# Bird response to habitat restoration at Fernhill Wetlands



Audubon Society of Portland
Founded in 1902

CleanWater Services


Image courtesy Google Earth
**Before Restoration**


Photo: CWS
**After Restoration**

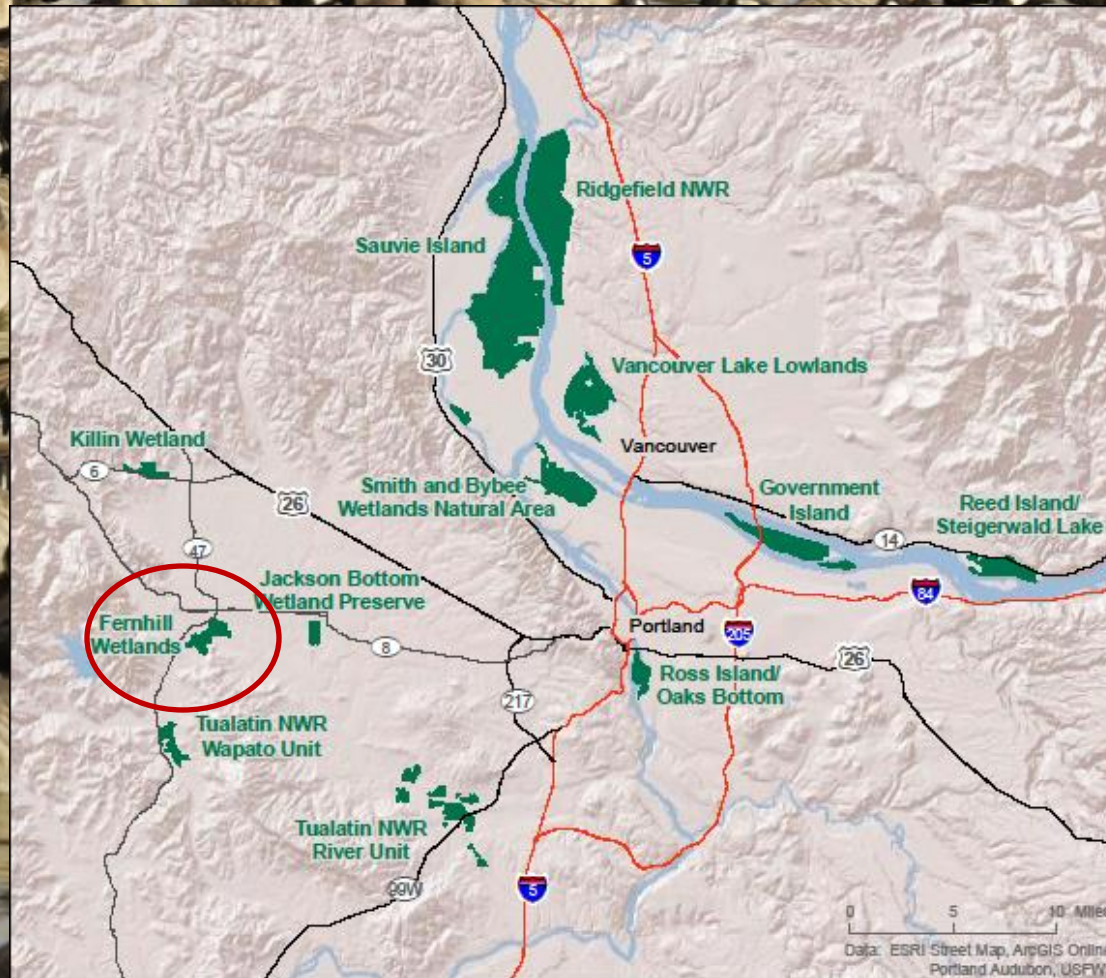*Joe Liebezeit, Candace Larson, Jay Withgott, Audubon Society of Portland*

