

## *SERDP & ESTCP Webinar Series*

*Thank you for signing in early*

The webinar will begin promptly at  
12:00 pm ET, 9:00 am PT



# SERDP and ESTCP Webinar Series

***The webinar will begin promptly at 12:00 pm ET,  
9:00 am PT***

- You have two options for accessing the webinar
  1. Listen to the broadcast audio if your computer is equipped with speakers
  2. Call into the conference line: 303-248-0285  
Required conference ID: 6102000
- For any question or issues, please email [serdp-estcp@noblis.org](mailto:serdp-estcp@noblis.org) or call 571-372-6565

## *SERDP & ESTCP Webinar Series*

# Approaches to Managing Threatened, Endangered and At- Risk Bird Species

June 14, 2018



# *SERDP & ESTCP Webinar Series*

## Welcome and Introductions

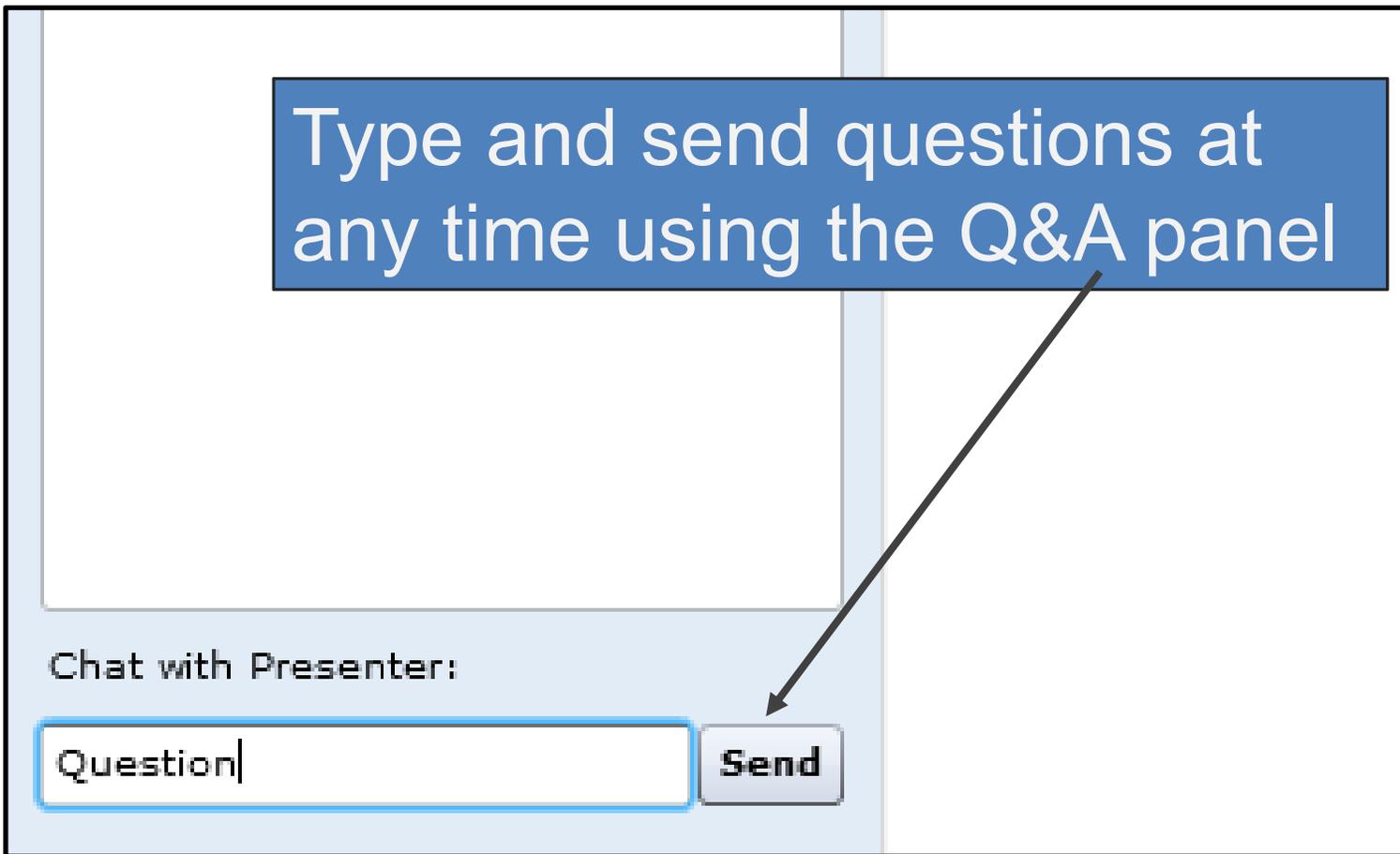
Rula A. Deeb, Ph.D.  
Webinar Coordinator



# Webinar Agenda

- **Webinar Logistics** (5 minutes)  
**Dr. Rula Deeb**, Geosyntec Consultants
- **Overview of SERDP and ESTCP** (5 minutes)  
**Dr. Kurt Preston**, SERDP and ESTCP
- **Advances in Avian Monitoring on Department of Defense Installations** (25 minutes + Q&A)  
**Dr. Richard Fischer**, U.S. Army Engineer Research and Development Center
- **Understanding and Managing Avian Species of Concern on Department of Defense Installations** (25 minutes + Q&A)  
**Dr. Brandt Ryder**, Smithsonian Migratory Bird Center
- **Final Q&A session**

# How to Ask Questions



Type and send questions at any time using the Q&A panel

Chat with Presenter:

Question|

The image shows a screenshot of a Q&A panel interface. A large blue box with white text is overlaid on the top part of the panel, stating "Type and send questions at any time using the Q&A panel". Below this, the interface shows a text input field containing the word "Question" followed by a cursor. To the right of the input field is a "Send" button. An arrow points from the blue box to the "Send" button.

# In Case of Technical Difficulties

- Delays in the broadcast audio
  - Click the mute/connect button
  - Wait 3-5 seconds
  - Click the mute/connect button again
  - If delays continue, call into the conference line
    - Call into the conference line: 303-248-0285
    - Required conference ID: 6102000
- Submit a question using the chat box

# SERDP and ESTCP Overview

Kurt Preston, Ph.D.  
Resource Conservation and  
Resiliency Program Manager



# SERDP

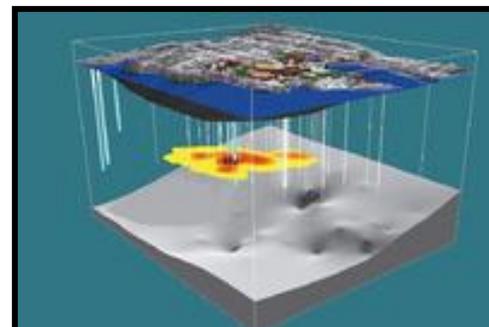
- Strategic Environmental Research and Development Program
- Established by Congress in FY 1991
  - DoD, DOE and EPA partnership
- SERDP is a requirements driven program which identifies high-priority environmental science and technology investment opportunities that address DoD requirements
  - Advanced technology development to address near term needs
  - Fundamental research to impact real world environmental management

# ESTCP

- Environmental Security Technology Certification Program
- Demonstrate innovative cost-effective environmental and energy technologies
  - Capitalize on past investments
  - Transition technology out of the lab
- Promote implementation
  - Facilitate regulatory acceptance

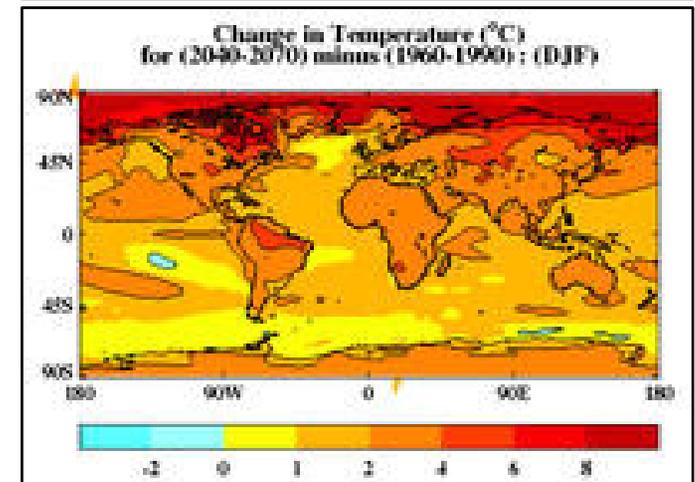
# Program Areas

1. Environmental Restoration
2. Installation Energy and Water
3. Munitions Response
4. Resource Conservation and Resiliency
5. Weapons Systems and Platforms



