SNAPSHOT WISCONSIN

Integrating camera traps, remote sensing and citizen science to improve ecological forecasting

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WSST WISCONSIN SOCIETY OF SCIENCE TEACHERS · NASA · Wisconsin Environmental Education Board · WISCONSIN UNIVERSITY OF WISCONSIN-MADISON · ADLER PLANETARIUM · ZOONIVERSE · UW Extension University of Wisconsin-Extension

Balancing Act of Wildlife Management

Monitor animal populations
Deliver information to stakeholders
Forecast changes in populations

SNAPSHOT WISCONSIN

Partnership to monitor wildlife year-round through a statewide network of trail cameras




Potential of Snapshot Wisconsin

Improve accuracy of population estimates

Fawn-to-doe ratios based on roadside, opportunistic sampling

Increase coverage & reduce costs

Aerial surveys limited by weather, cost, logistics

Less need for invasive methods

Baiting, trapping, harvest records

Citizen Science

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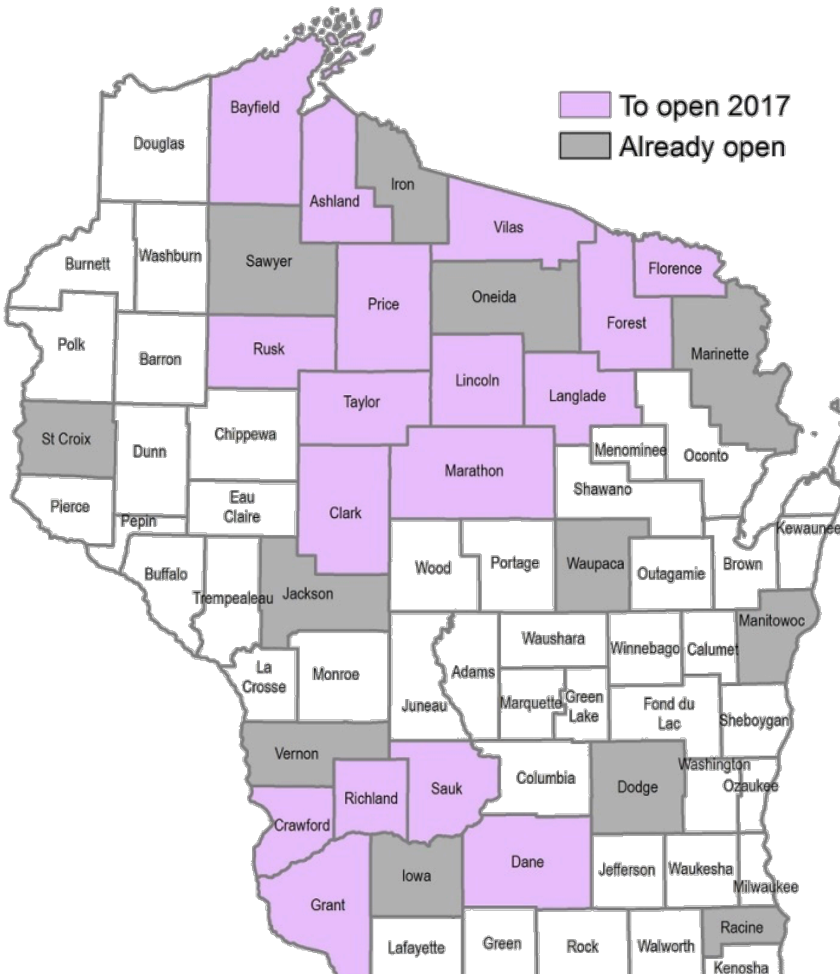
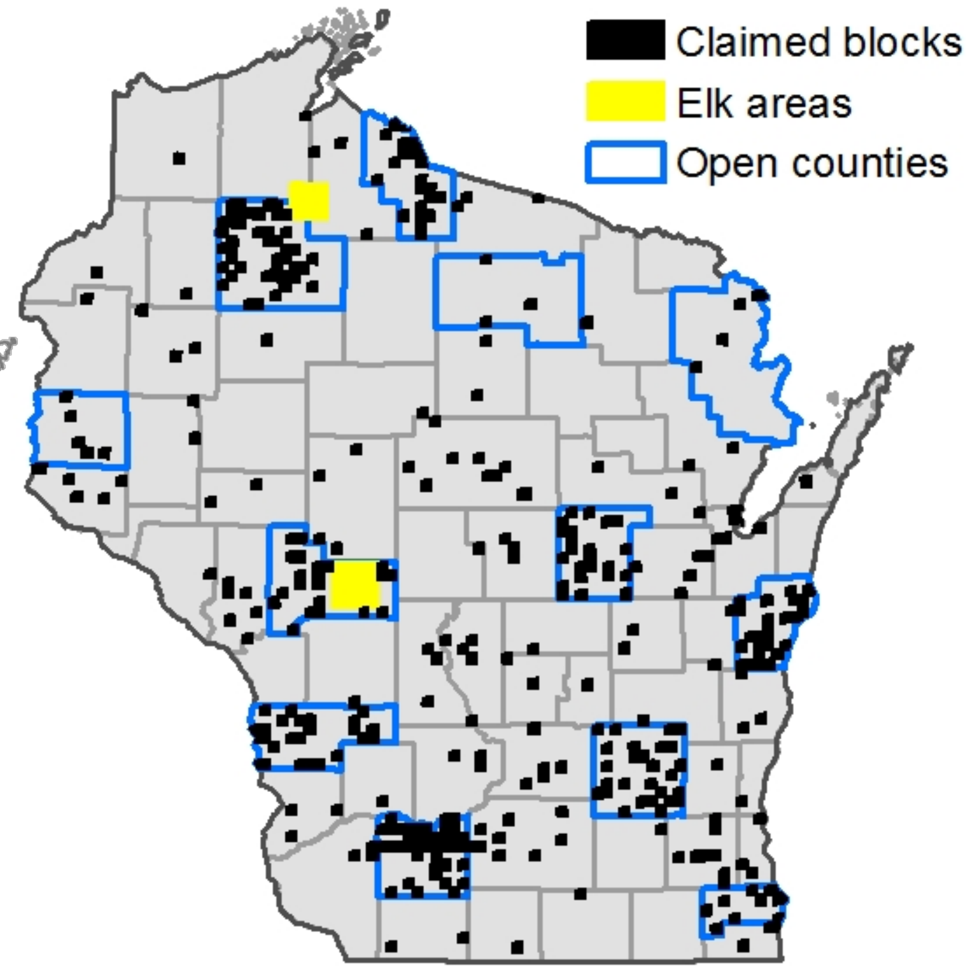
Citizen Science