*Carol Murdock, Clean Water Services*

*Jon Plissner, Fernhill supporter*



**Thanks to the dozens of community scientists!**

# Part of a matrix of Important Bird Areas in Portland Metro area

# Fernhill Wetlands 2012 – pre-restoration
## - Prior to conversion to "Natural Treatment System" (NTS)



Photo: CWS

# Why Create A Natural Treatment System at Fernhill?

- Win-Win: create native wetland habitat to cool water & remove nutrients

- Meet demand from growth in Hillsboro/Forest Grove area

- Saves rate payers $$$

Fernhill NTS
Advanced Treatment
Saving rate payers
$13M

# Fernhill: NTS construction (June 2014 to February 2015)



Photo: CWS

# After construction: winter 2014/15

# What did it take?

- 200 cubic yards of soil re-contoured

- 15 water control structures and 2,400 feet of piping

- 750,000 native wetland plants and 3.5 billion seeds

- 180 logs and snags to create habitat and perches



Photos: CWS



Photos: CWS

# Bird community response



Objectives:

1. Document avian diversity and abundance changes pre and post restoration.

2. Document bird use changes through time as the restored vegetation matures.

3. Evaluate community science data as a tool to measure ecological response to habitat restoration.

Photo: CWS

# Some predictions

- Increase:
  – Marsh birds
  – Wetland-associated songbirds

- Decrease:
  – Wintering grebes
  – Shorebirds

- Stable:
  – Dabbling ducks

Photos: C. Larson
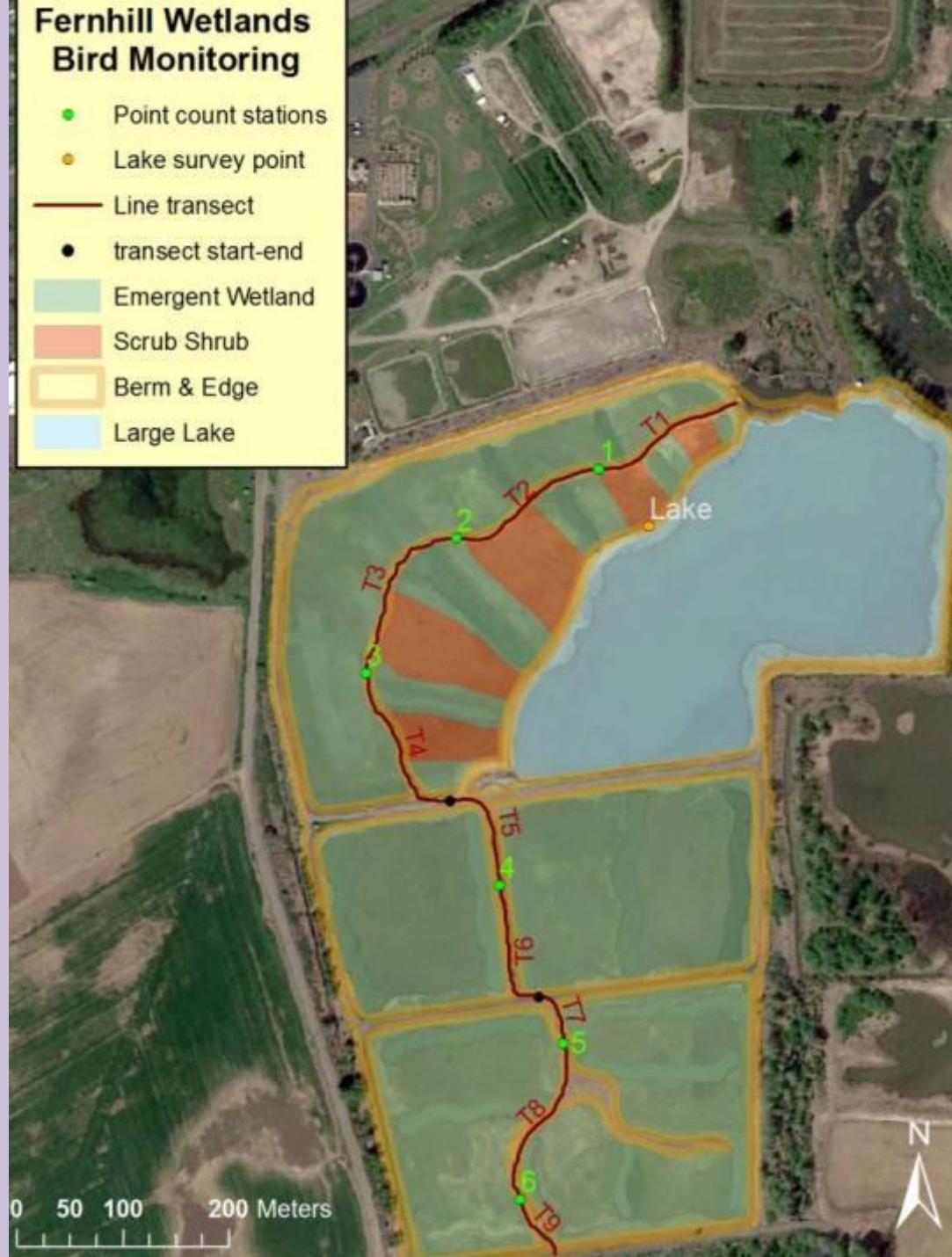
# Methods – community science surveys

