00
ψ(WETAREA + HARVEST5TO15)	480.3	12	504.3	10.7	0.00
ψ(YNGSF + MUD + YEAR)	482.8	11	504.8	11.1	0.00
ψ(MUD + HARVEST5TO15 + COGR)	487.1	10	507.1	13.4	0.00
ψ(BEAVER + YNGSF)	487.3	10	507.3	13.7	0.00
ψ(MUD + HARVEST5TO15 + COGR + RWBL)	486.1	11	508.1	14.5	0.00
ψ(MUD + HARVEST5TO15 + YEAR)	489.1	10	509.1	15.5	0.00
ψ(BEAVER + YNGSF + RWBL)	487.2	11	509.2	15.5	0.00
ψ(BEAVER)	491.8	9	509.8	16.1	0.00
ψ(·)	495.6	8	511.6	18.0	0.00

[a] K, no. of parameters; ΔAIC, difference in AIC relative to the most parsimonious value; w^i, Akaike wt.

[b] Base model for all models shown: ψ(CHOICE), p (WIND + DATE + PLAYBACK), where p denotes detectability.

Best-fit Occupancy Model

Table 4. Untransformed parameter estimates, standard errors, and 95% confidence intervals for the best habitat occupancy model for Rusty Blackbirds at 546 wetlands in Maine and Vermont, USA, 2006–2007.

Covariate	Estimate	SE	95% CI		
Habitat occupancy					
Intercept (ψ)	-4.24	0.61	-5.44	,	-3.04
$\text{CHOICE}_{\text{Old+}}$[a]	0.91	0.52	-0.12	,	1.94
$\text{CHOICE}_{\text{Random}}$	-0.56	0.48	-1.50	,	0.37
PUDDLES	1.90	0.62	0.68	,	3.12
BEAVER	0.91	0.42	0.09	,	1.72
SOFTWD_UP	1.04	0.39	0.27	,	1.80

Occupancy: Variable Importance

Table 5. Relative importance of influential variables affecting wetland occupancy of Rusty Blackbirds.

Variable	No. Models	β [a]	$\sum w_i$ [b]
PUDDLES	7	+	0.97
SOFTWD_UP	5	+	0.94
BEAVER	8	+	0.83
YEAR	4	+	0.27
WETAREA	4	N/A [c]	0.08
MUD	8	+	0.03
YNGSF	6	+	0.03
HARVEST5TO15	5	+	0.02
ROAD	1	N/A [c]	0.02
COGR	3	+	0.00
RWBL	2	−	0.00

[a] β, direction of sign of parameter estimate for the variable in a univariate analysis.

[b] $\sum w_i$, sum of Akaike weights of all models the varible is included in.

[c] Categorical variable.

Unmportant Stuff

- Detectability *not* affected by
  - – Physical structure of wetland
  - – Size of wetland
  - – Time of day*
- Occupancy *not* affected by
  - – Other icterids
  - – Roads
  - – Wetland size
  - – Presence of mud

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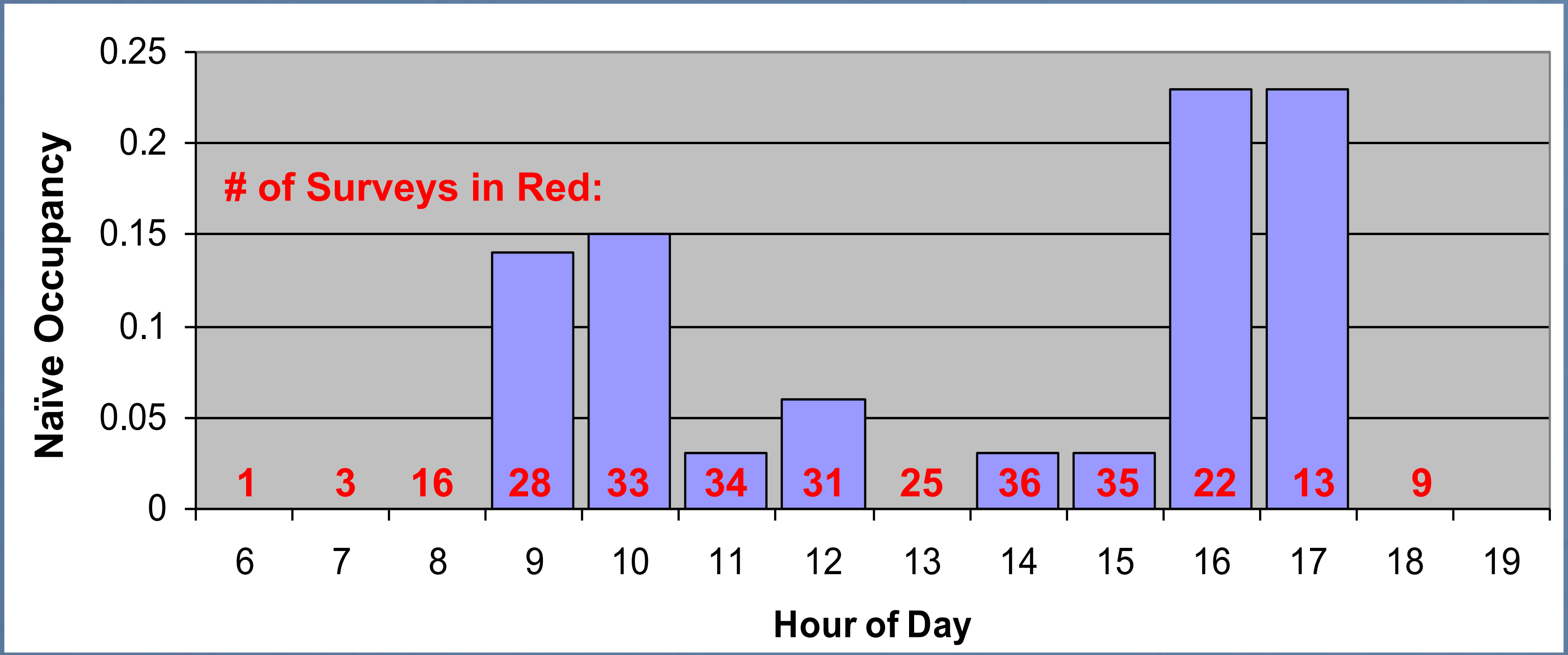
Crepuscular?
2006 data