# Resource Conservation and Resiliency

- **Natural resources**
  - Ecological forestry
  - Arid lands ecology and management
  - Cold regions ecology and management
  - Pacific island ecology and management
  - Coastal and estuarine ecology and management
  - Living marine resources ecology and management
  - Species ecology and management
  - Watershed processes and management
- **Resilience**
  - Vulnerability and impact assessment
  - Adaptation science
  - Land use and carbon management
- **Air quality**
  - Wildland fire dynamics
  - Fugitive dust



# SERDP and ESTCP Webinar Series

Date	Topic
June 28, 2018	Managing Sites Impacted by 1,4-Dioxane: New Developments in Molecular Tools and Conceptual Site Models
July 12, 2018	Innovative Low Cost Building Automation Sensors and Controls
August 9, 2018	Energy Sustainable Wastewater Treatment Systems for Forward Operating DoD Installations
August 23, 2018	Sediment Volume Search Sonar Development
September 6, 2018	Informing Restoration Programs for Threatened and Endangered Plant Species

## *SERDP & ESTCP Webinar Series*

**For upcoming webinars, please visit**

<http://serdp-estcp.org/Tools-and-Training/Webinar-Series>



# Save the Date!

SERDP • ESTCP  
**SYMPOSIUM**  
2018 | Enhancing DoD's Mission Effectiveness

A three-day symposium showcasing the latest technologies that enhance DoD's mission through improved environmental and energy performance

November 27 - 29, 2018

Washington Hilton Hotel

***Registration is coming soon***

## *SERDP & ESTCP Webinar Series*

# Advances in Avian Monitoring on Department of Defense (DoD) Installations

Richard A. Fischer, Ph.D.  
U.S. Army Engineer Research  
and Development Center



# Agenda

- DoD bird monitoring needs/justification
- Monitoring tools and techniques
- Mission-sensitive bird species
- Autonomous Aerial Acoustic Recording Systems (AAARS)

# Why Does DoD Monitor Birds?

- Support the training and testing mission!
- Compliance with legislation
- Obtain basic inventory data
- Identify problems and their causes
- Help design management programs and evaluate successes and failures

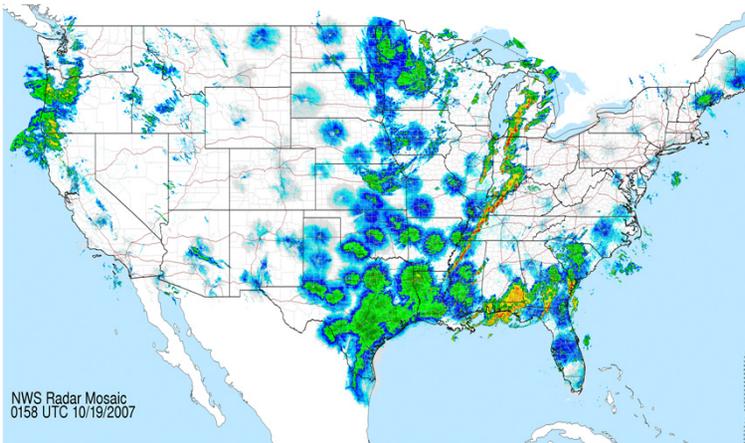


# DoD Bird Monitoring Requirements

- Migratory Bird Treaty Act (1918)
- Endangered Species Act (1973)
- Executive Order 13186 (2001)
  - “Responsibilities of Federal Agencies to Protect Migratory Birds”
- Sikes Act (1960)
- DoD Migratory Bird “Readiness Rule” (2007)



# Monitoring Technology on DoD Lands



# DoD Coordinated Bird Monitoring

- Reviewed existing monitoring programs
- Provided guidelines for monitoring surveys
- Identified DoD mission-sensitive bird species for focused monitoring
- Integrated DoD into continental programs
- Data mining and input into the Avian Knowledge Network



# DoD Mission-Sensitive Species

*Species with the highest potential to impact the military mission should they become Federally listed*



Golden-Winged Warbler



Bachman's Sparrow



Mountain Plover



Burrowing Owl



Tricolored Blackbird



Wood Thrush  
(Watch List)

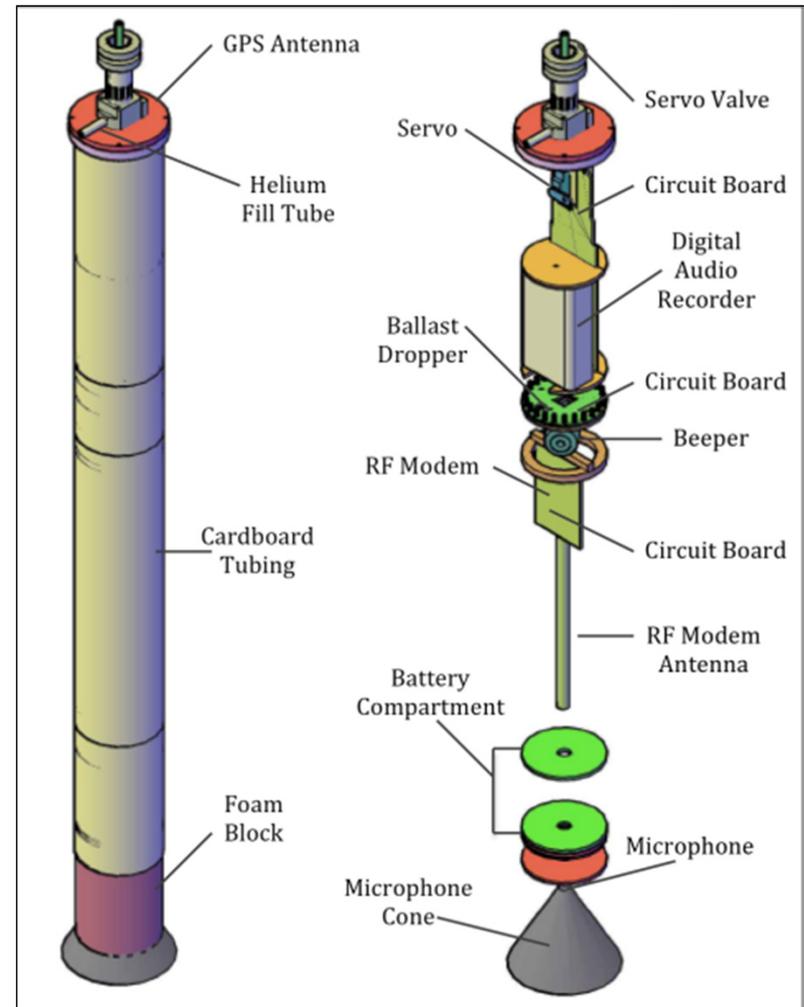
# Challenges

- DoD has ~425 federally-listed species and ~520 species at risk
- ~250 installations have at least one listed species
- >1M acres of inaccessible “impact” areas with little to no monitoring data
- Monitoring data often needed from these areas to contribute to the overall understanding of migratory bird populations inhabiting DoD installation habitats



