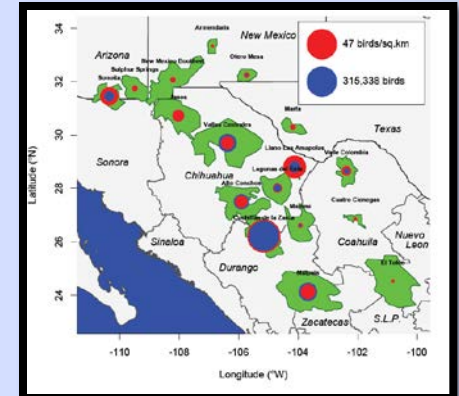
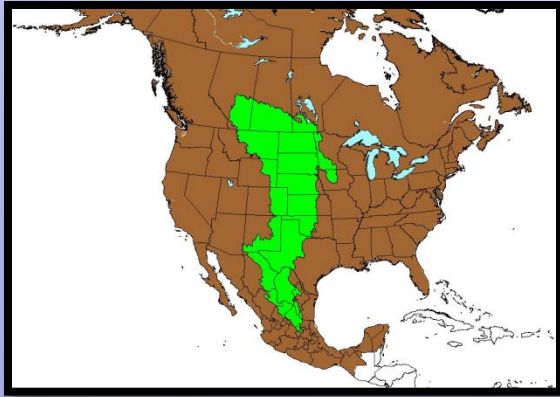


# Full annual-cycle integrated population monitoring for grassland birds



**Arvind Panjabi, Viviana Ruiz-Gutierrez, Alberto Macias-Duarte, Erin Strasser**

**Rocky Mountain Bird Observatory**

**Irene Ruvalcaba-Ortega**  
**Universidad Autónoma de**  
**Nuevo León**

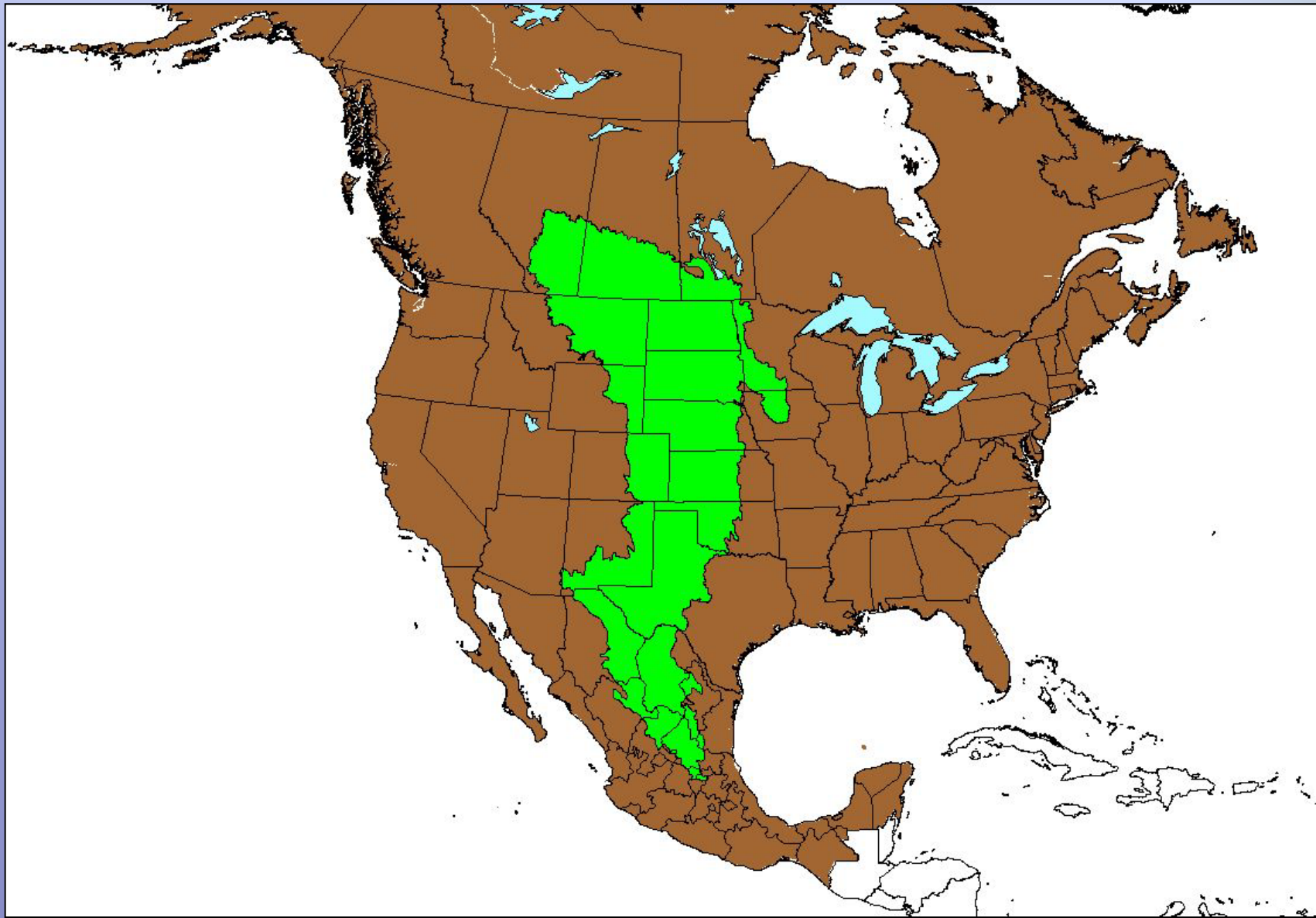
**Jose Hugo Martinez Guerrero**  
**Universidad Juarez del Estado**  
**de Durango**



*Conserving Birds & Their Habitats*



# North America's Central Grasslands





# Central Grassland Birds

- 36 grassland-obligate species
- 80% have significant negative trends (BBS)
  - MCLO= -6.2%/yr      CCLO= -4.4%/yr
  - LARB= -4.1%/yr      SPPI= -3.5%/yr
  - BAIS= -2.9%/yr      GRSP= -2.8%/yr
  - *35-95% loss across species*
  - Stable, increasing or uncertain trends: SWHA, FEHA, GOEA, MERL, PRFA, UPSA, LBCU
- 83% are migratory
  - 90% of migrants winter in Chihuahuan Desert
- *Strictly* a habitat loss issue?