eBird

- Simple protocol

- eBird two new "hotspots" created: NTS & outside NTS
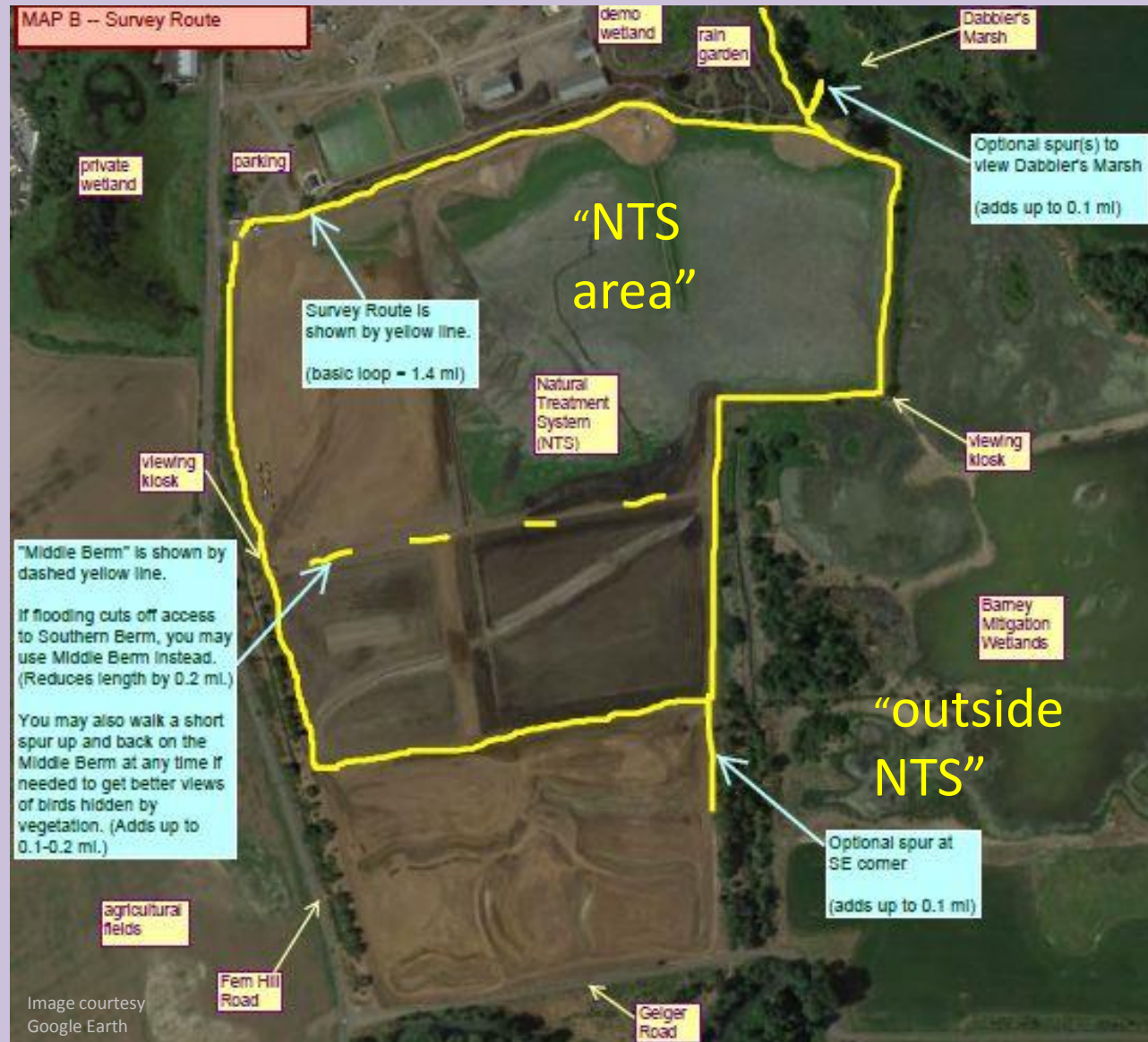
# Methods – formal surveys