Important Stuff

- Detectability affected by
  - Wind (-), date (-), and playback (+)
- Occupancy affected by
  - Site selection method
  - >70% Softwood uplands (+)
  - Puddles (+)
  - Beaver (+/-)
  - Year?

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ROAD	1	N/A [c]	0.02
COGR	3	+	0.00
RWBL	2	–	0.00

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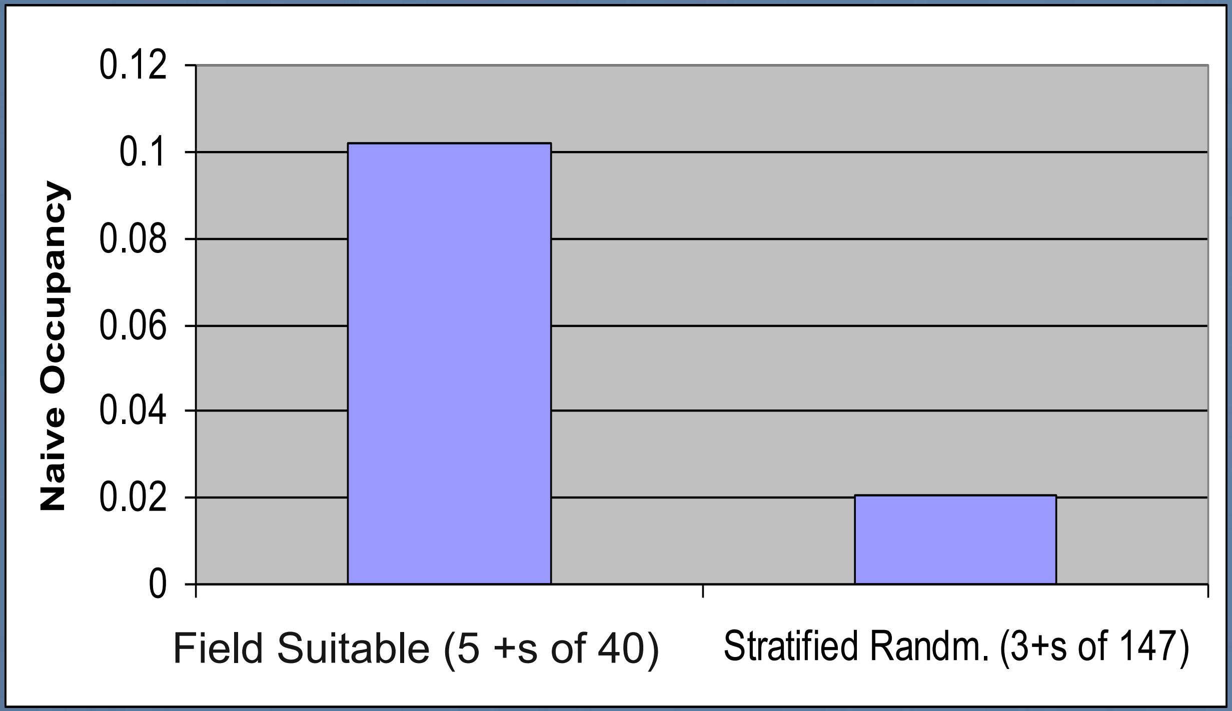
Naïve Occupancy by Site Selection Method



Puddles

- Pools independent of flowing water
- Generally void of fish
- Many larval amphibians – important food?!