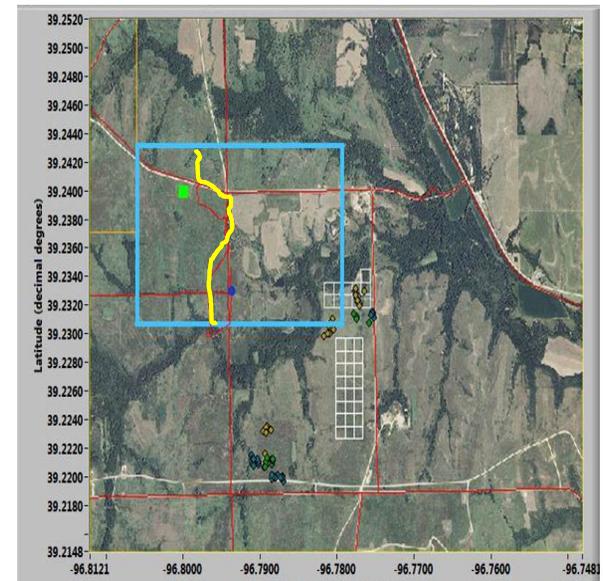
# AAARS System Description

- Lifting system
- Microprocessor
- RF communications
- GPS system
- Altitude control
- Digital audio recorder
- Power supply
- PC-based ground tracking/ control stations



# Objectives of ESTCP Investigation

1. Demonstrate and validate the use of AAARS for monitoring avian populations
2. Develop an automatic detection software pathway to streamline audio analysis and derive species density estimates
3. Compare AAARS data with that of human observer techniques



# AAARS – Field Operations

- Balloon is released on downwind side of target area
- Vehicle flies with ambient wind direction and speed
- Onboard altitude control
- Recovery is on windward side of target area



# Focal Species



Greater Prairie  
Chicken



Grasshopper  
Sparrow



Henslow's  
Sparrow



Prairie  
Warbler



Bachman's  
Sparrow



Northern  
Bobwhite



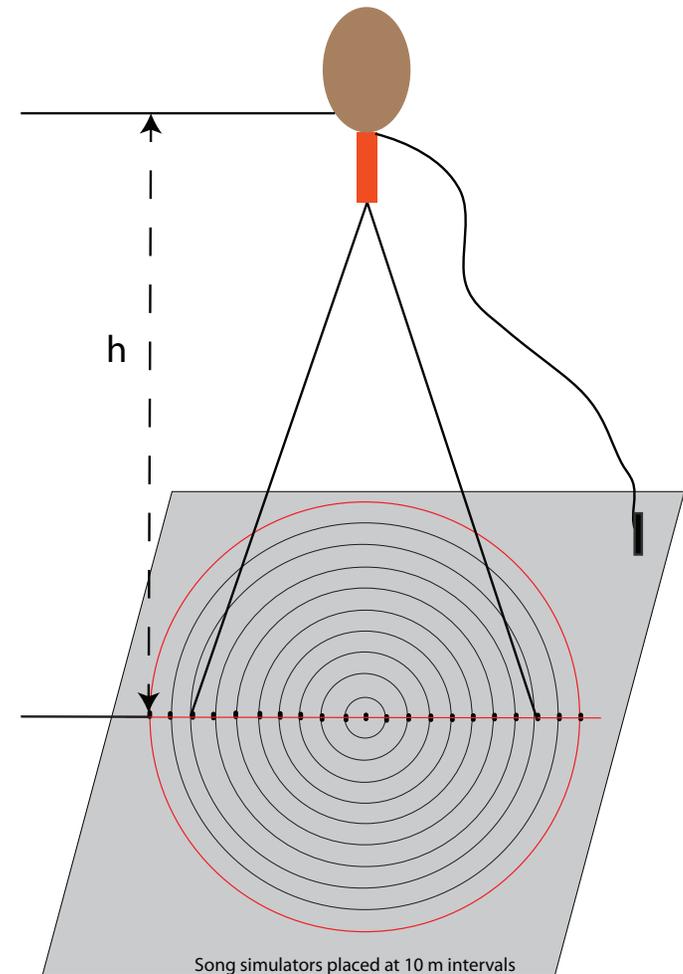
Red-Cockaded  
Woodpecker



Field  
Sparrow

# Performance Validation

- Microphone footprint
  - Tethered AAARS at point-center
  - Walked song simulators down transect and stopped at 10-m intervals out to 300 m
  - Played 2, 5, and 8 kHz tones at each stop at target bird amplitudes
  - Conducted tests at 100 m, 200 m, and 300 m altitudes ( $h$ )
  - Analyzed the resultant audio files to determine effective detection distance horizontally and vertically



# Performance Validation

- Conducted 335 free flights at Fort Riley, Fort Bragg and JPG in 2011-2013
  - 95% success on pre-flight
  - 95% hit target area
  - 89% maintained target altitude
  - 83% with good audio data
  - 99% were recovered
  - Total free flight success (with audio) = 74%



# Results: Detections of Prairie Warblers

	Available	Observer Detected	AAARS Detected
Jefferson P.G.	129	83 (64%)	117 (91%)
Ft. Bragg	139	110 (79%)	135 (97%)
<b>TOTAL</b>	<b>268</b>	<b>193 (72%)</b>	<b>252 (94%)</b>



# AAARS vs. Human Observers

*Similar amount of audio data and 33x the area covered!*

	Observer	AAARS
Effort	~30 point counts (radius = 100 m)	5 flights (@10 km each)
Data	300 min audio	~300 min audio
Area covered	94 hectares	3,000 hectares

# AAARS Cost

- AAARS fabrication = \$1000 per unit
- Base stations (3/installation) = \$1000 per base station
- Field operation
  - 3 trained personnel
  - 5 flights per morning
- Acoustic analyses



# Other Applications

## *Feasibility of bat detection/AARS technology*

*Pettersson bat detector with balsa wood box, hanging attachments, and Li-Ion battery*



# Conclusions

- Comprehensive monitoring of sensitive species is important
- New tools/techniques are improving monitoring capabilities
- AAARS technology highly successful (consistent performance and cost-effective)
- Permanent audio archive and applicable to multiple species
- Improves monitoring capabilities for management that supports DoD missions

# Acknowledgments

- **Drs. David Buehler, Stacy Worley, John Wilkerson Mr. David Smith, Ms. Emily Hockman, Ms. Stephanie Prevost, Mr. Matt Menachery**, UT Dept. Forestry, Wildlife and Fisheries, and UT Dept. Biosystems Engineering and Soil Science
- **Mr. Thomas Fowler**, Cornell Lab of Ornithology, retired



# *SERDP & ESTCP Webinar Series*

For additional information, please visit  
<https://www.serdp-estcp.org/Program-Areas/Resource-Conservation-and-Resiliency/Natural-Resources/Species-Ecology-and-Management/RC-201112>

## **Speaker Contact Information**

Richard.A.Fischer@erdc.dren.mil; 502-454-4658



# *SERDP & ESTCP Webinar Series*

## Q&A Session 1



## *SERDP & ESTCP Webinar Series*

# Understanding and Managing Avian Species of Concern on DoD Installations

T. Brandt Ryder, Ph.D.  
Smithsonian Migratory Bird Center

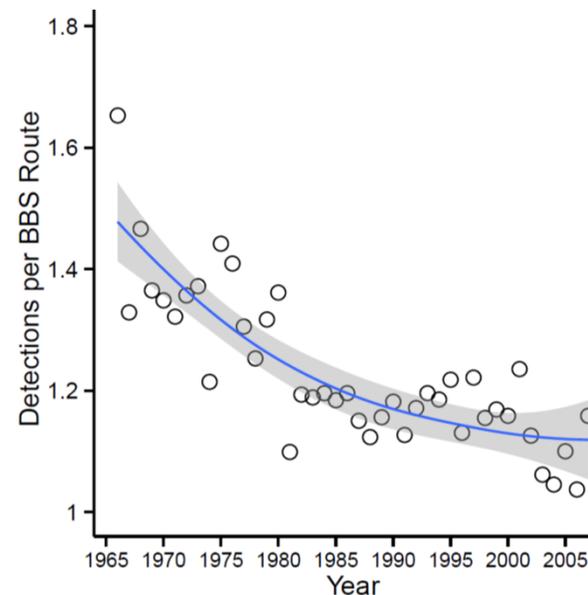


# Agenda

- Overview
  - Department of Defense (DoD) and migratory birds
  - Source-sink (SS) dynamics
- Project objectives
- Methods
- Results
  - Point-counts and species distribution models
  - Demography
  - Population dynamics
- Management and monitoring