# Full annual cycle monitoring

## Conservation of migratory birds

- Requires coordinated actions across the hemisphere

## Guide conservation and management actions

- Focused on stage-specific limiting factors
- Target demographic parameters most likely driving population change



# Full annual cycle framework

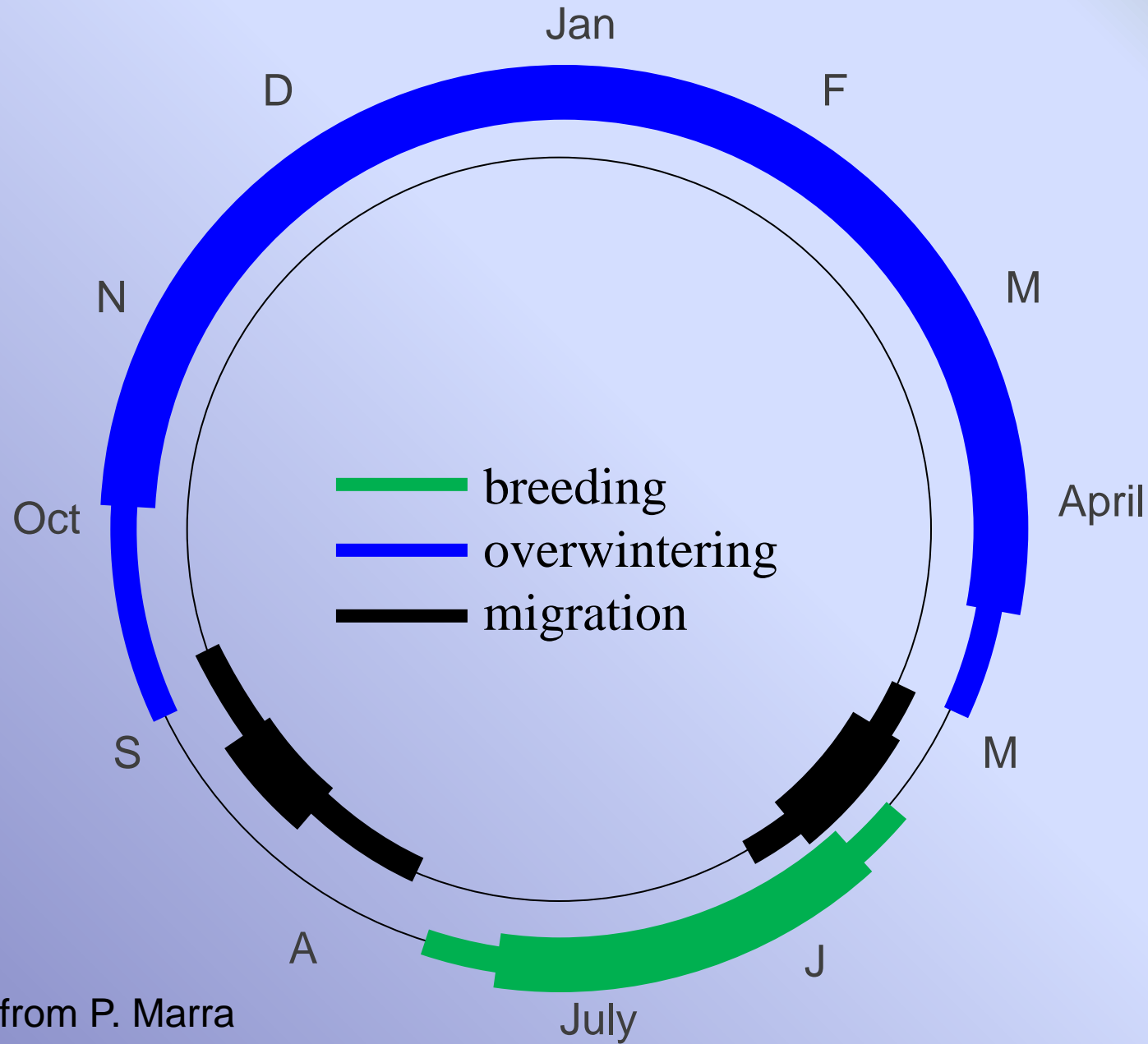
## Evaluate and quantify population change

- Relative contributions of sources of mortality
  - Age classes
  - Geographical locations
  - Seasons
- Model variability in recruitment
  - Breeding success
  - Fledgling survival

