



**Full Annual Cycle  
conservation of  
migratory birds in the  
western hemisphere**

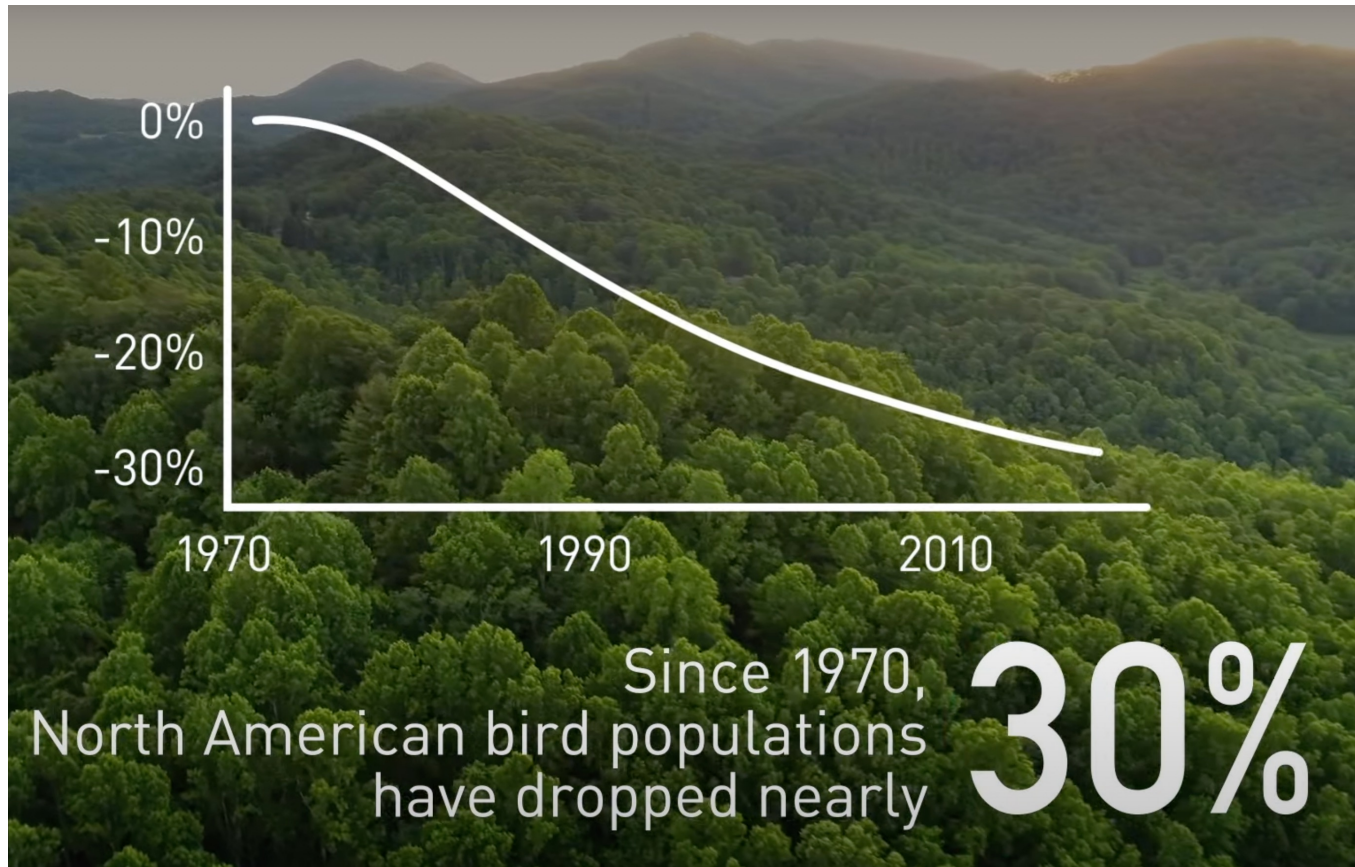
Jill Deppe  
National Audubon Society



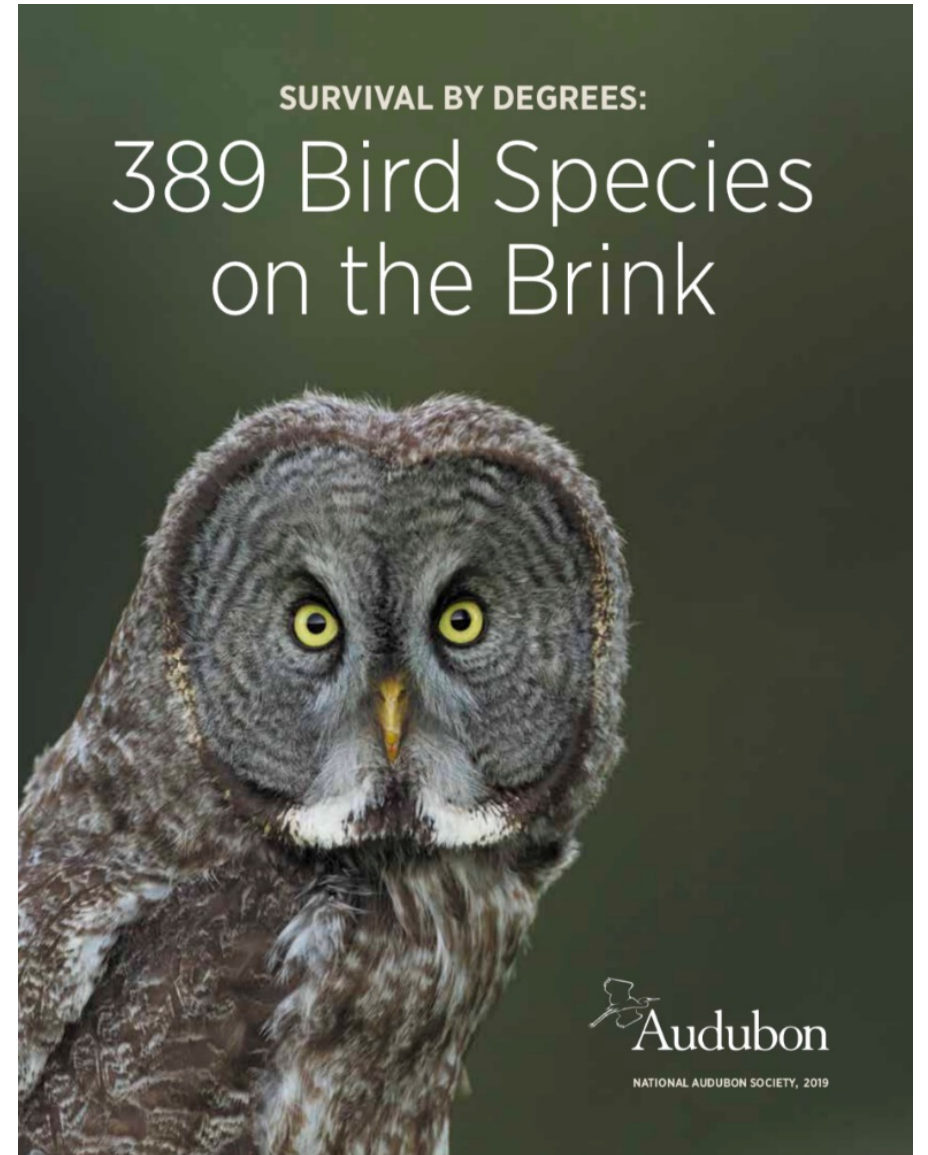
*Black-throated Green Warbler. Photo: Joshua Galicki, Audubon Photography Awards*



# Migratory birds are being lost at **an alarming rate**



Rosenberg et al. (2019) *Science*



Bateman et al. (2020) *Conservation Science & Practice*



# Conservation strategies that benefit birds, ecosystems & people




## Environmental Benefits


- Improved water quality
- Increased biodiversity contribution
- Improved carbon sequestration
- Decreased erosion

## Socioeconomic benefits

- Increased yields (crops and animals)
- Increased profitability (average annual income growth of more than 10 percent)



Sustainable cattle ranching restores forests, adding trees, shrubs, and live fences and providing bird habitat.



Protected areas conserve wetlands, water resources, and other critical habitat and wildlife corridors.



Innovative rotations of sugarcane and rice crops create artificial wetlands and bird habitat, mitigate flooding, and increase farm productivity.

# Conservation is a series of decisions

## Strategy decisions – Where should we invest to protect birds?

- **Question:** Where are areas of high value for birds?
- **Implementation:** Allocate human & financial resources to priority regions

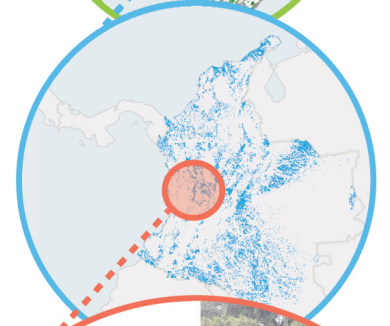
Hemispheric



## Planning decisions – Where should we invest to protect birds & ecosystems?

- **Question:** Within priority regions, which places have highest value for birds? Greatest potential for C sequestration? Water conservation? Etc.
- **Implementation:** Allocate human & financial resources to priority areas