# DoD and Migratory Birds

- DoD manages 30 million acres of wildlife habitat
- Enigmatic declines of migratory birds
- Management is a DoD conservation priority
- 2010 Strategic Bird Monitoring
- Balance with mission and military readiness activities



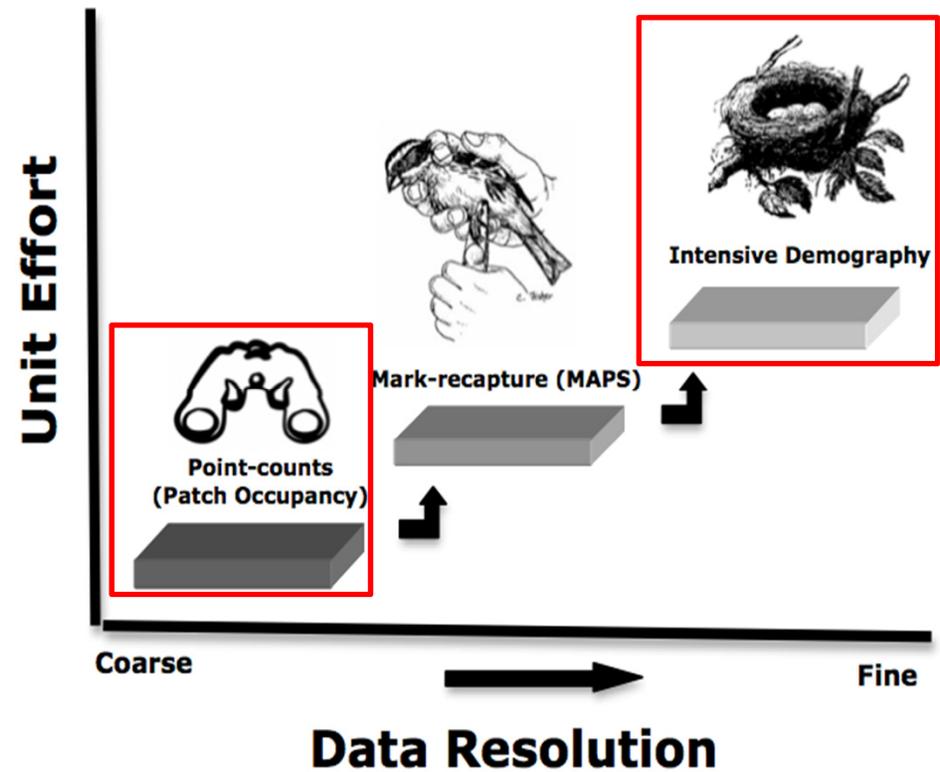
# Management, Sources and Sinks

- Management requires demographic monitoring
  - Habitat-specific demography
  - Population dynamics
- Key tool is modeling source-sink dynamics (population growth  $\lambda$ )
- Source = birth  $>$  death and emigration  $>$  immigration
- Sink = death  $>$  birth and immigration  $>$  emigration



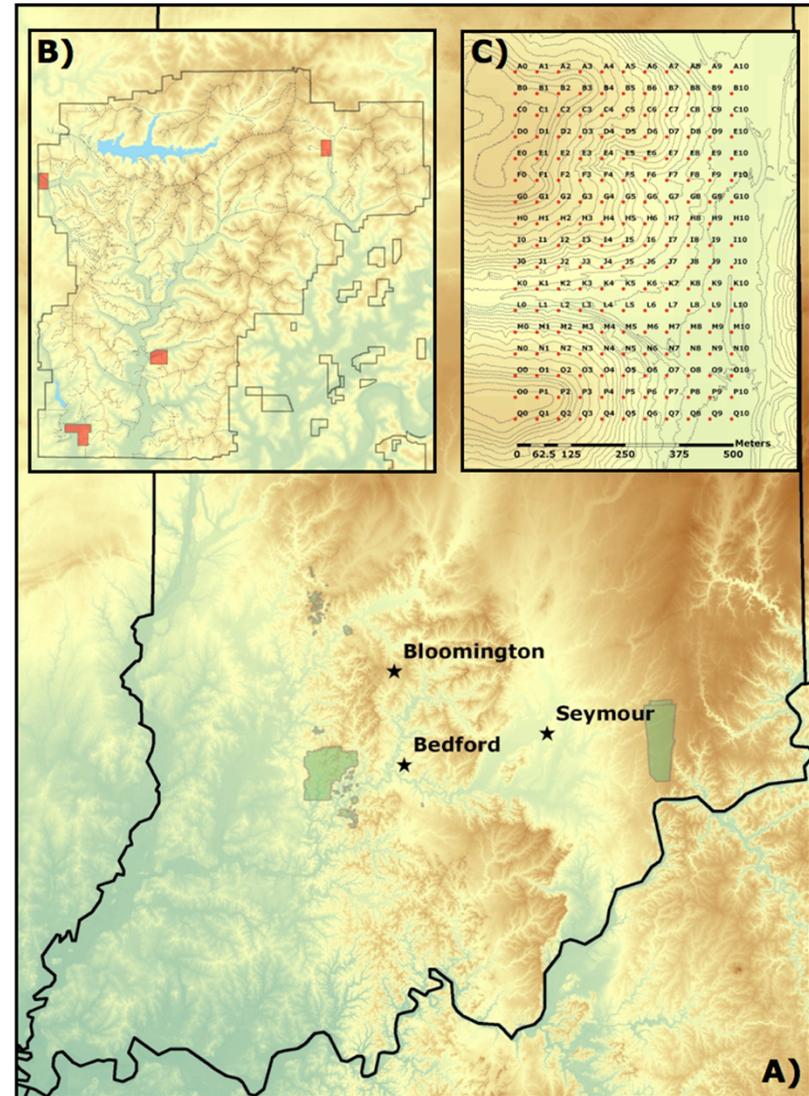
# Project Objectives

- Measure SS dynamics for the species of concern (SOC) – Wood Thrush
  - Spatial and temporal drivers
  - Local and landscape
- Cost-effective monitoring approaches
  - Point-counts
  - Intensive demography
- Monitoring and management



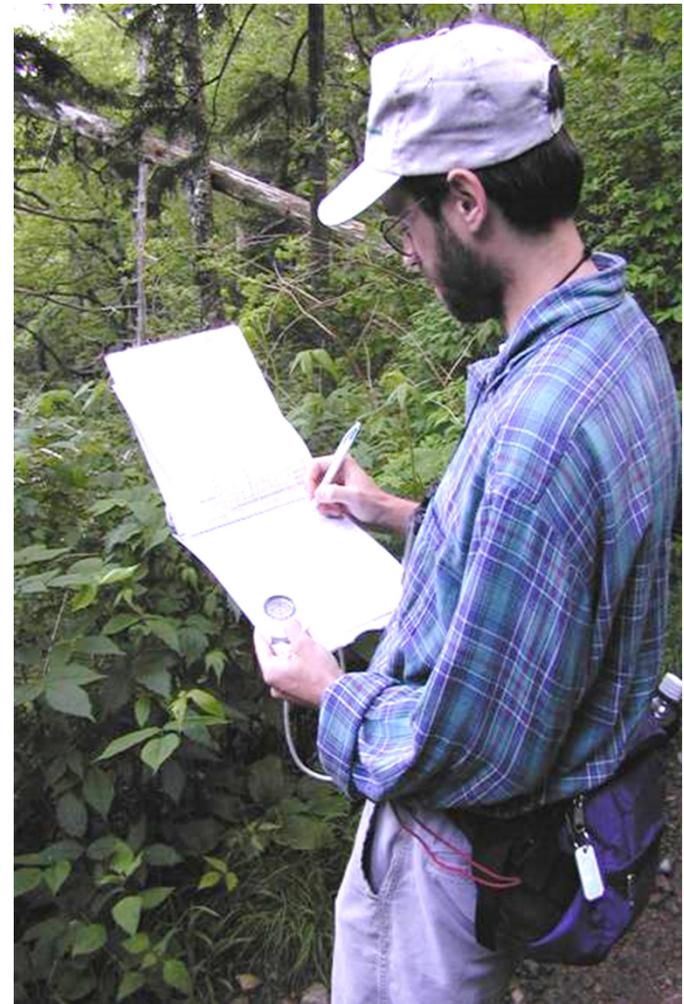
# Study Sites and Methodology

- DoD installations with large contiguous forests
  - Big Oaks National Wildlife Refuge (BONWR)
  - Crane
- Illinois Department of Natural Resources
  - Small fragments
- 12 study plots (37-63 ha)
  - Point-counts
  - Monitoring Avian Productivity and Survivorship (MAPS)
  - Demography