***How and when do each of these factors most contribute to population change?***



# Annual-cycle of Neotropical migrants



Adapted from P. Marra

# Integrated Population Monitoring Program



## Demography

## Count-based

Survival

Productivity

Distribution

Abundance

Connectivity

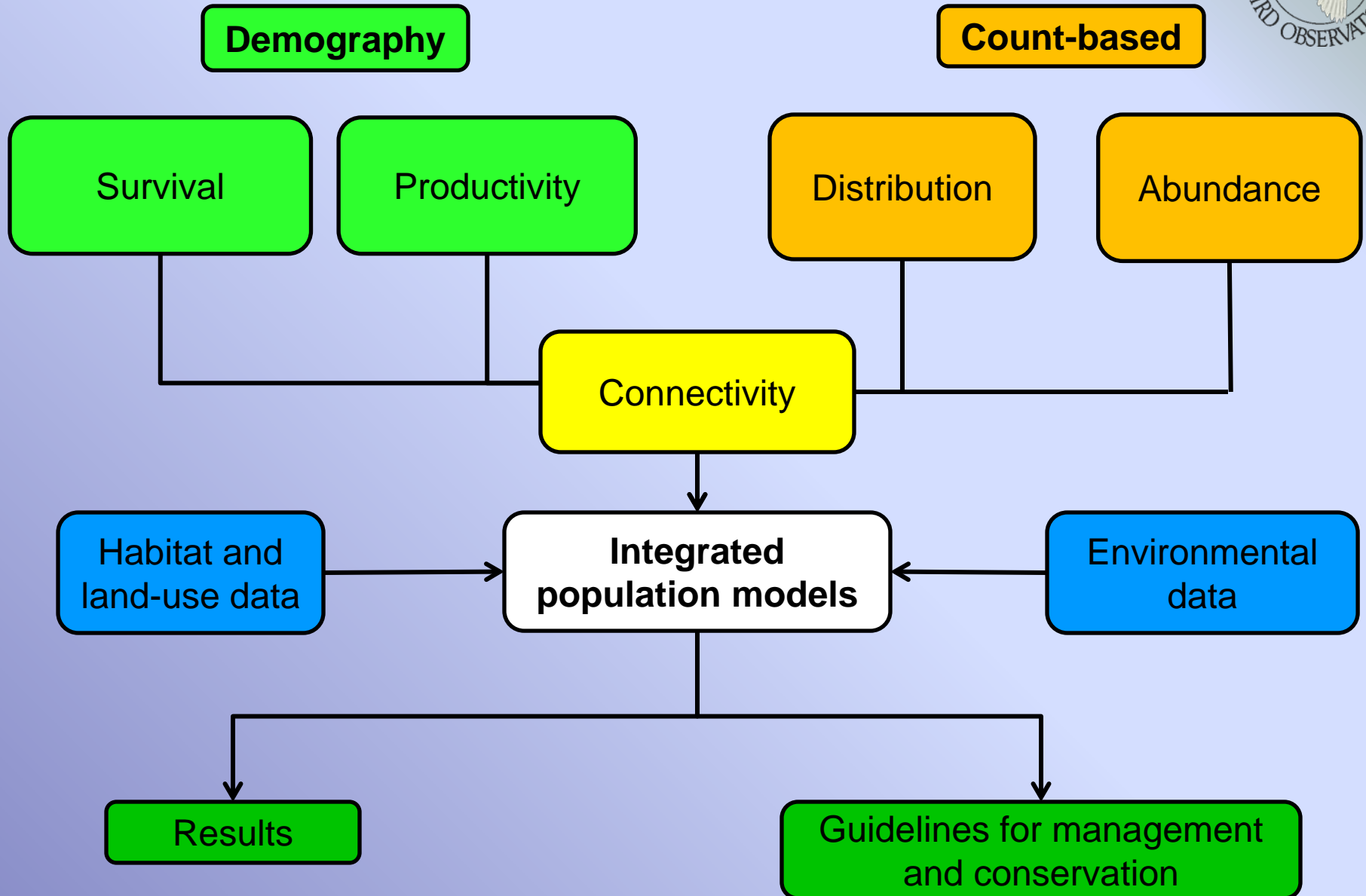
Habitat and  
land-use data

Integrated  
population models

Environmental  
data

Results

Guidelines for management  
and conservation



# Integrated Pop. Monitoring Program



- ***What information exists to inform FAC conservation?***
- ***Where are critical gaps of information, and how do we fill them?***
- ***What are the regional/political/conservation contexts of this information?***
- ***Who are our stakeholders and decision makers?***

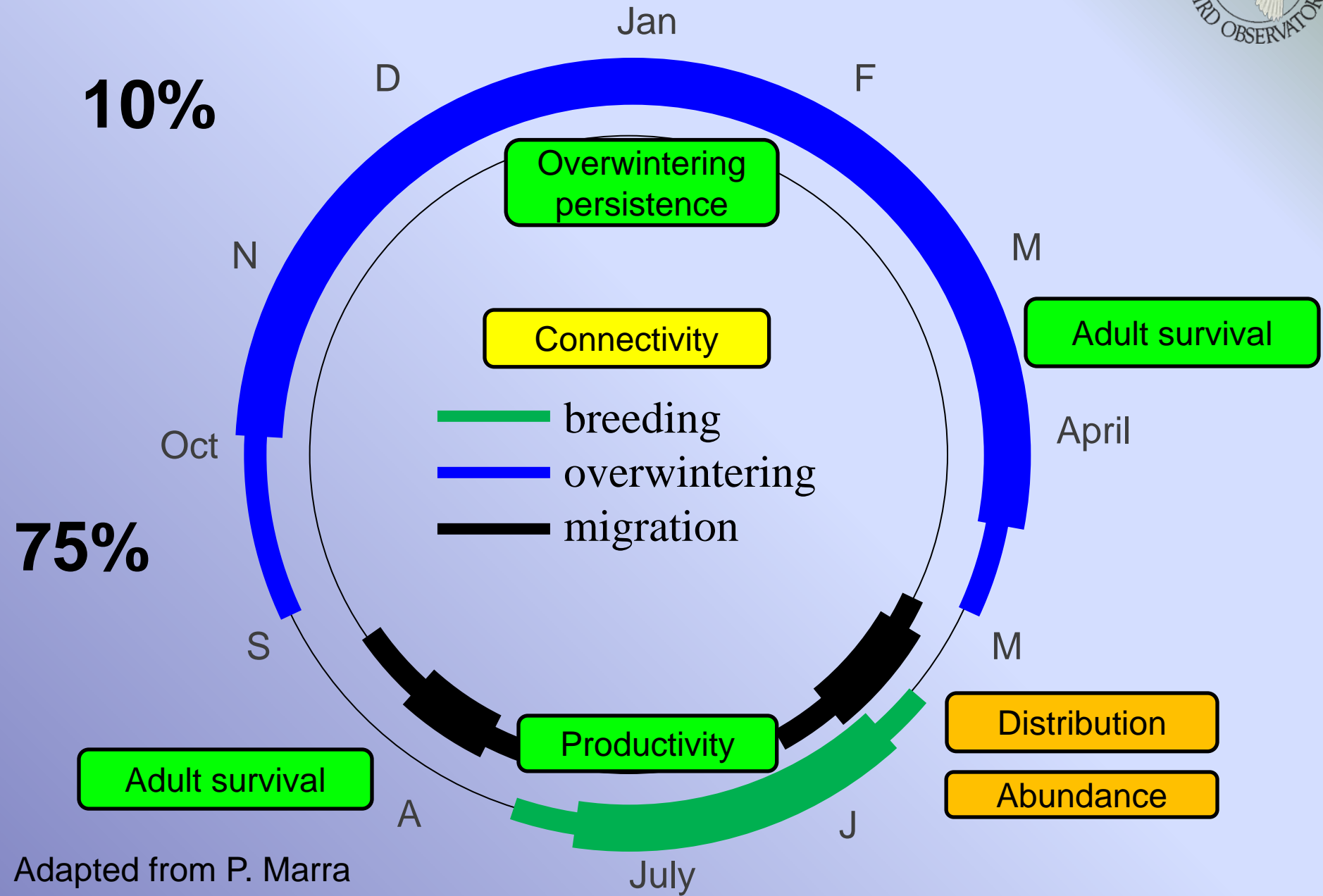


# Integrated Pop. Monitoring Program



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# Annual-cycle of Neotropical migrants