Volunteers receive training
Free equipment
DNR staff

Motion-activated
Photos of 3 with 15-second lag
Encrypted, date/time programmable

600 volunteers **800** cameras **10 million** photos

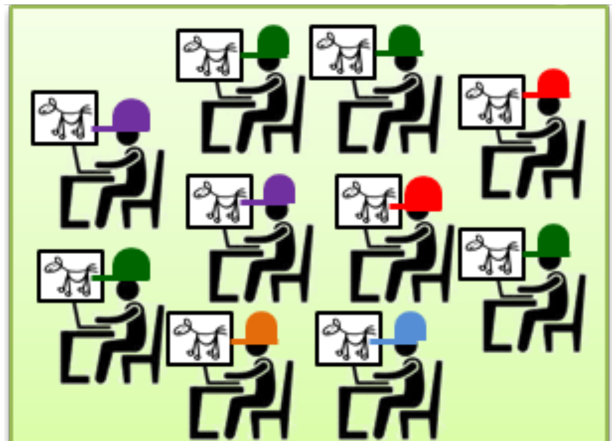




Crowdsourcing with Zooniverse

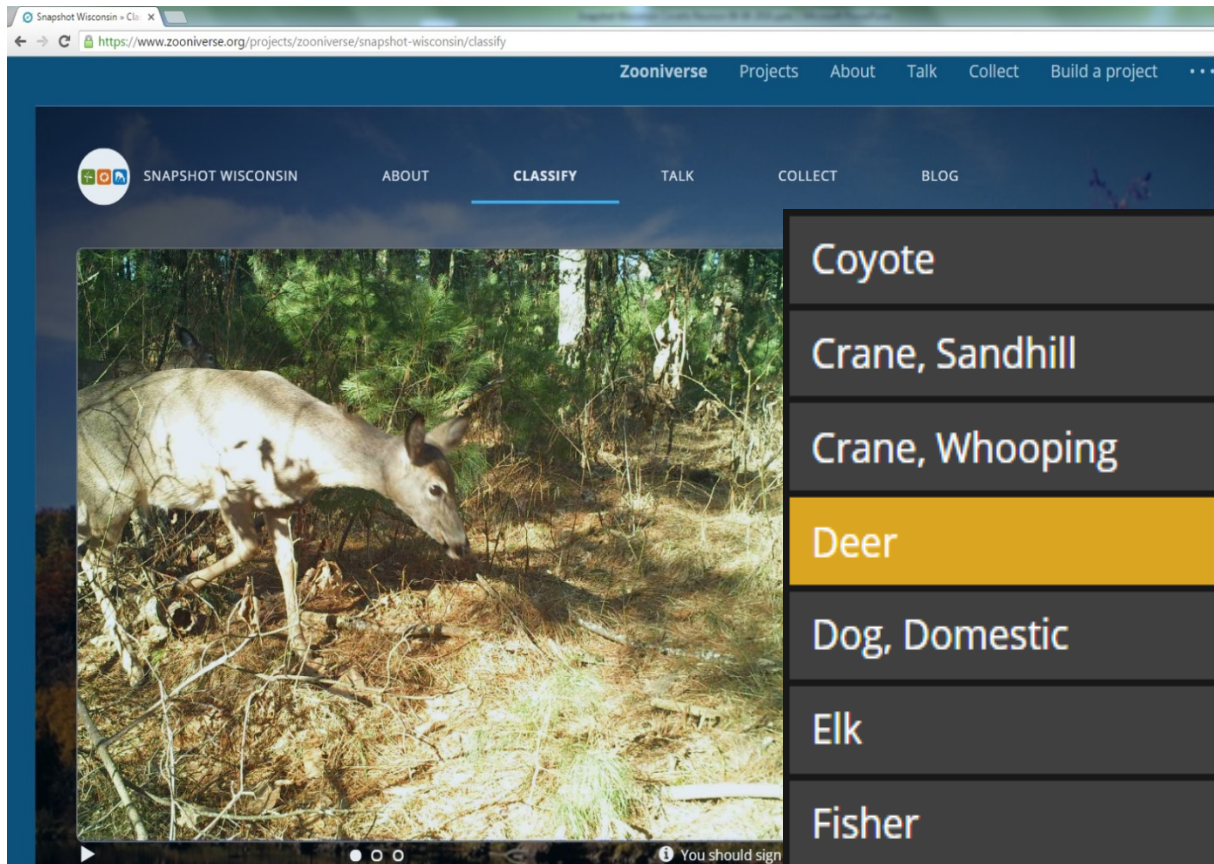
5,000 volunteers **1 million** classifications