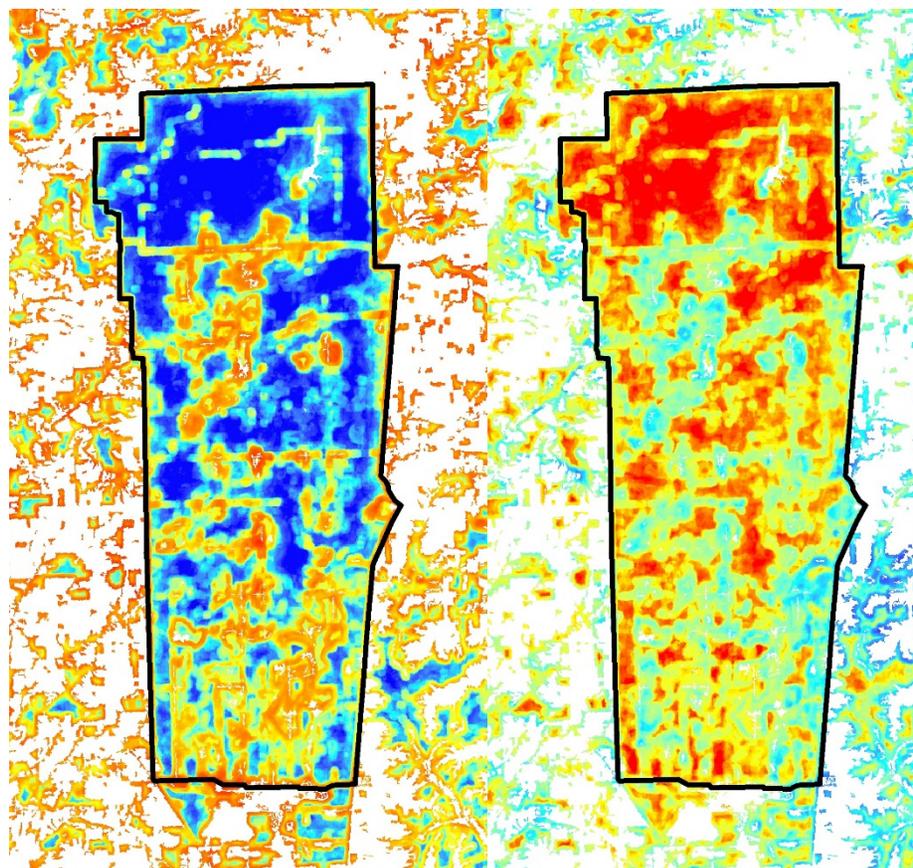
# Point-Counts

- Community-wide sampling
- 685 counts in 487 patches
  - Design captured variation in patch size
- Used distance-sampling approach
  - Density (birds/ha)
  - Detection probability
- Design enables
  - Occupancy
  - Colonization
  - Extinction



# Species Distribution Models (SDMs)

- Benefits of count data
  - Landscape scale
  - Probability of occurrence
- SDM
  - LandSAT as predictors of occurrence
- Sensitivity to landscape structure
- Complexities of managing for diverse avian assemblages