- Initiated Fall 2015 (post-restoration)

- Combined line transect and lake surveys

- 10 weekly surveys in Fall and in Spring



**Fernhill Wetlands Bird Monitoring**

- Point count stations
- Lake survey point
- Line transect
- transect start-end
- Emergent Wetland
- Scrub Shrub
- Berm & Edge
- Large Lake

# Analysis methods

2009  2010  2011  2012  2013  2014  2015  2016  2017

**Response variables:**
- Species diversity: Shannon-Weiner index
- Species abundance: detections/survey

Pre-restoration

Restoration

Post-restoration

**Covariates:**
- Treatment (pre & post restoration), Year, Season
  - Generalized linear mixed model

- Community science (eBird) vs. Formal count comparison
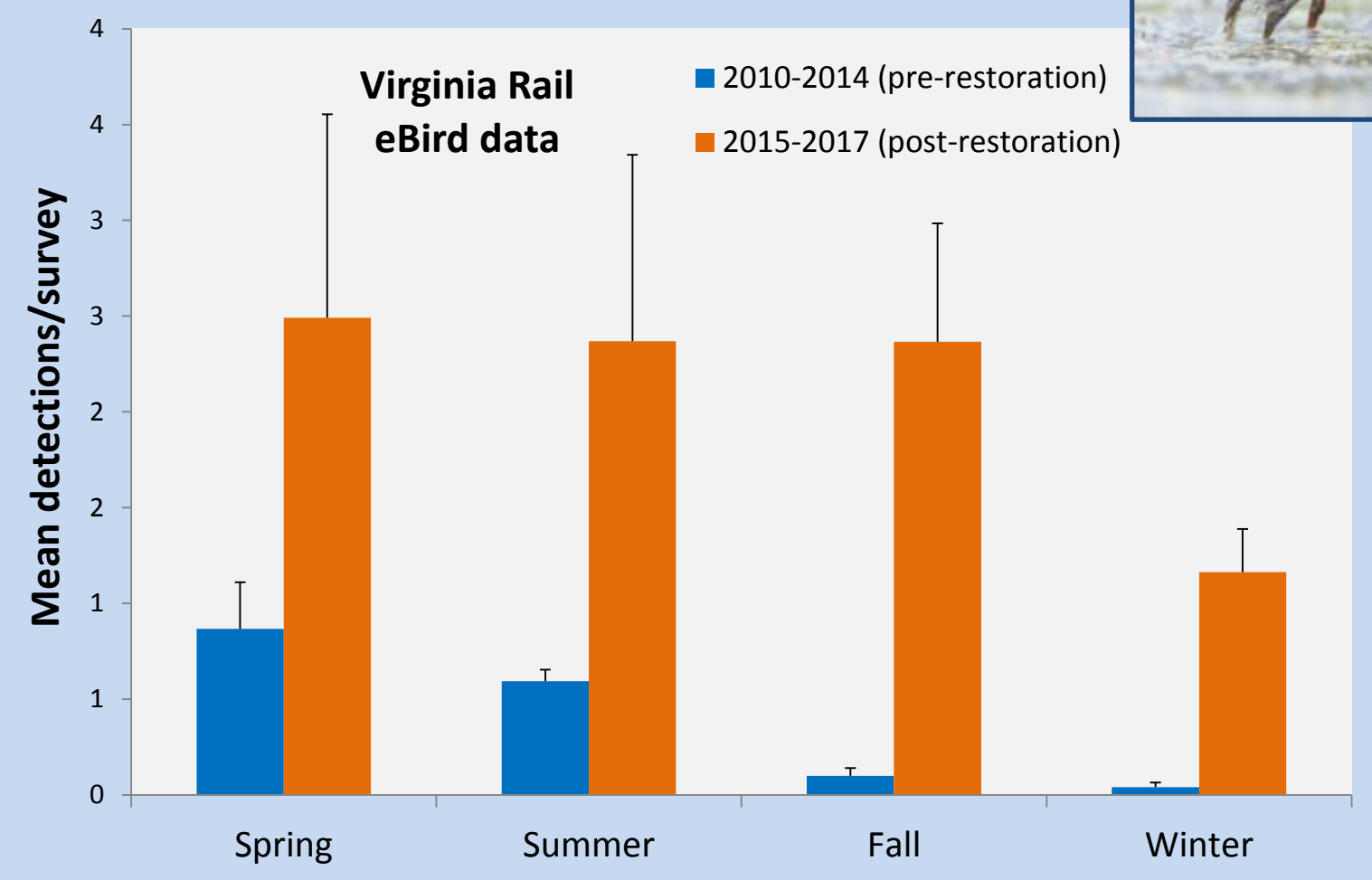  - Paired T-Test