Are Beaver Effects that Big?

"The Rusty Blackbird has undoubtedly benefited from the resurgence of the beaver in New York"

-John Peterson

NYS BBA, 1988

Are Beaver Effects that Big?

Giant Beaver (*Castoroides sp.*)
from Royal Tyrrell Museum of Palaeontology


Beaver

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Quality: Replica

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Giant Beaver Skull - The Giant Beaver became extinct about 10,000 years ago. Although it ranged from Alaska to Florida, there have been very few specimens found. This particular one is considered to be among the largest and most complete. Compared to a modern Beaver, its size was remarkable. Our specimen is available in either the antique, or tar pit finish.

Giant Beaver Skull (Dark Finish)
Replica
WBC-071T
(Click on image to enlarge)

Specifications:

CLASS: Mammalia
ORDER: Rodentia
FAMILY: Castoridae

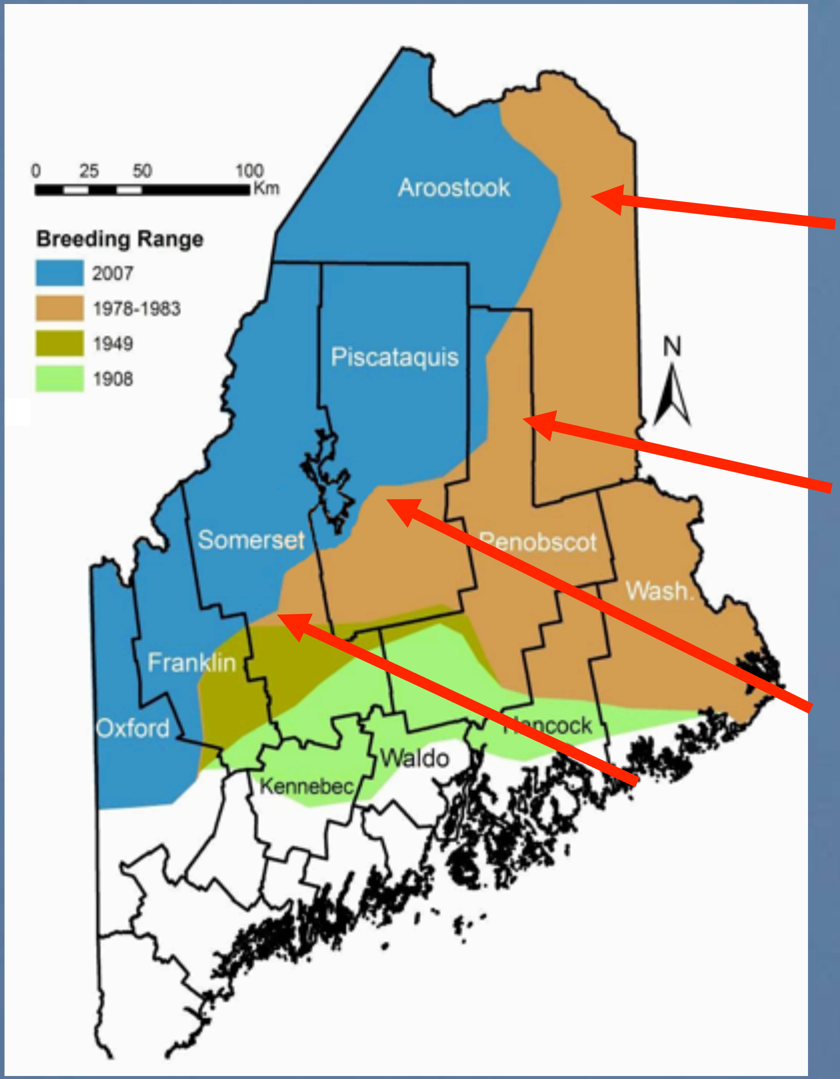
Monitoring Recommendations

- Detectability
  - – Make survey periods equal
  - – Record detections each minute
  - – Calculate ideal survey length time
  - – Time of day effect?

Monitoring Recommendations (cont.)

- Occupancy
  - Remote ID of wetlands possible?
    - 2006 National Land Cover Dataset (NLCD)
  - Better resolution on
    - Beaver data
    - Water depth/puddles
    - Softwood characteristics
  - Identify high occupancy areas
  - Quantify temporal trend - breeding occupancy
    - Northeast is most feasible place outside of Alaska
  - Site consistency
    - Colonization/Extinction dynamics
    - Interaction w/ land management

Range Contraction in Maine



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Questions?