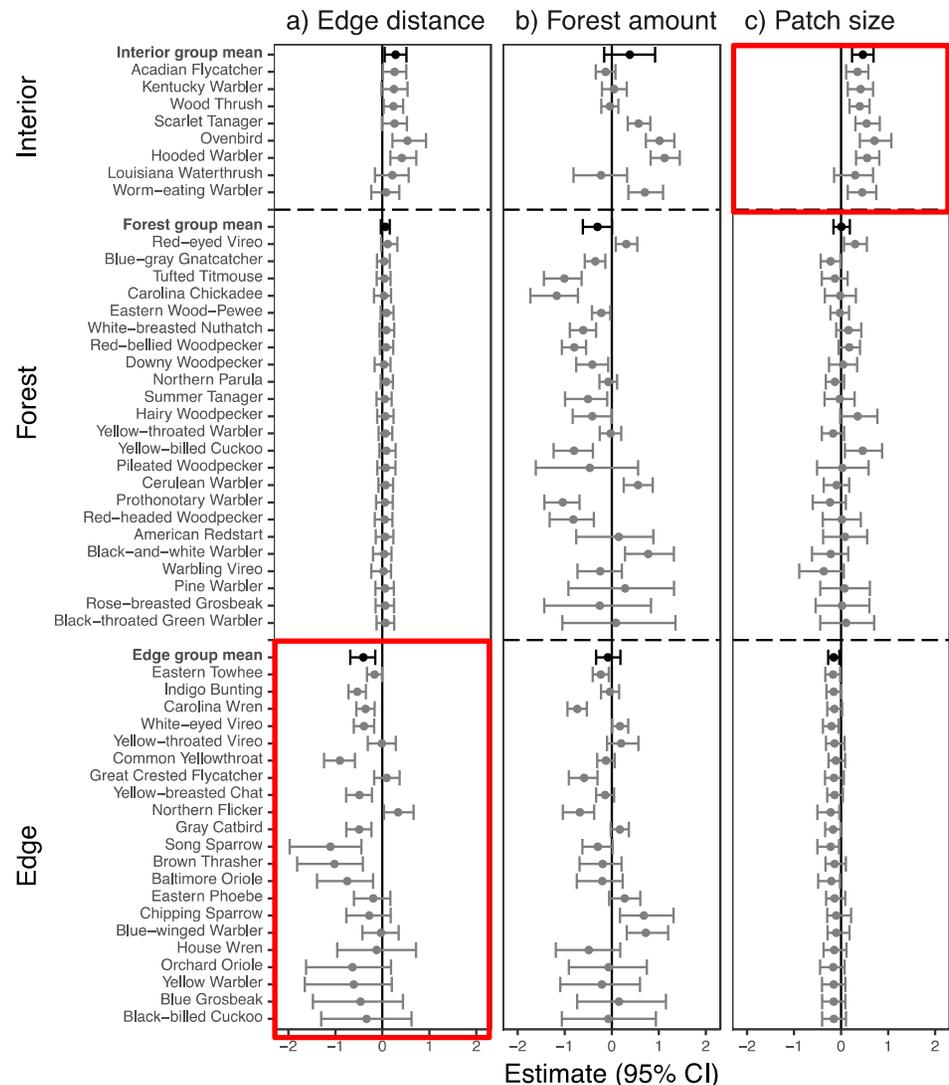


Indigo Bunting

Wood Thrush

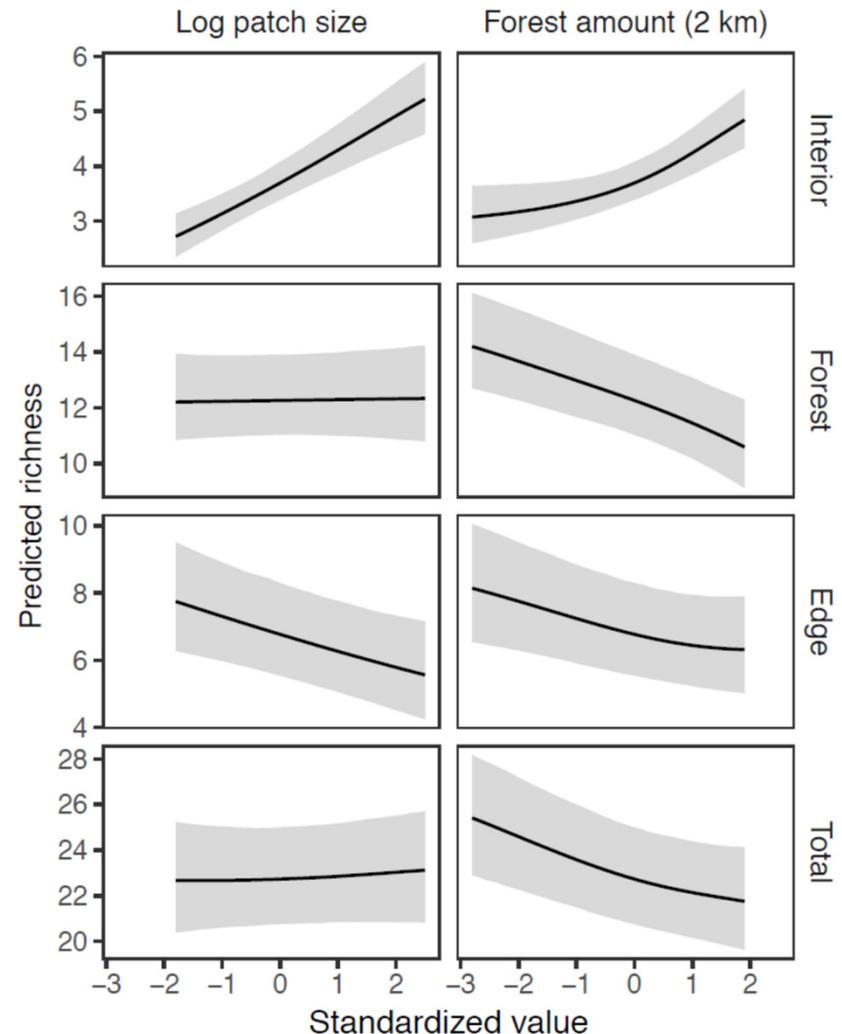
# Drivers of Avian Distribution

- Patch size and forest amount predict occupancy
- Robust after controlling for edge
- Edge important for successional species



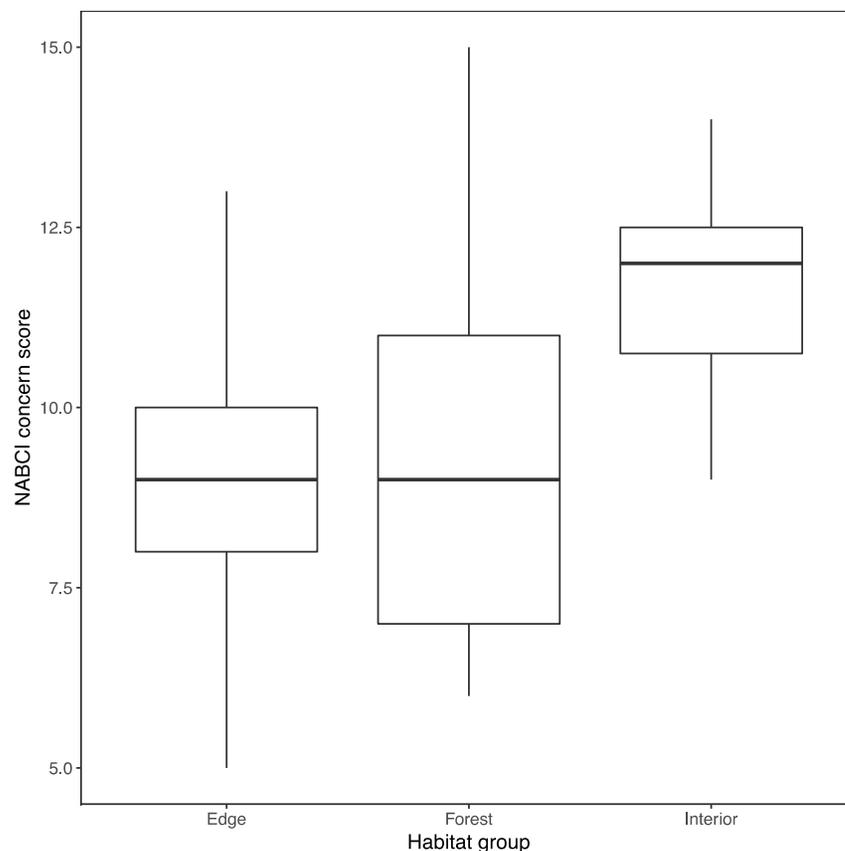
# Maximizing Species Richness

- Response to landscape factors is variable
- Avian diversity maximized via mixed management
- Maintain large intact tracts (zero management)
- Managed mixed-use tracts of variable sizes (selective logging)
- Maintain edges, successional and small patches



# How and What to Manage For

- Managing for SOCs
- Interior forest species require focused conservation
- Richness and demography
- Why invest in more costly monitoring approaches?

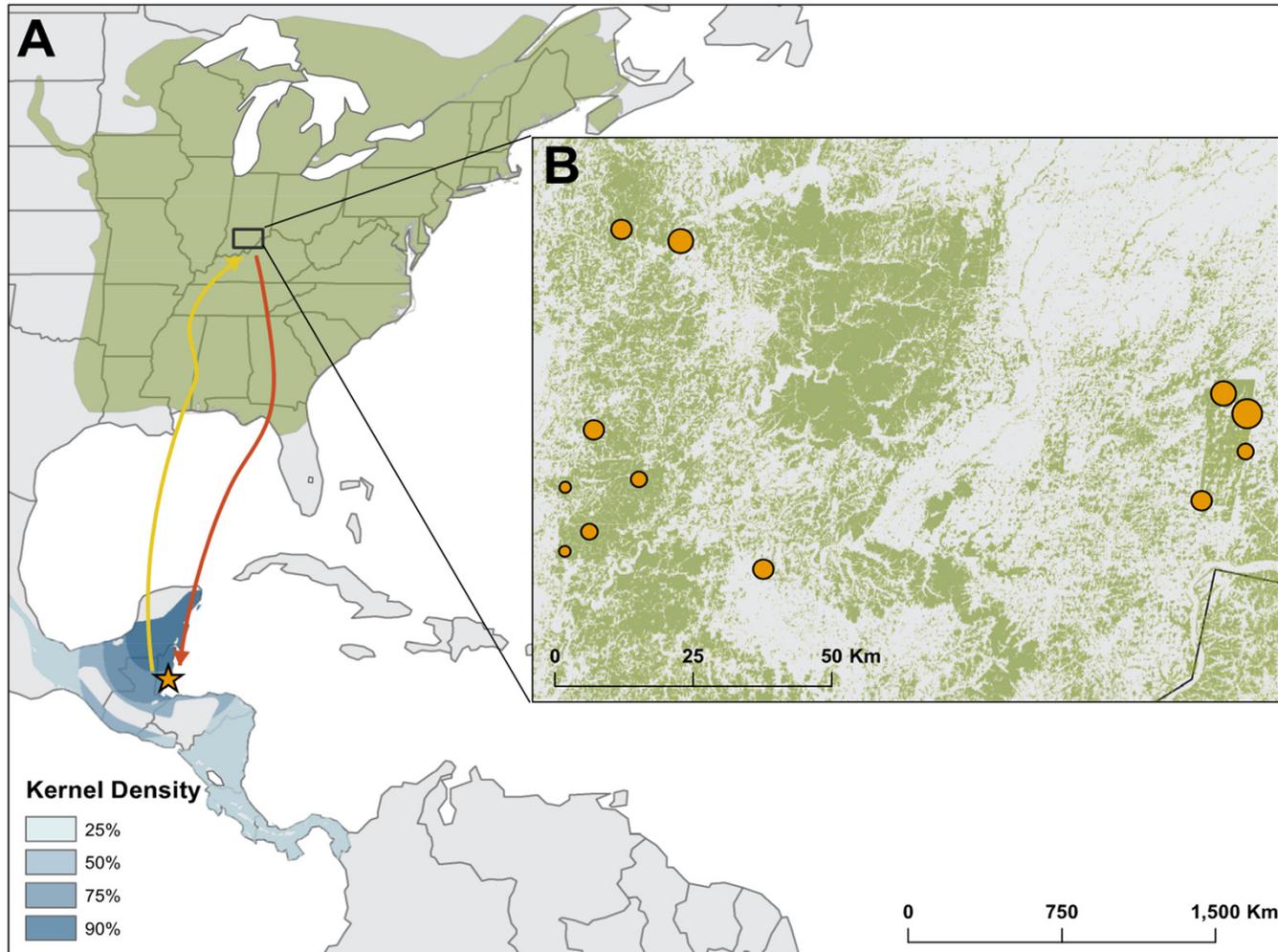


# Intensive Demography

- Monitored ~40/pairs/yr (~1,400 total, 4 years)
- Per capita vital rates
  - Adult survival – mark-recapture
  - Fecundity – nest monitoring
  - Juvenile survival – radio telemetry
  - Immigration – stable isotopes
- Full-annual cycle
  - Geolocators and non-breeding demography