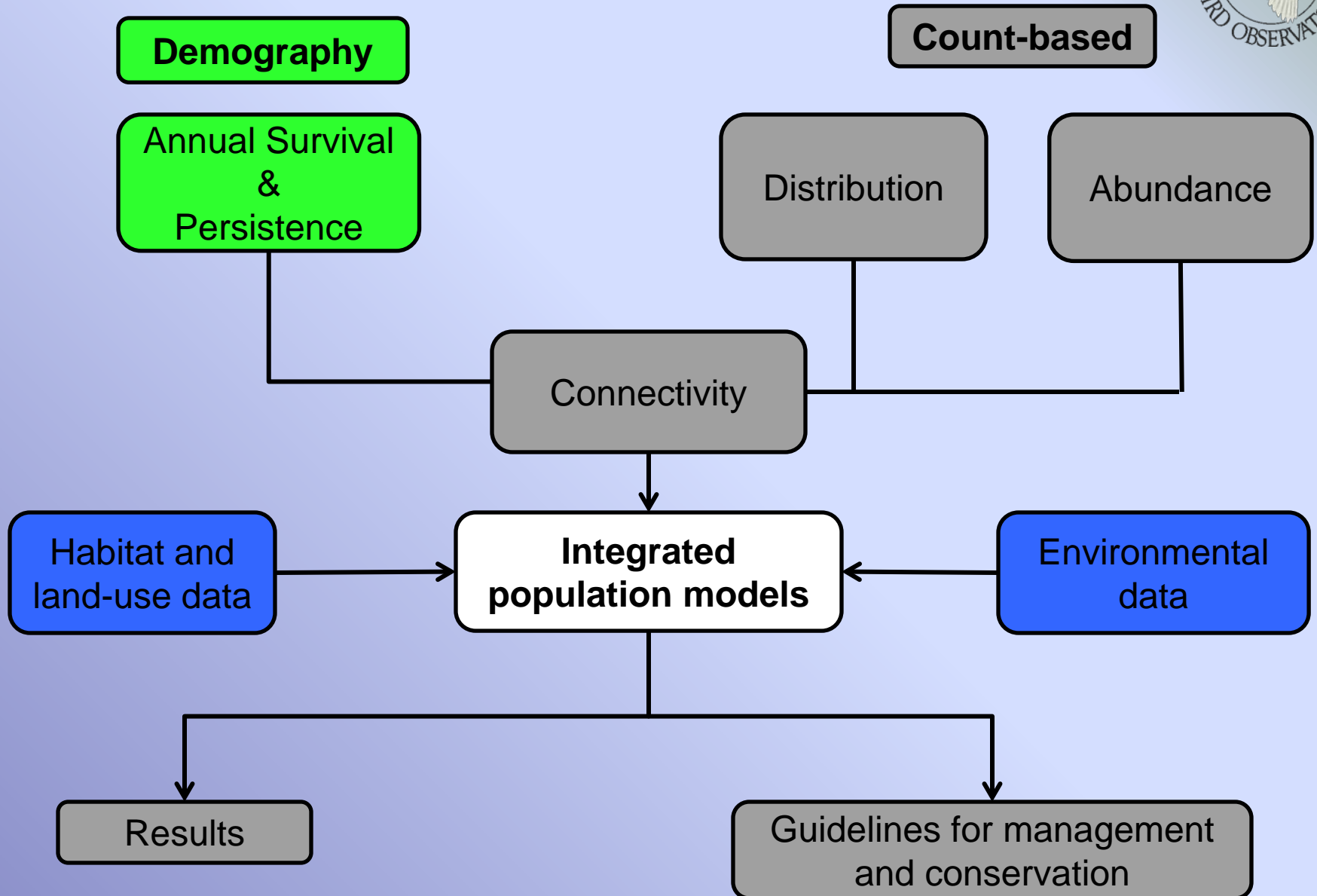


# Integrated Pop. Monitoring Program



- *What information exists to inform FAC conservation?*
- ***Where are critical gaps of information, and how do we fill them?***
- *What are the regional/political/conservation contexts of this information?*
- *Who are our stakeholders and decision makers?*

# Wintering Grounds Information



# Integrated Population Monitoring Program



## Integrated full annual cycle models

- Challenge to apply to real data
- Little overlap between the scale of information and the distributional range

## Grasslands Bird Conservation Program:

- Model system for implementing an integrated approach to FAC research and conservation