Online Global Community

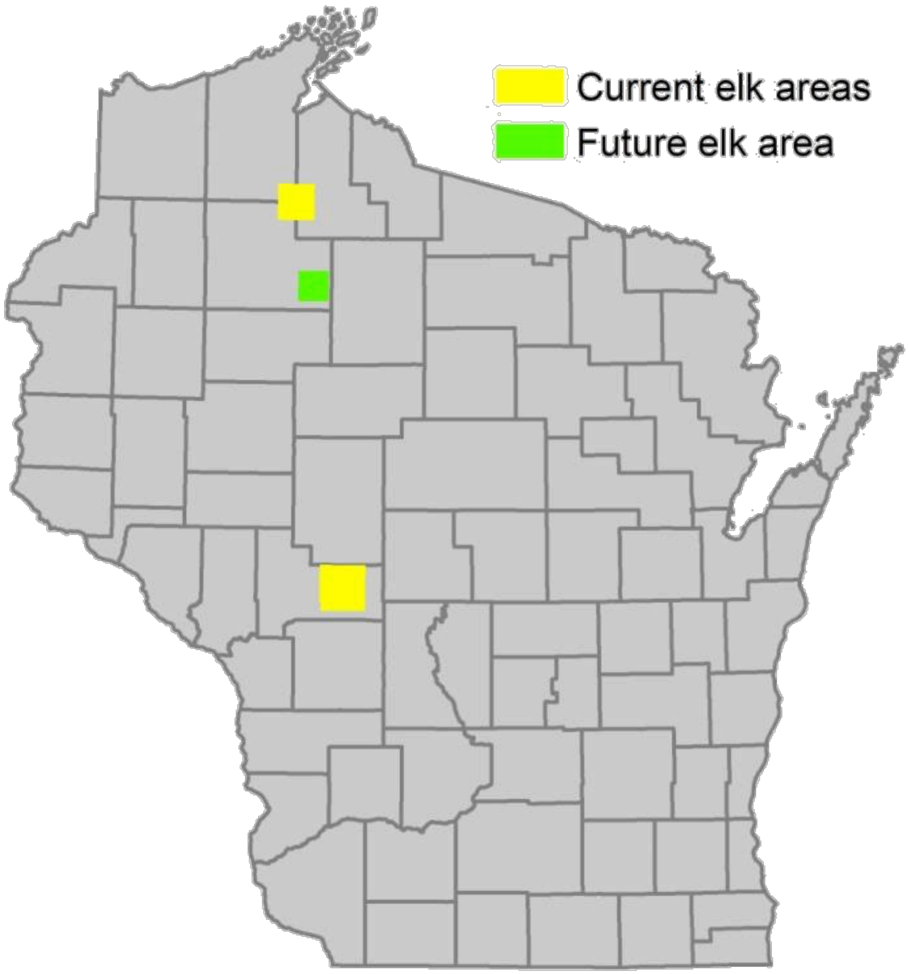


ZOONIVERSE

snapshotwisconsin.org



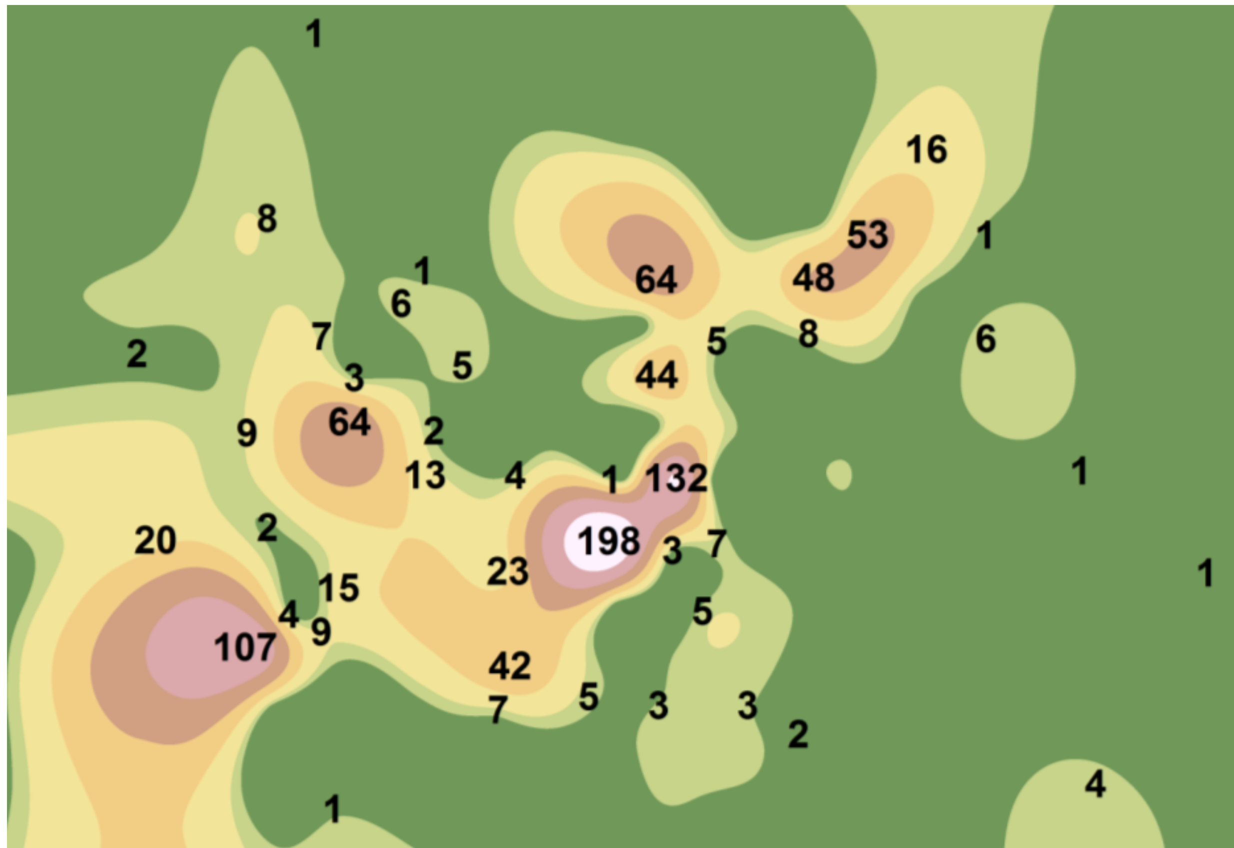
Applications: Elk Reintroduction



Elk Sightings

Fewer sightings

More sightings



For cameras active July 17 – Oct 5, 2015

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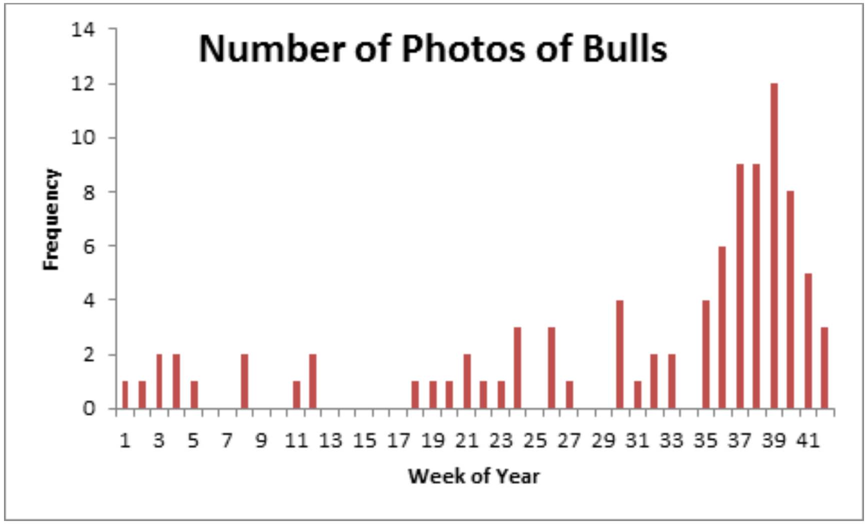