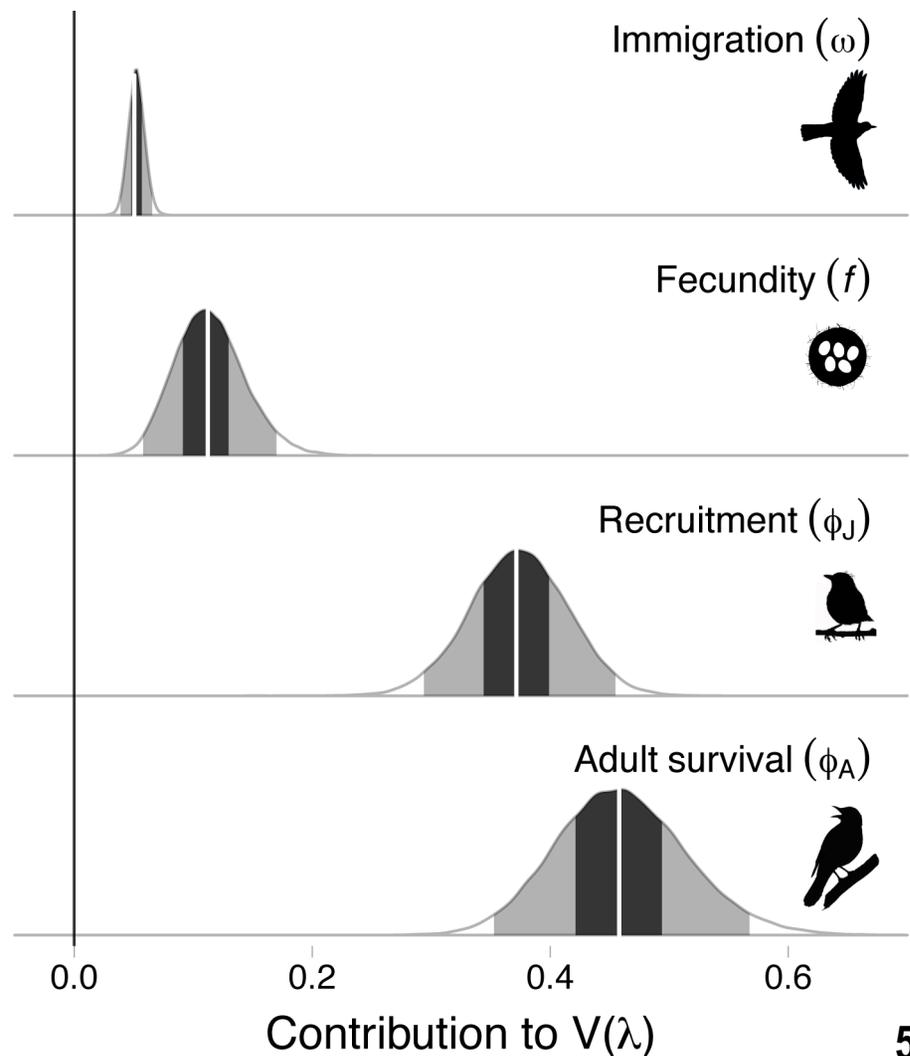


# Full-Annual Cycle Integrated Model



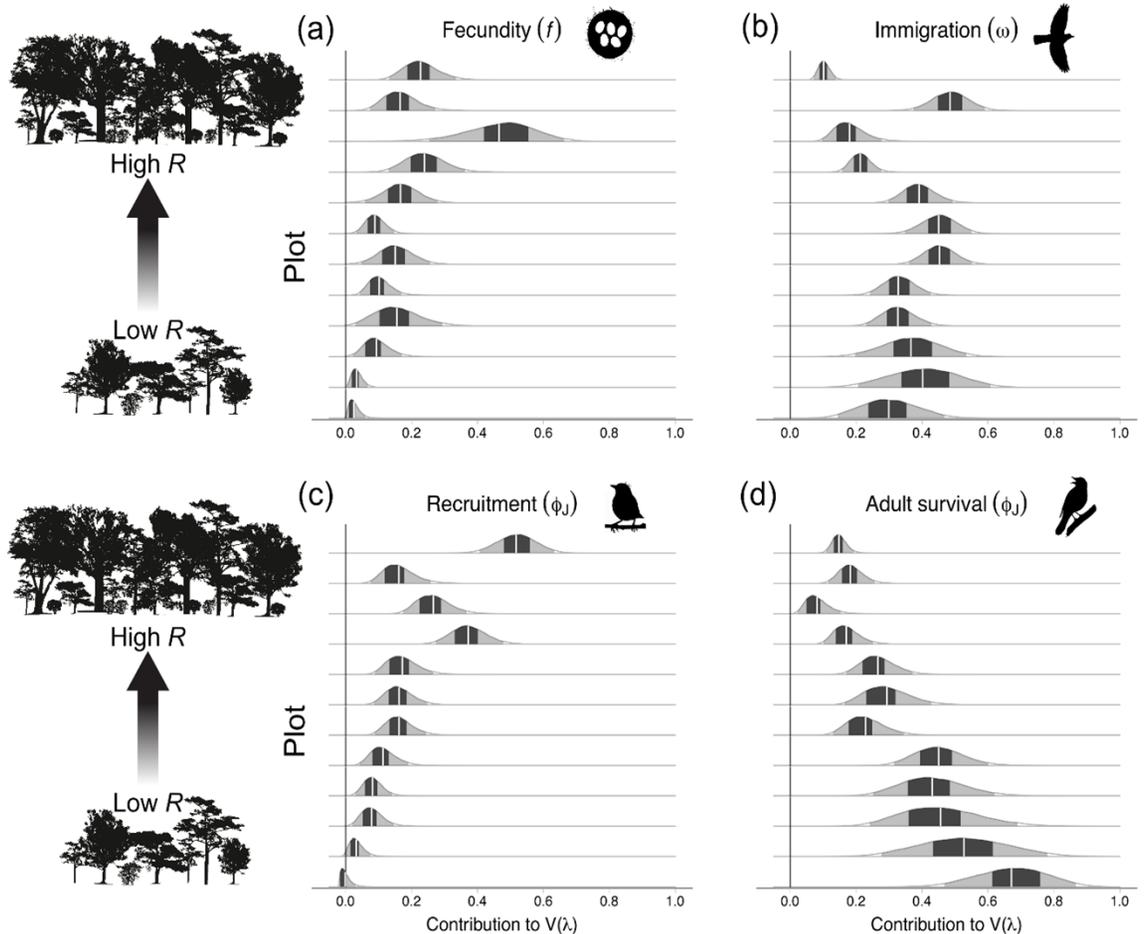
# Demographic Contributions to $\lambda$

- Managing populations requires knowledge when, where and how populations are limited
- Survival and recruitment are key vital rates
- Breeding demography is critical
- Migration survival