## Two key areas of development

- FAC integrated population model
- Monitoring the FAC under a SDM framework

# Integrated Population Monitoring for grassland birds

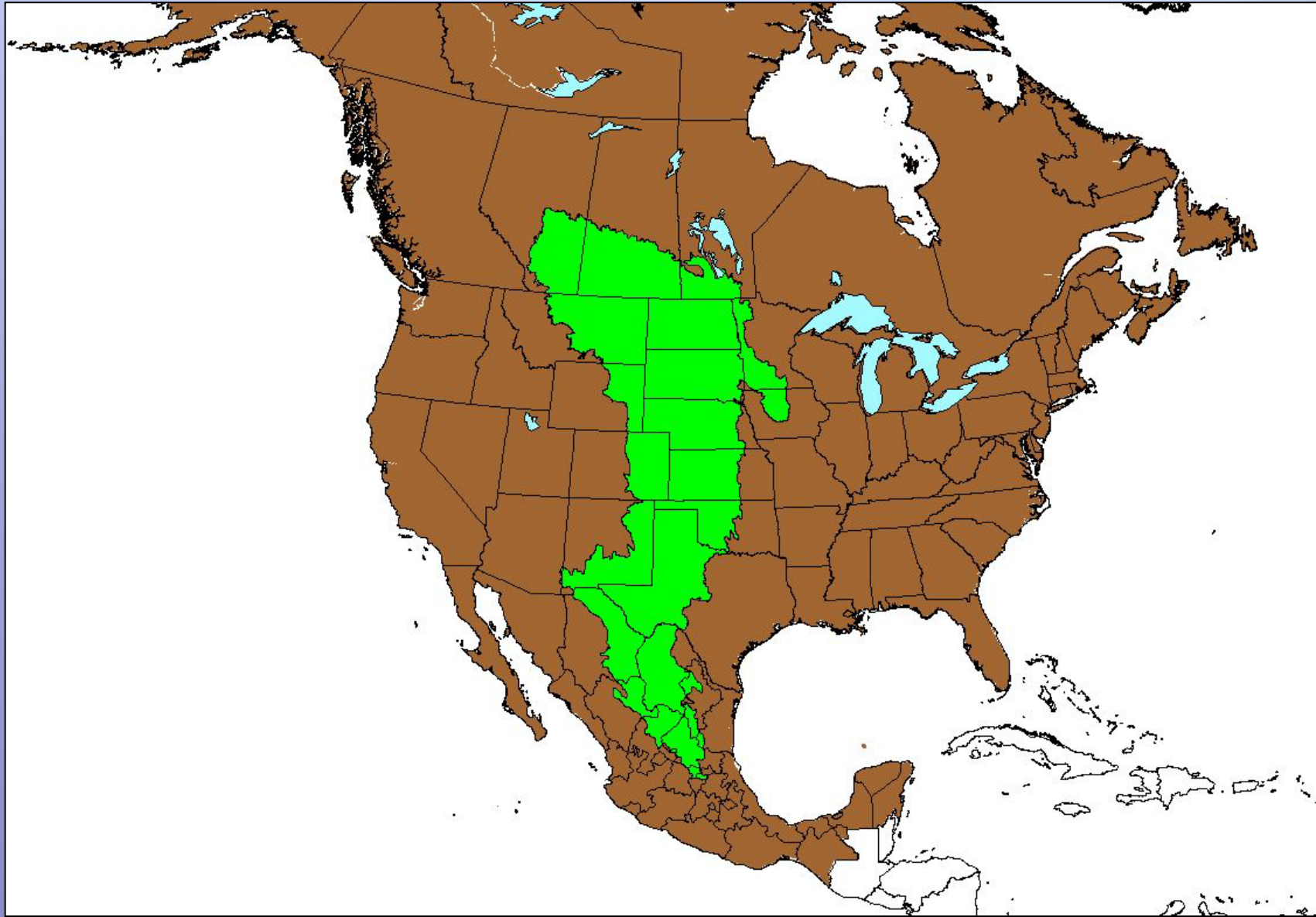


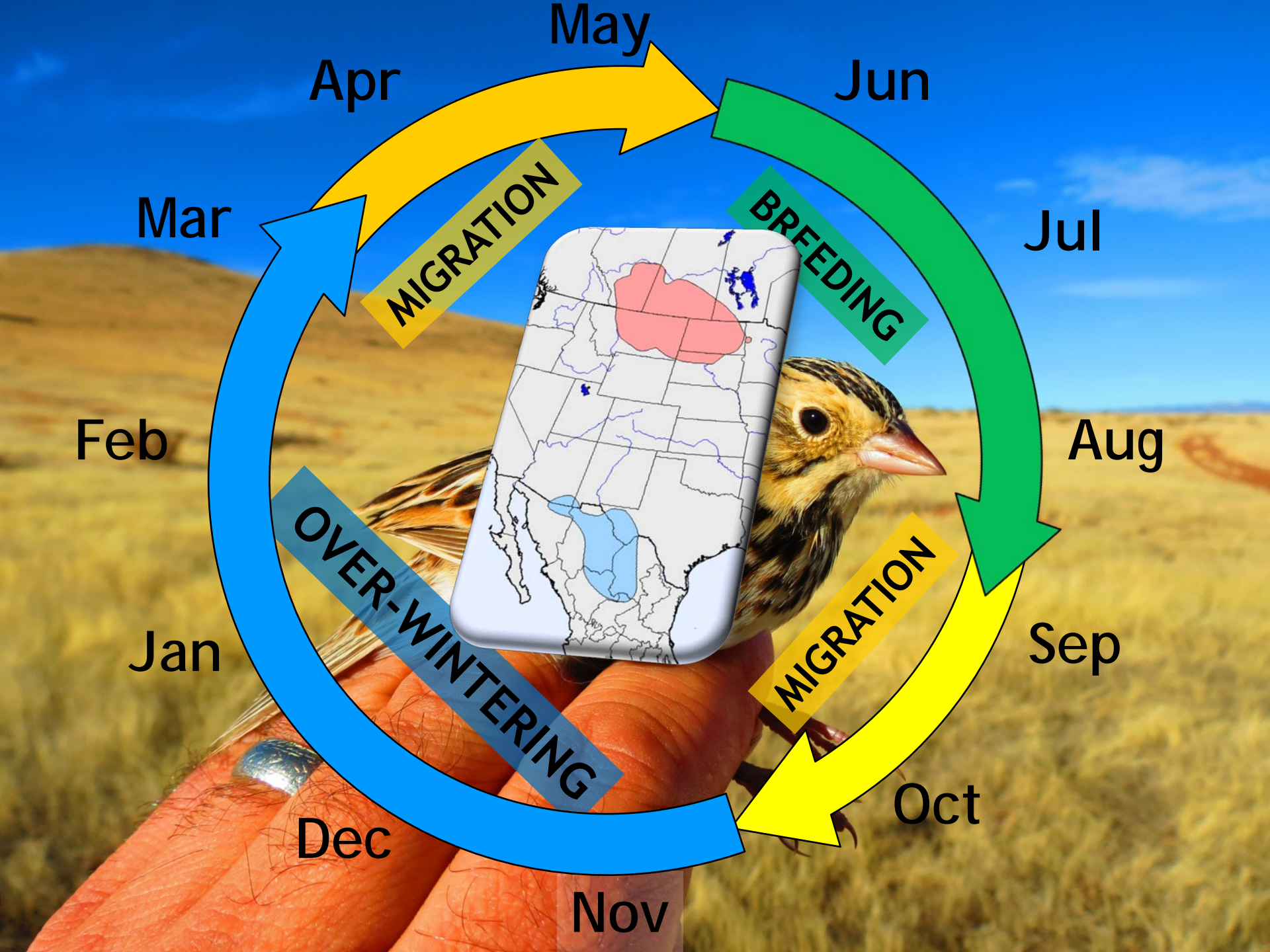
## Strengths and uniqueness:

- Surrogate/representative species
  - Baird' Sparrow
- Restricted distributional ranges
  - Increase feasibility of modeling efforts
- Much information from the non-breeding grounds
  - Demographic and count-based
- Information on survival used to inform on the ground management
- Model system for engaging partners and stake holders
  - Working with diverse group of stakeholders and partners since 2002