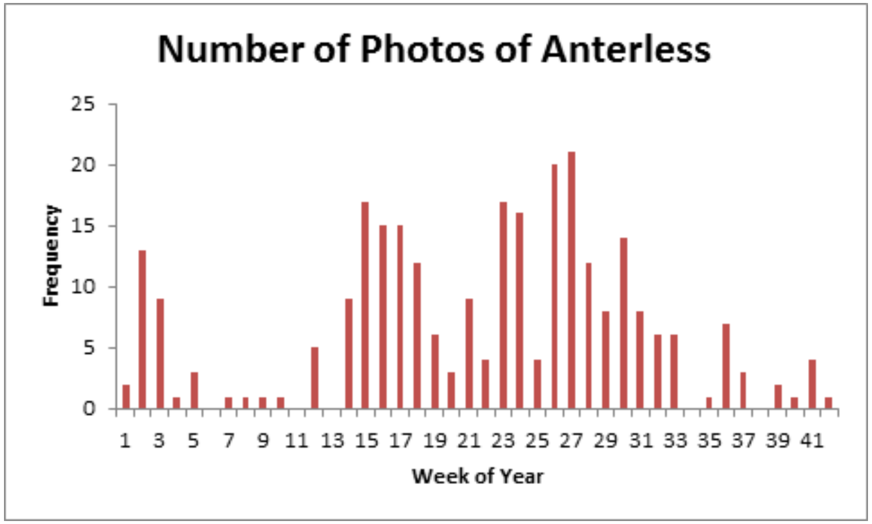
Patterns of Activity





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Recruitment

Elk (Calf-to-Cow Ratios)

2015/16 = 0.47

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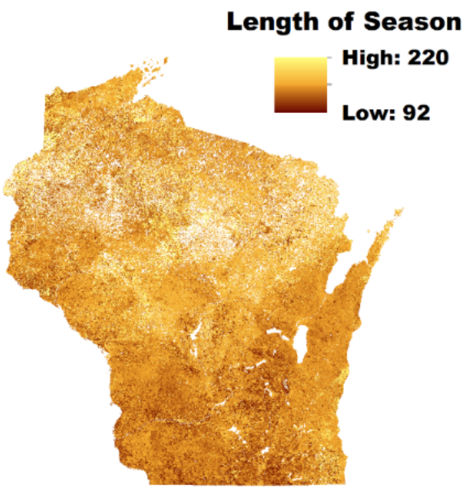
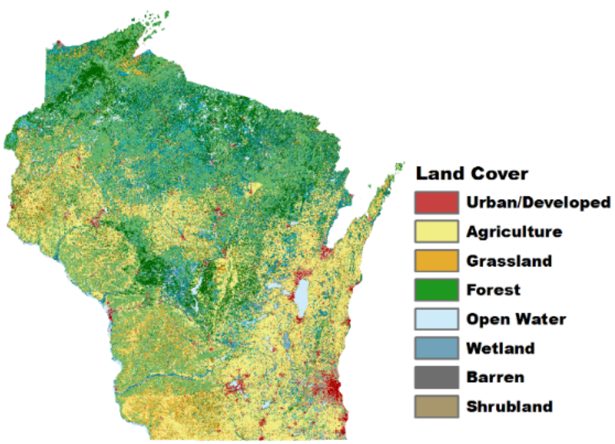
Deer (Fawn-to-Doe Ratios)