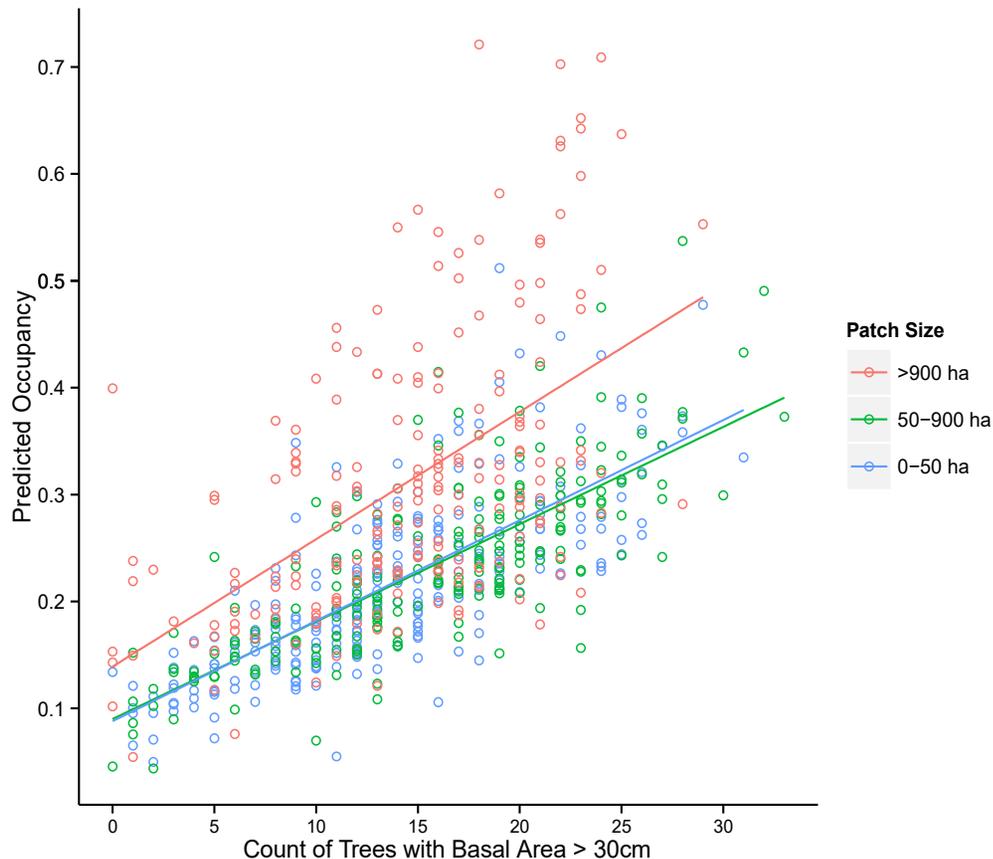


# Habitat-Specific Demography

- Immigration and SS dynamics
- Self-recruitment and habitat quality
- Importance of vital rates varies with habitat quality



# Local Drivers of Source Populations



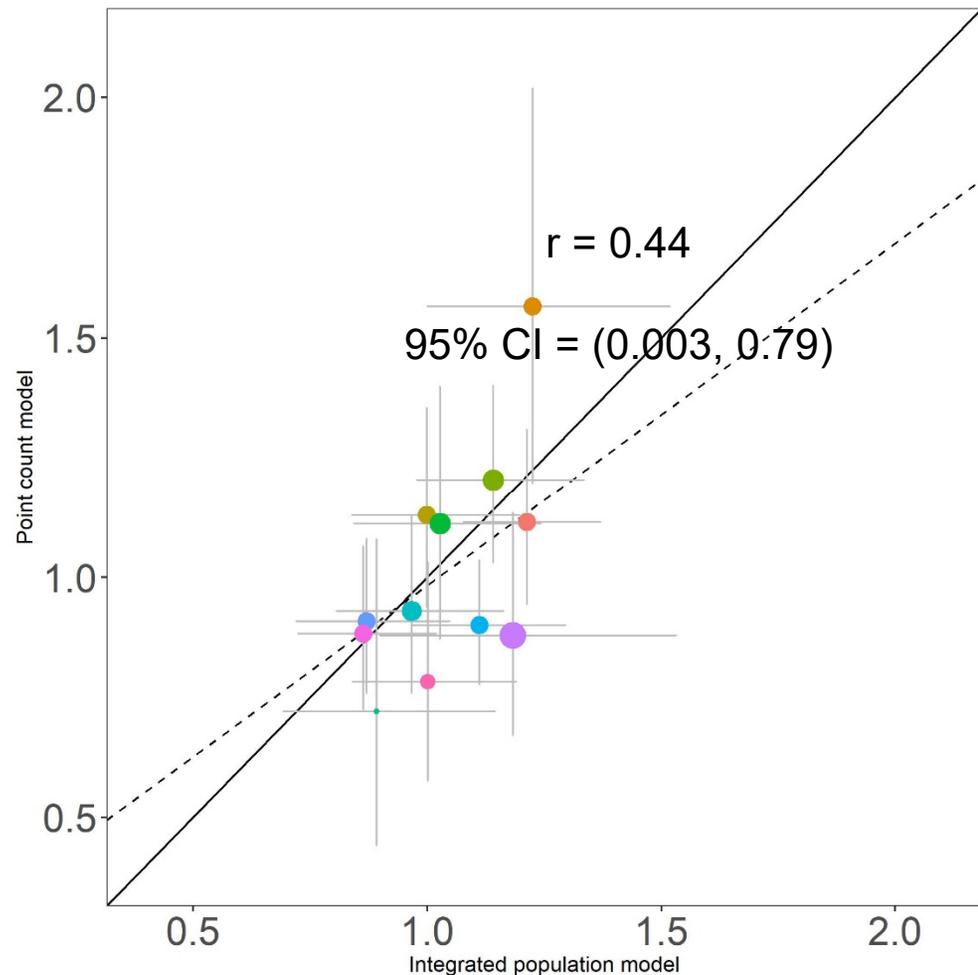
- Landscape scale management is challenging
- Prescriptive management is most effective at small scales
- Managing for large trees will help forest interior birds

# Local Drivers of Source Populations

Model	AIC <sub>c</sub>	w <sub>i</sub>
Basal Area > 30 (BAG30)	0.0	0.66
Null	2.3	0.21
BAG30 + ForCov + PatchSize	5.0	0.06
BAG30 + PatchSize	6.2	0.03
ShrubCov + BAG30 + ForCov + PatchSize	7.0	0.02
PatchSize	8.0	0.01

# Methodological Comparisons

- PC vs. demography
- Count data is variable and may measure non-breeding birds
- PC and demography correlated for trends across 4 years



# DoD Benefits

- Baseline data for Wood Thrush population health
- Vital information about local and landscape drivers of avian population dynamics
- Key management recommendations for interior forest specialist
- Efficacy of different monitoring methods

# Conclusions

- Trade-offs between species richness and demographic performance
- Count data are cost effective to monitor communities and population trends
- Demographic monitoring may be required for SOC and to inform habitat-specific management
- Interior forest species will benefit from unmanaged large interior tracts of forest
- Consistency between PC and demography for trends and drivers of population dynamics

# Project Collaborators

- **Drs. Peter Marra and Scott Sillett**, Smithsonian Conservation Biology Institute
- **Drs. Rodney Siegel and James Saracco**, Institute for Bird Populations
- **Dr. Mathew Betts**, Oregon State University
- **Dr. Richard Fischer**, US Army ERDC
- **Clark Rushing, Jonathon Valente and Calandra Stanley**, post-doctoral and graduate students



Smithsonian



THE INSTITUTE FOR  
BIRD POPULATIONS



## *SERDP & ESTCP Webinar Series*

For additional information, please visit  
<https://www.serdp-estcp.org/Program-Areas/Resource-Conservation-and-Resiliency/Natural-Resources/Species-Ecology-and-Management/RC-2121>

### **Speaker Contact Information**

rydert@si.edu; 202-633-4181



# *SERDP & ESTCP Webinar Series*

## Q&A Session 2



## *SERDP & ESTCP Webinar Series*

The next webinar is on  
June 28, 2018

*Managing Sites Impacted by 1,4-Dioxane:  
New Developments in Molecular Tools and  
Conceptual Site Models*



# *SERDP & ESTCP Webinar Series*

## Survey Reminder

*Please take a moment to complete the survey that will pop up on your screen when the webinar ends*