March 17, 2016

Photo: J. Liebezeit



September 20, 2016

Photo: C. Larson
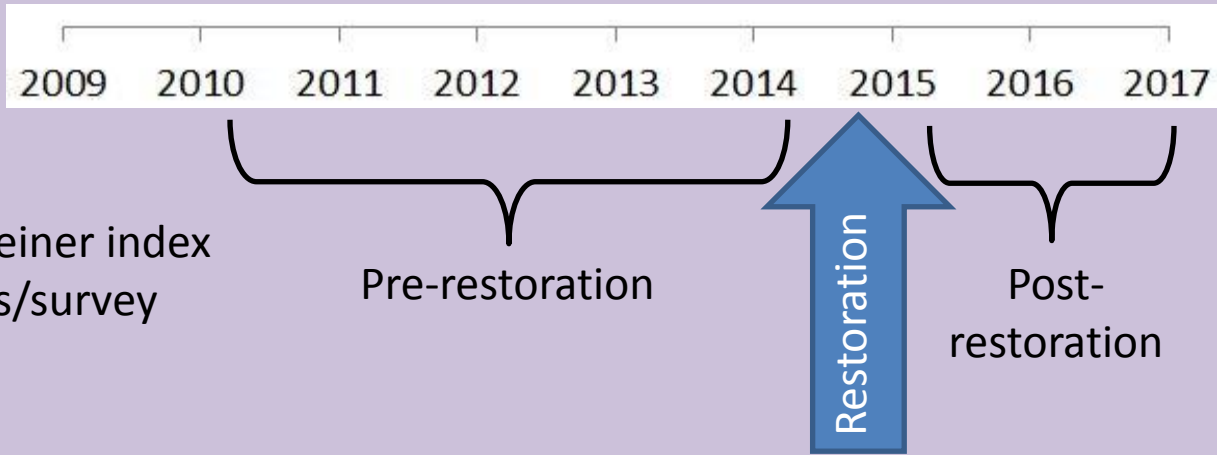
# Results: Species Diversity
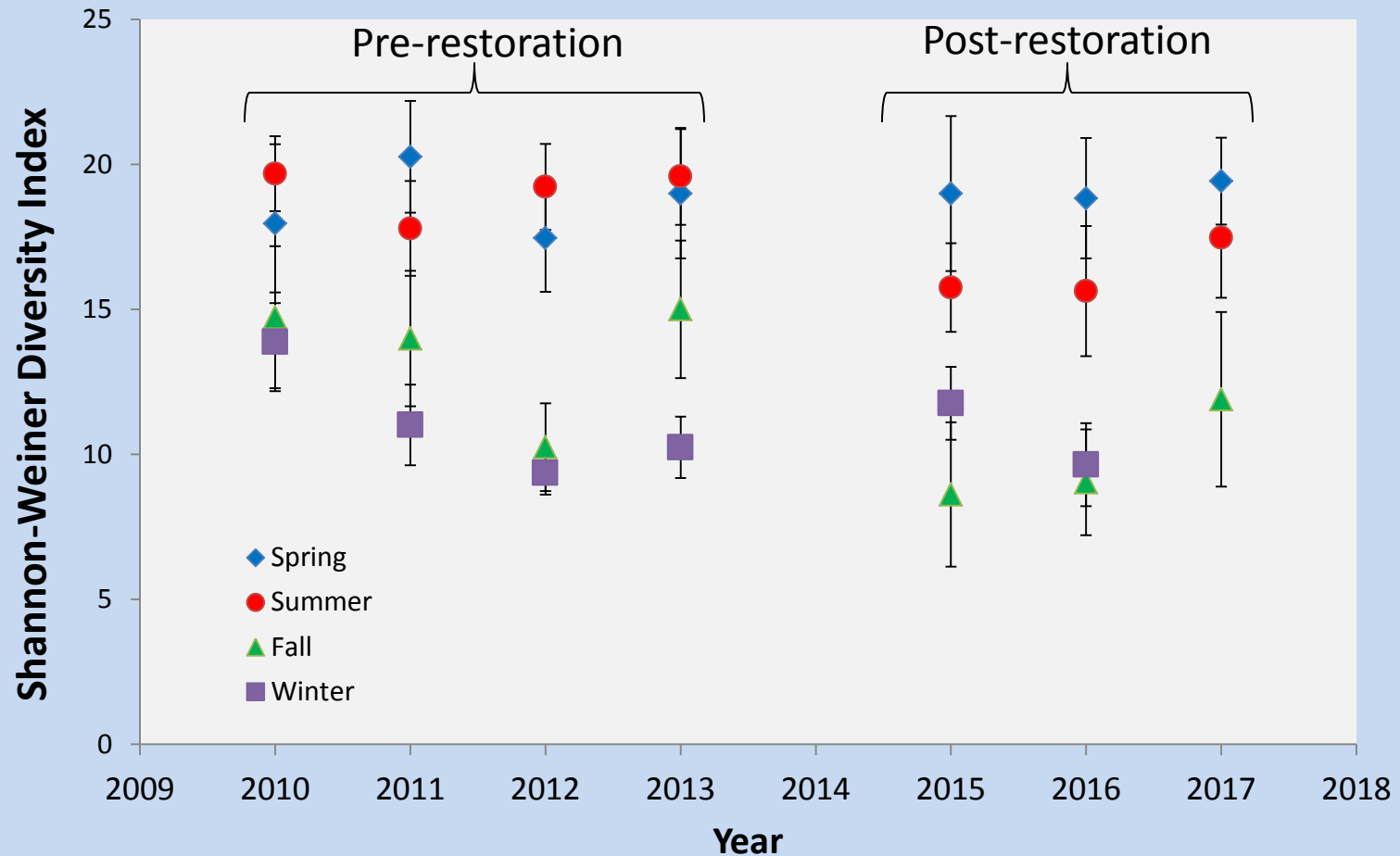