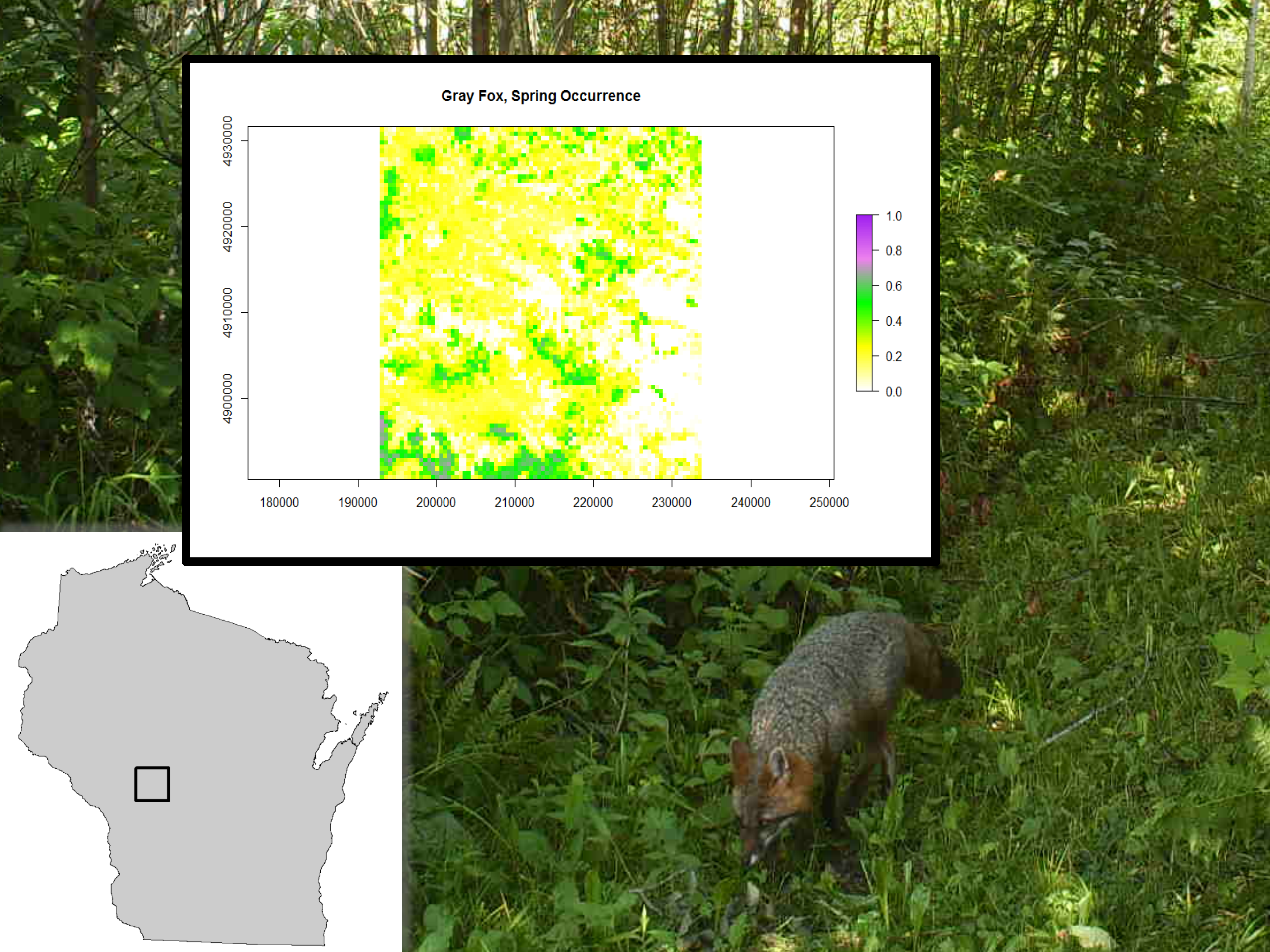
2015/16 = 0.7 to 1.0

Christina Locke, Susan Frett, Jen Stenglein (DNR)

Species Distribution Modeling



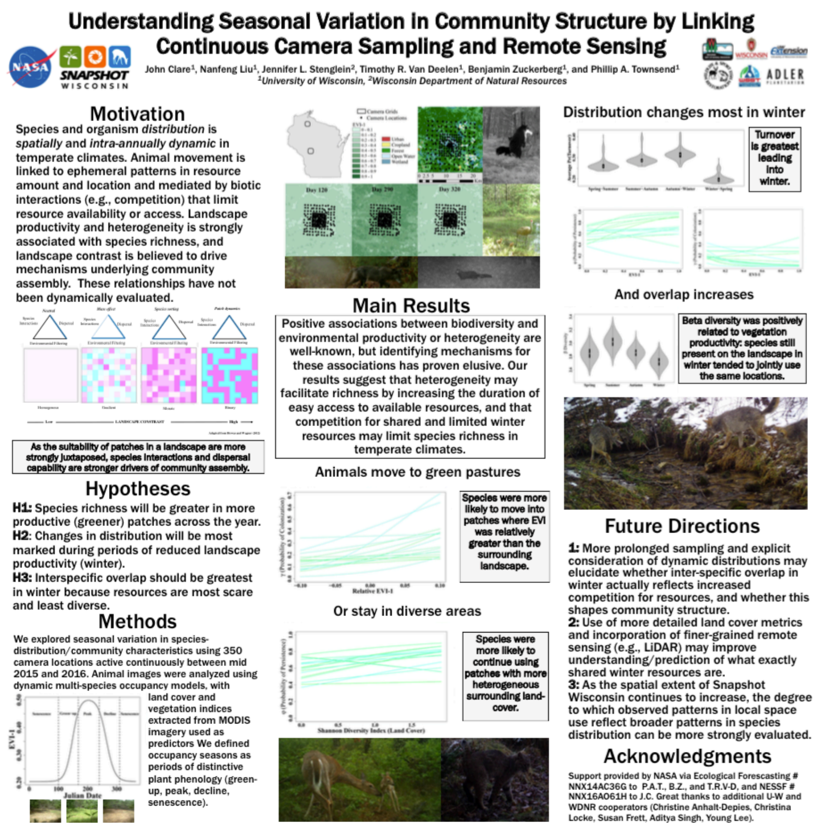




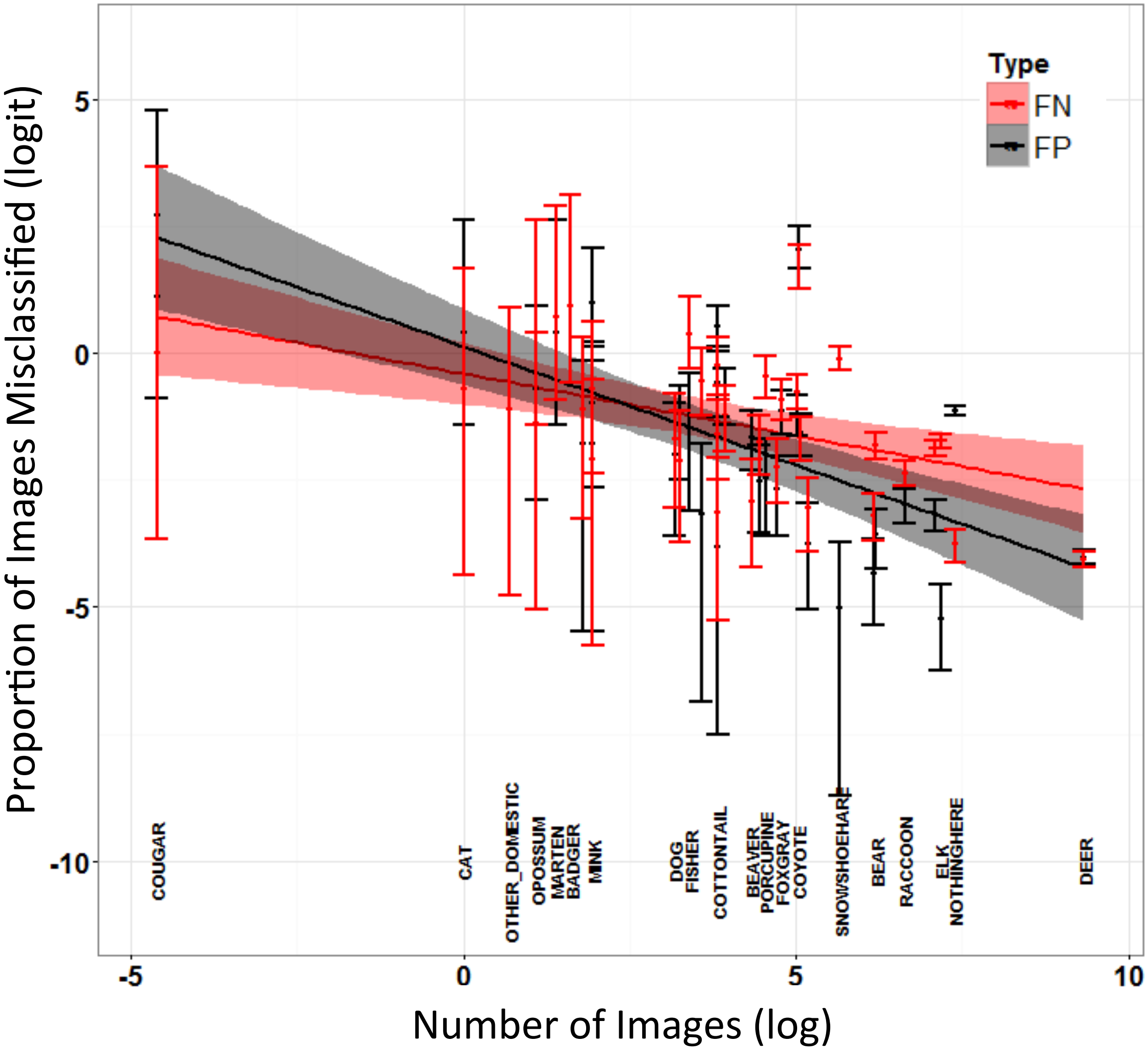
Gray Fox, Spring Occurrence
4930000
4920000
4910000
4900000
180000
190000
200000
210000
220000
230000
240000
250000
1.0
0.8
0.6
0.4
0.2
0.0