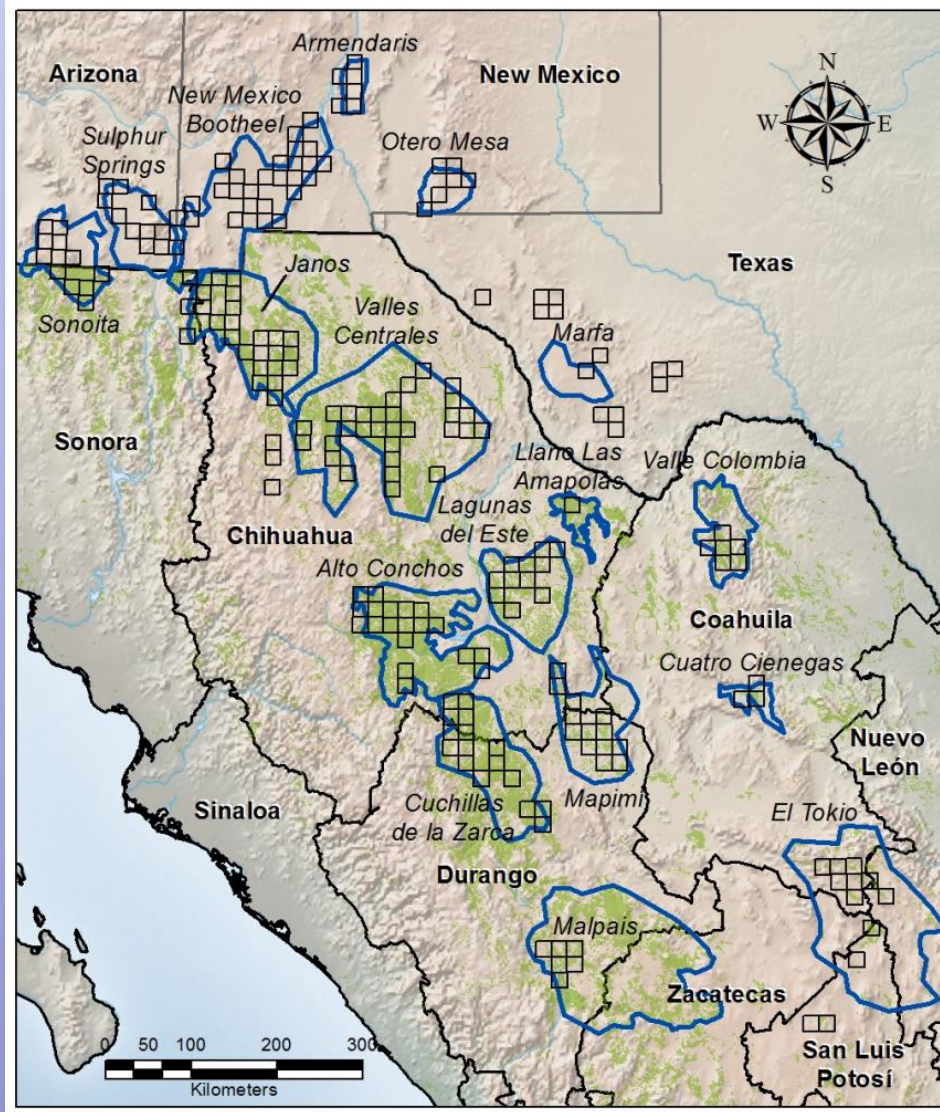
# Grasslands in North America







# RMBO Chihuahuan Desert Grassland Bird Conservation Program, 2006-2014



Density  
Abundance  
Distribution  
Habitat Use  
Survival

# Grassland Bird Conservation Program

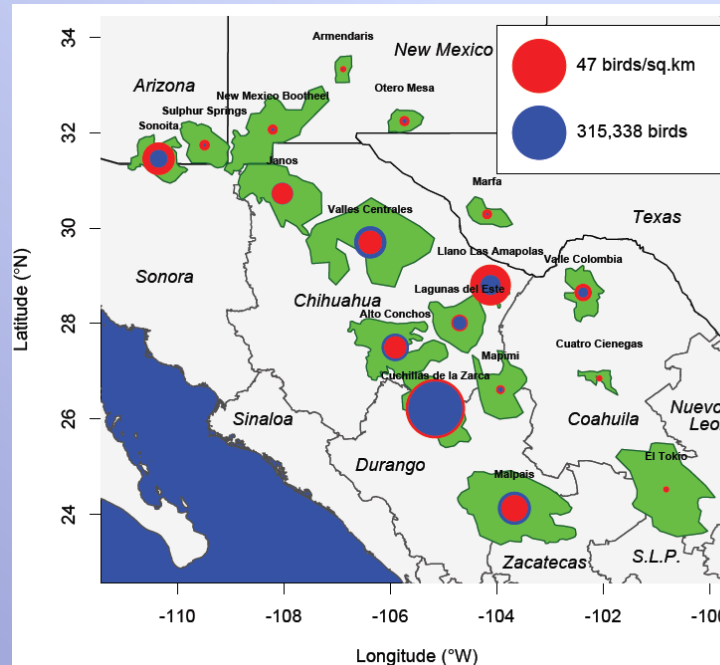


## Full annual-cycle population models

- Cannot be implemented without information on abundance
- Vital to link populations without needing to recapture individuals at both breeding and wintering sites

Distribution

Abundance



**Baird's sparrow**

# Grassland Bird Conservation Program

- Full annual-cycle population models
  - Vital rates are the key parameters of interest
  - Survival is usually estimated from CMR data
    - Persistence, model away movement
  - We have true survival from telemetry
    - Overwintering survival