**No significant difference** in avian species diversity between pre and post restoration periods

Photo: S. Finnegan

# Results: Species Abundance



Virginia Rail eBird data

Legend:
- 2010-2014 (pre-restoration)
- 2015-2017 (post-restoration)

Y-axis: Mean detections/survey

X-axis categories: Spring, Summer, Fall, Winter
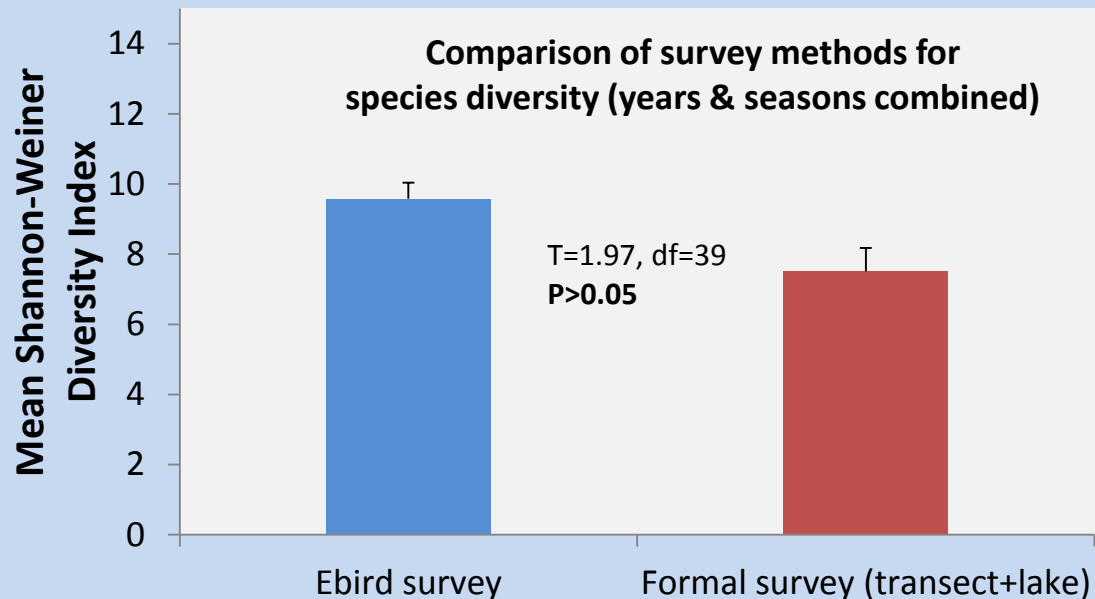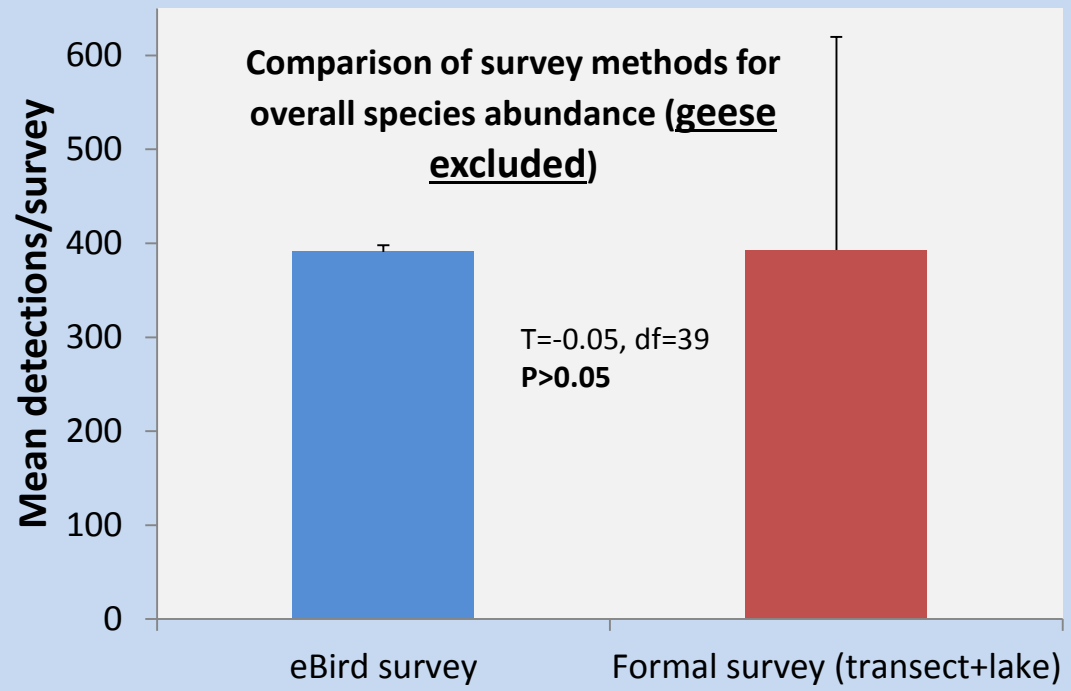
Analysis of 8 of 13 individual species  followed abundance predictions

# Results: eBird Community science vs. formal surveys

- Overall abundance similar between eBird and formal surveys (geese excluded)

- Species diversity similar between eBird and formal surveys



Photo: C. Larson



**Comparison of survey methods for overall species abundance (geese excluded)**

T=-0.05, df=39
**P>0.05**

Mean detections/survey

eBird survey      Formal survey (transect+lake)



**Comparison of survey methods for species diversity (years & seasons combined)**

T=1.97, df=39
**P>0.05**

Mean Shannon-Weiner Diversity Index

Ebird survey      Formal survey (transect+lake)

# Preliminary conclusions

- Overall species diversity and abundance similar between pre and post-restoration periods

- At guild & species level, seeing many responses we predicted
  - Fast positive response for some species (e.g. Sora, Virginia Rail)

- Community science data comparable to Formal surveys in many cases

Photo: C. Larson

# Moving beyond pipes and infrastructure for clean water



Spread the word on success at Fernhill….