See John Clare (NESSF student) Poster

More on the use of remote sensing to predict animal community patterns as a function of vegetation dynamics:



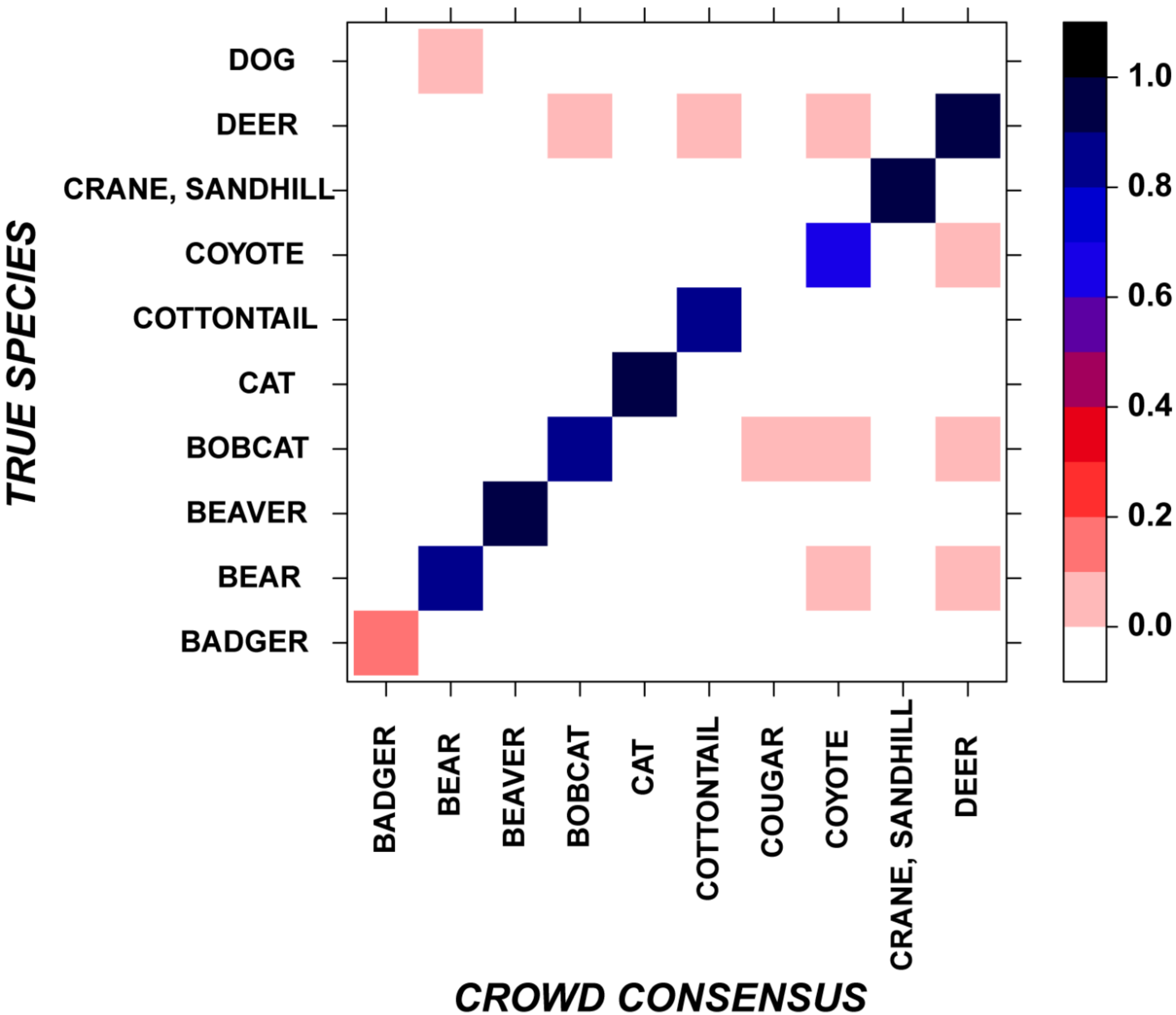
Classification Accuracy



Comparison of expert vs. crowdsourced classification

Less common species have higher classification error

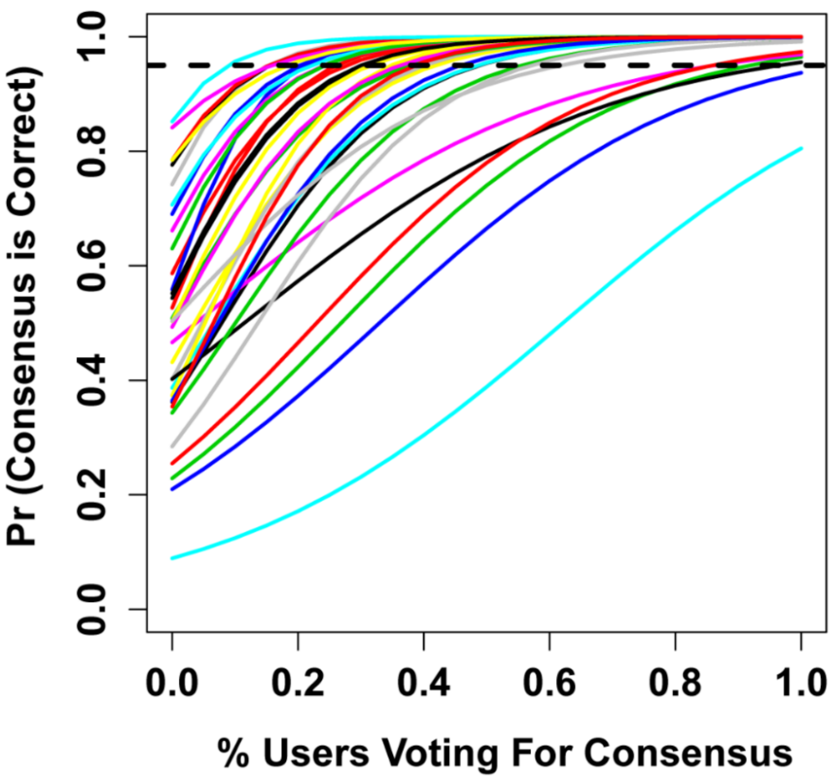
Classification Accuracy

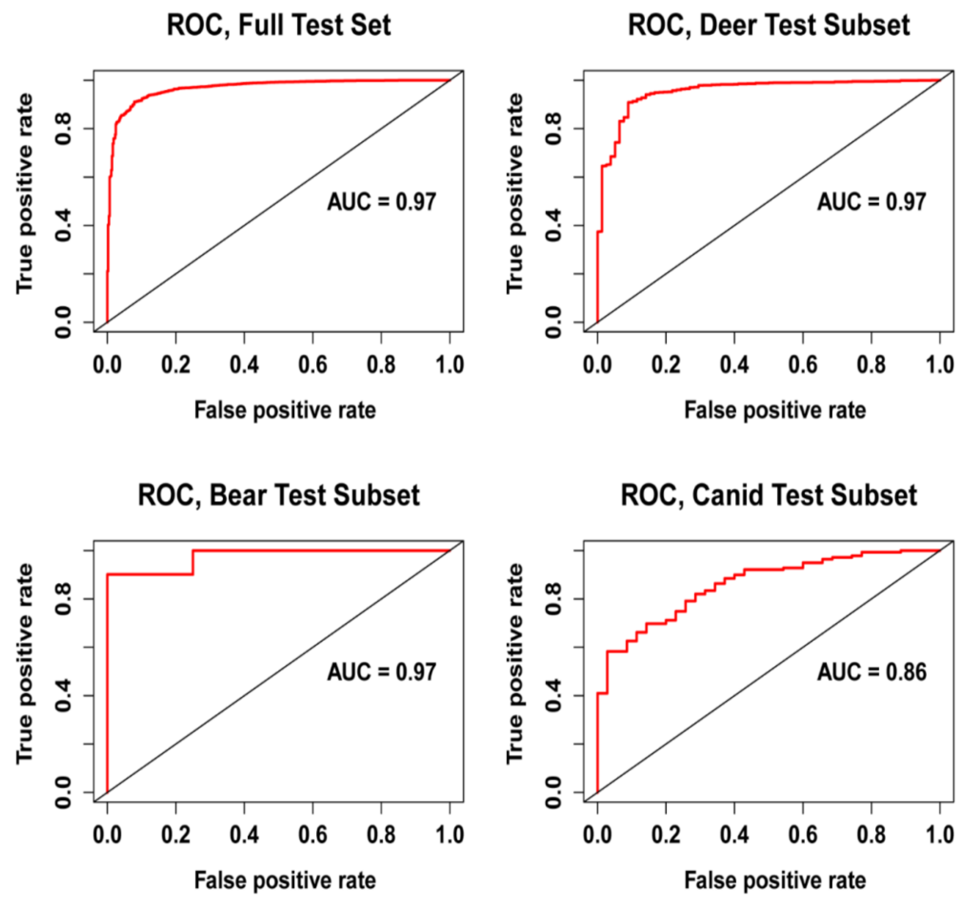


Comparison of expert vs. crowdsourced classification

Error is not equally distributed across species

Classification Accuracy

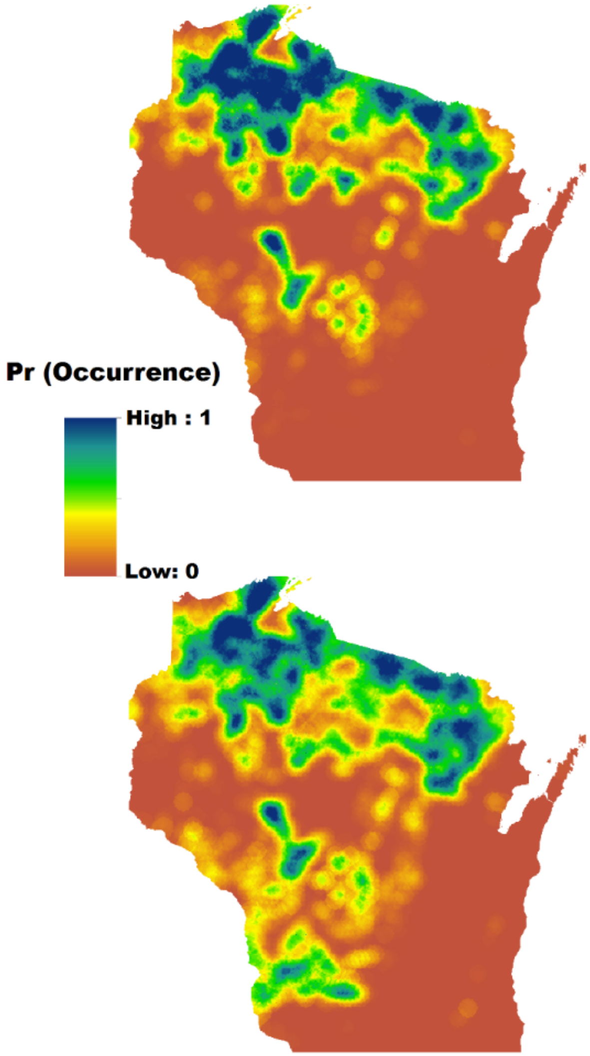


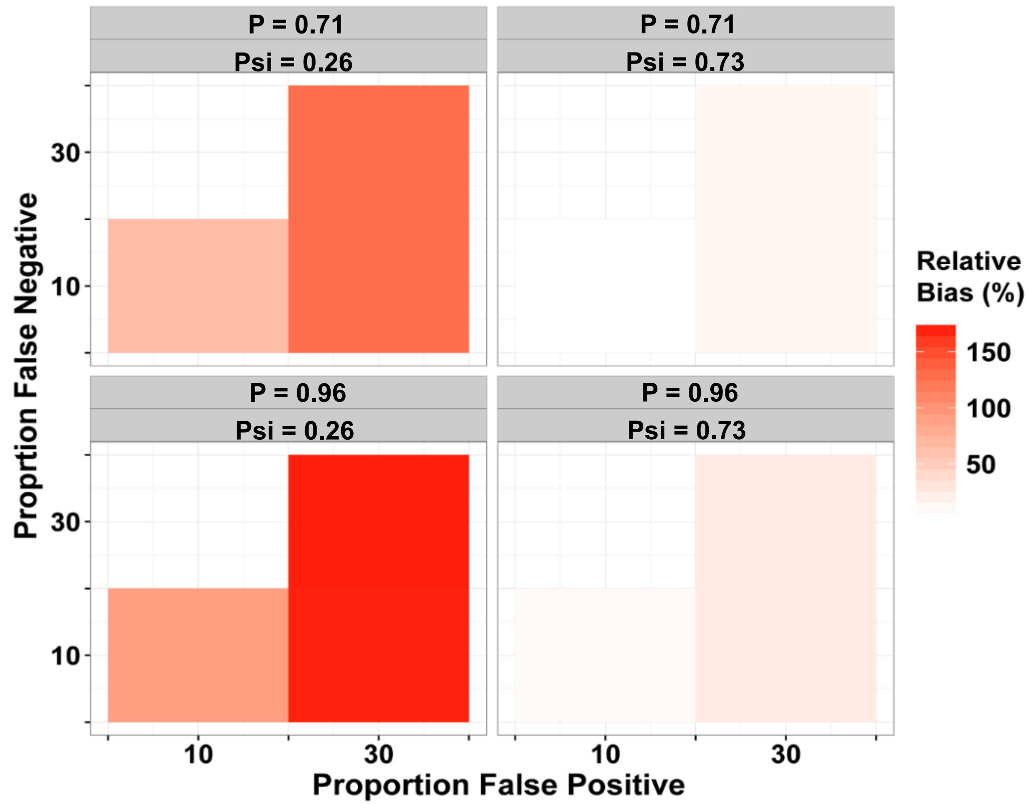


More people agree, the more likely it is that the consensus is correct

Strong predictability of whether a given image is correctly classified

Distribution Modeling