Overwintering  
survival



**Baird's sparrow**



# Preliminary results: Baird's and Grasshopper Sparrow winter survival (n=177)

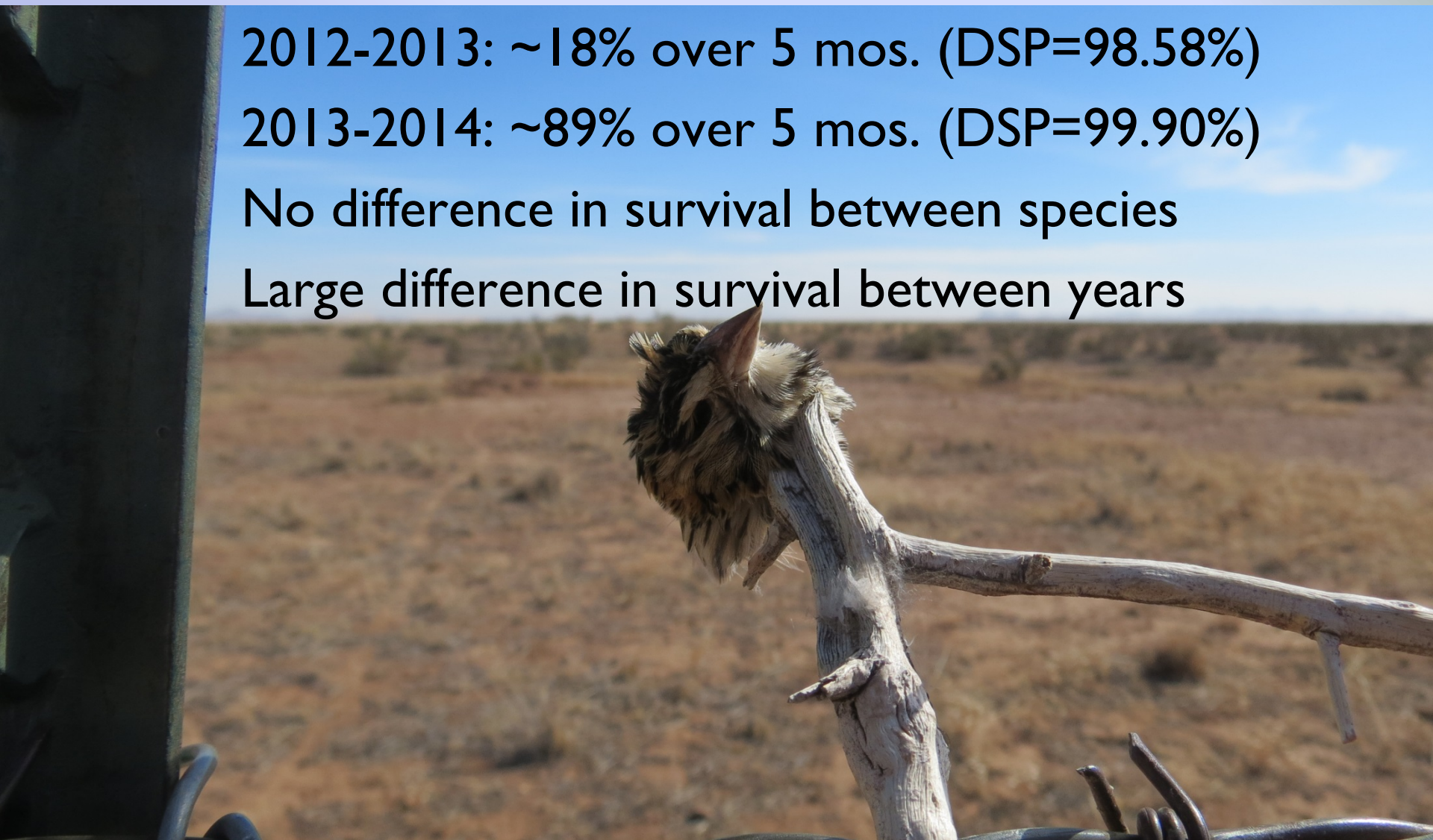


2012-2013: ~18% over 5 mos. (DSP=98.58%)

2013-2014: ~89% over 5 mos. (DSP=99.90%)

No difference in survival between species

Large difference in survival between years





# What do we need to do to develop a grassland bird IPMP?



1. Need to fill in information gaps
  - U.S. breeding grounds
2. Determine migratory connectivity
  - Geolocators
  - Geochemical and DNA markers
3. Continue to generate information on the wintering grounds
4. Expand spatial coverage of inference

# Grassland Birds IPMP



## Demography

**U.S.(2015):** Survival  
**MX (06-15):** Survival

**U.S. (2015)**  
Productivity

## Count-based

**U.S. & CA (2015):** Density  
**MX (06-15):** Density

**Connectivity (2015)**

Habitat and  
land-use data

**Integrated  
population models**

Environmental  
data

**Results**

**Grassland Bird  
Conservation  
Plan**

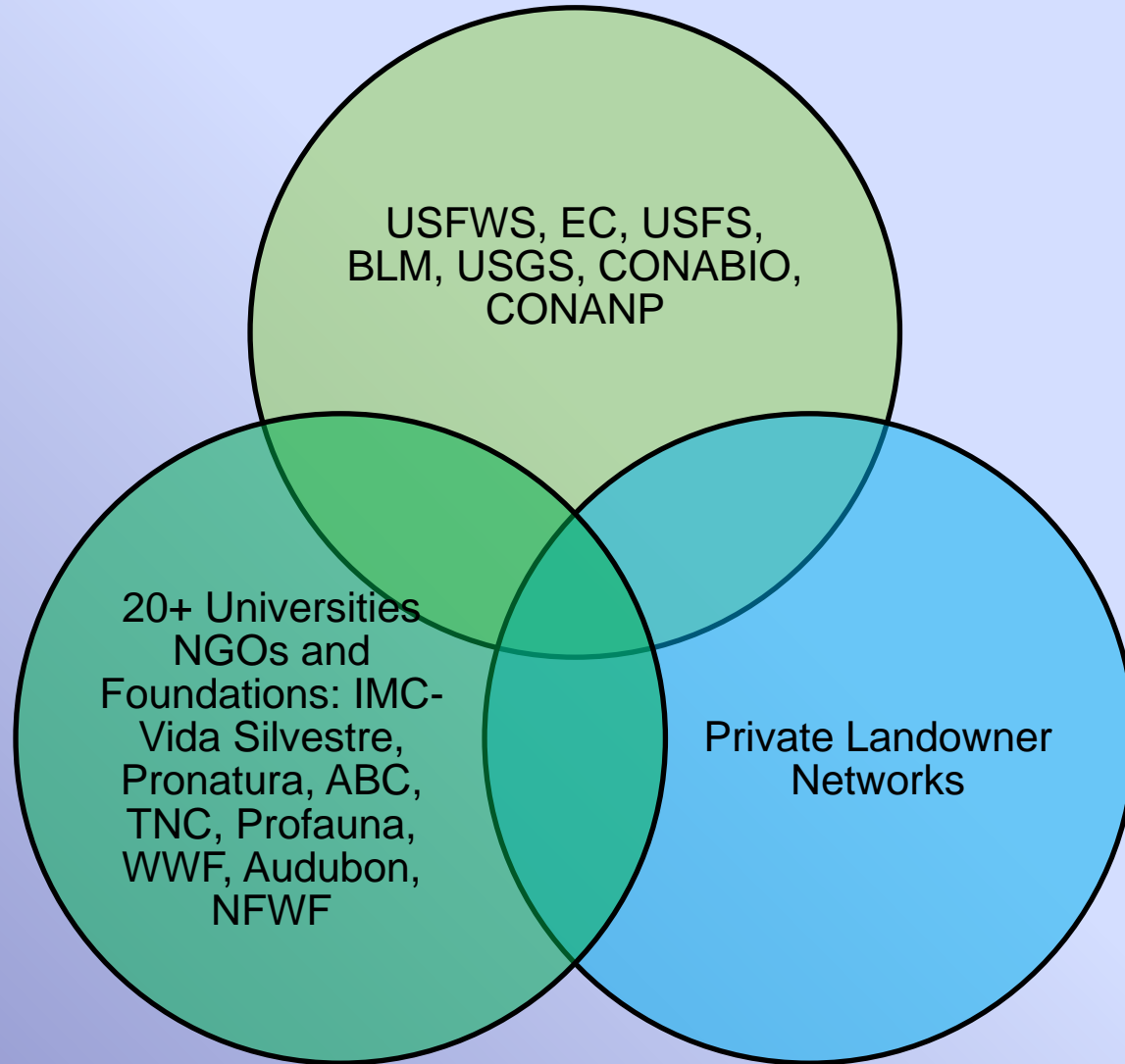
CSU, UNAM,  
Universities

PROFAUNA,  
PRONATURA,  
ABC, TNC

FWS, EC, CONABIO,  
NFWF, BLM,  
Southern Wings

Ranchers,  
Schools

# Unique representation of partners



# Grassland Bird Conservation Program



## Needed steps:

- Collect information from the breeding season
  - In collaboration with existing partners and institutions
  - Initial meeting planned for AOU 2015
    - Coordinate Canada and U.S. research efforts
    - Define priority areas for data collection
- Demographic monitoring in ND in 2015
  - Productivity, adult & juvenile survival for BAIS and GRSP
  - MT and SD sites planned for 2015
  - Need to add sites in AB, SK
  - Cost is roughly \$160,000/site