Rare species have greater rates of false positive classification and high bias

Volunteer Motivation

94%

Of volunteers are property owners (n = 52)

73%

Of volunteers are male (n = 54)
with an average age of 61 (range 25-75, n = 52)

60%

Of volunteers identify as a hunter (n = 55)

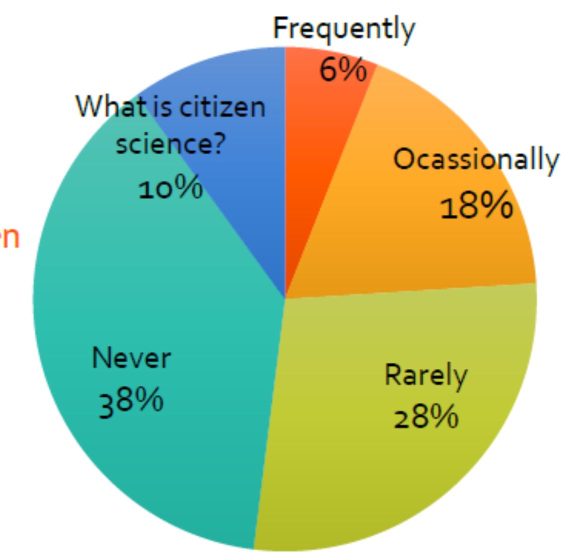
40%

Of volunteers have a graduate degree or more (n = 52)

To hopefully aid the DNR & public in understanding wildlife populations more accurately.

I want to know what is on my land. Have always wanted a trail cam—curiosity.

How often do you participate in citizen science?



n= 50

Agency Partner: Wisconsin DNR

Fully bought-in

This is their show already!

3 fulltime staff

>$1,000,000 spent (staff, IT infrastructure, cameras)

Project will be sustained after NASA funding

(full deployment of cameras 2019 – received state pressure to speed up the process – project is viewed as a success)

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Lessons Learned

Successes

Hybrid citizen science
Inclusion of interest groups
IT development
Remote sensing

Challenges

Computer skills of volunteers
Data management
long-term, high volume
Dealing with “nothing there”

Acknowledgements

Susan Frett
Scott Hull
Christina Locke
Joe Dittrich
Dan Storm

Mike Kvitrud
Sarath Manne
Dougal Walker
Mitch Liddicoat
Dan Storm
John Dadisman
Joe Dittrich

Volunteers
Laura Trouille
Ali Swanson
Sarah Allen

Becky Sapper

Clayton Kingdon
Young Lee
Prabu Ravindran

Trail camera monitoring volunteers
Ho Chunk Nation DNR
Jackson County Forest and Parks
US Forest Service
WDNR staff helping with camera hosting and photo classification


Questions?