# Next steps for GBCP

## Define current integrated monitoring scheme in a structured decision-making framework

- Extend conceptual model already defined for eastern grassland bird species
  - USFW Regions 3 and 4

---

### **Application of Structured Decision Making to Deliver Grassland Bird Conservation throughout the Eastern and Central United States**

*A case study from the Structured Decision Making Workshop*

*September 12-16, 2011*

Authors: Katie Koch<sup>1</sup>, Soch Lor<sup>2</sup>, Eric Lonsdorf<sup>3</sup>, Evan Grant<sup>4</sup>, Marissa Ahlering<sup>5</sup>, Laurel Barnhill<sup>6</sup>, Tom Dailey<sup>7</sup>, Ryan Drum<sup>8</sup>, Melinda Knutson<sup>9</sup>, Connie Mueller<sup>10</sup>, David Pavlacky<sup>11</sup>, Christine Ribic<sup>12</sup>, Catherine Rideout<sup>13</sup>, David Sample<sup>14</sup>, Donna C. Brewer<sup>15</sup>, Mike Runge<sup>16</sup>



# Next steps for GBCP

- Advantages of extending the SDM process (USFWS Regions 6 and 2):
  - Include the perspective of the wintering grounds
  - Broaden the U.S. stakeholders present
    - Include managers and practitioners
  - Expand on current engaged community of stakeholders and practitioners
    - U.S. and Mexico
- Contextualize the information generated by the IPM
  - Renewable energy and development in the U.S.
  - Common objectives with Sage Grouse and Lesser Prairie Chicken conservation and management

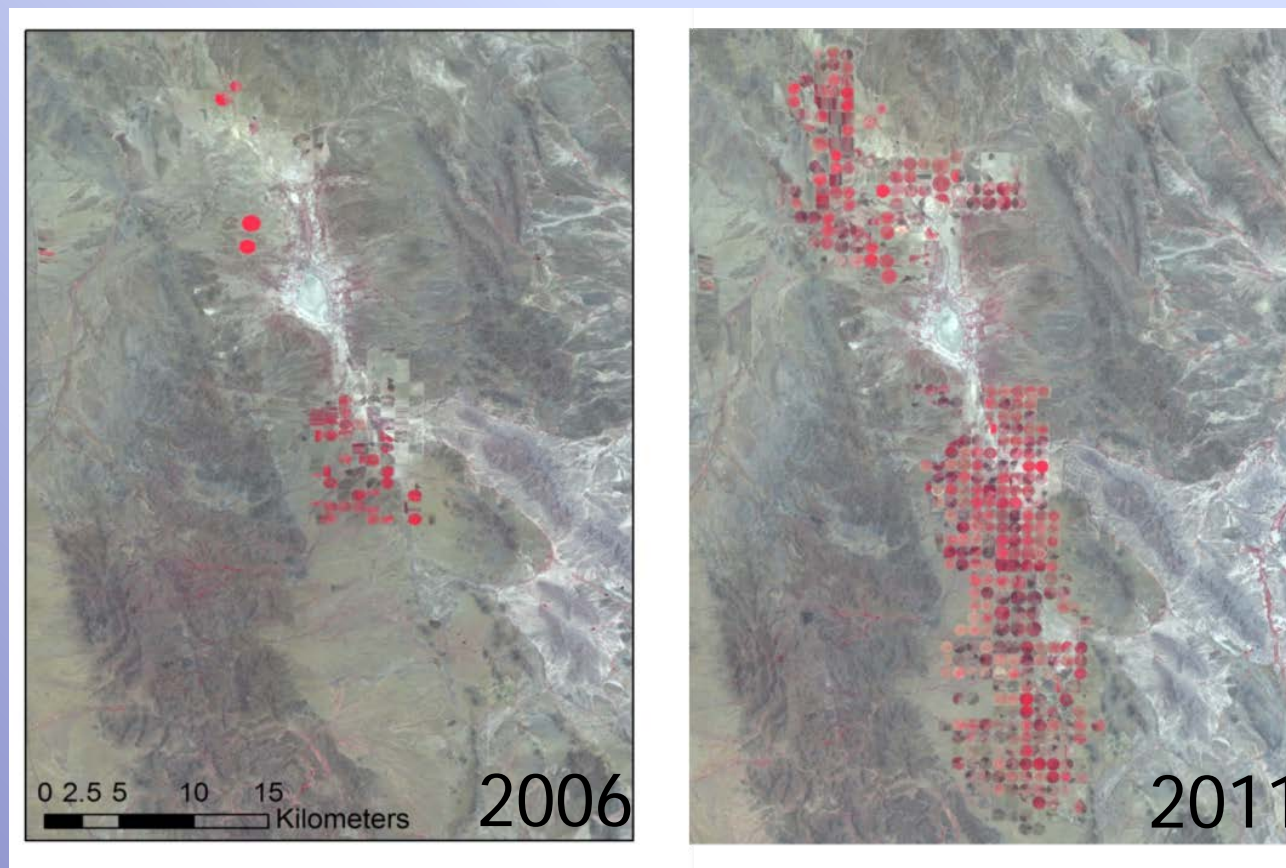


*Thank you!*

*Contact: Arvind Panjabi*  
*[arvind.panjabi@rmbo.org](mailto:arvind.panjabi@rmbo.org)*  
*970-482-1707*



# Rapid Cropland Expansion in northern Mexico



Valles Centrales GPCA, Chihuahua, MX

- 175,000 acres in Valles Centrales from 2006-2011
  - 1 new center pivot every 2 days
- 350,000 grassland birds displaced
  - 132,723 CCLO
  - 6,746 BAIS
  - 1,396 SPPI
- Valley-bottom grasslands could be gone by 2025

Pool, D., A. Panjabi, A. Macias-Duarte and D. Solhjem. 2014. Rapid expansion of croplands in Chihuahua, Mexico threatens declining North American grassland bird species. *Biol Cons* 170 (2014) 274–281.

# **Rapid Cropland Expansion in northern Mexico**



<http://world.time.com/timelapse/>