Regional



## Direct action decisions – Identify most impactful actions in priority places

- **Questions:** What birds does area benefit? What are the threats? Opportunities to protect birds and benefit people? Etc.
- **Implementation:** Land protection, restoration, habitat improvement, threat reduction

Local



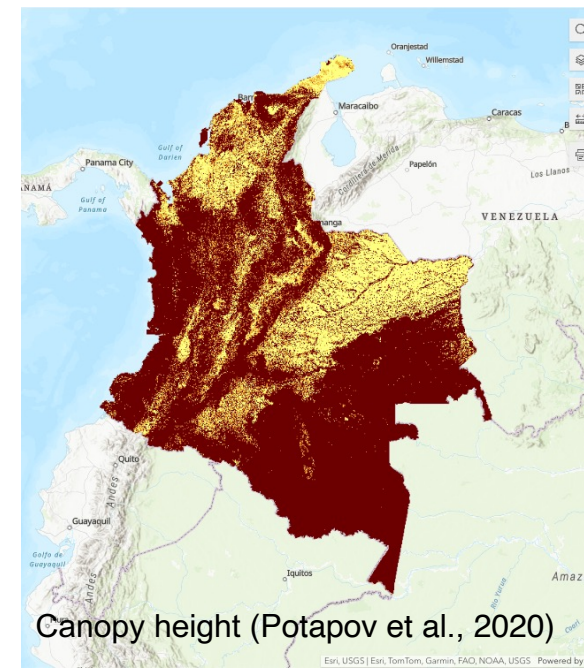
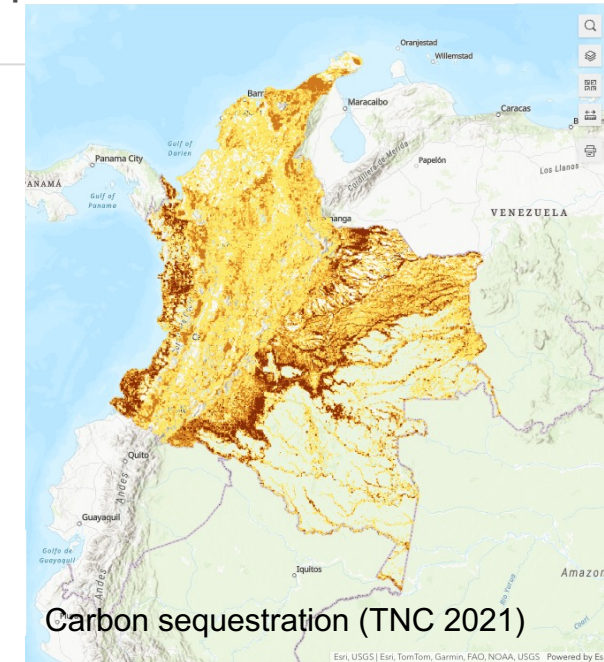


## Example spatial data

**Earth observation data** inform decisions about where to work in priority bird regions and which local actions will have maximum impact

Types of information provided:

- Land cover and land use
- Threats
- Conservation opportunities
- Benefits for ecosystems & people





## Problem:

- Biological data: scattered, sampling biases
- Remote sensing data: not easily accessible to conservation practitioners
  - Data scattered
  - Data often not summarized in way that is relevant for bird conservation decisions
  - Lack of technology to access, process, analyze, and visualize spatial data
  - Predominantly in English

## Project Goal:

Map priority areas for birds at two spatial scales and co-create an online decision-support system that provides easy access to Earth observation products to increase the efficiency and effectiveness of their decision-making process and maximize the benefits for birds, ecosystems and people in Colombia.



### 8 Earth observation products

- 6 vegetation types
- 3 classes of surface water
- 9 agriculture types
- 3 infrastructure types
- Canopy height (Lidar)
- Landscape connectivity
- 3 measures of green carbon
- Conserva Aves priority scores

### Areas of Interest for overlay and summary

- 6 types of social/political areas
- 3 types of protected areas
- 2 types bird appreciation areas (ENCA)
- 8 Ecosystem types (ENCA)

### Key conservation decisions to balance benefits for birds and people

- Where to work?
- What action to take?

# Alas Seguras Colombia Decision-support tool

Suitability Modeler widget

[ArcGIS Online](#) | [Other versions](#) | [Help archive](#)



### Bird Priority Areas for bird groups by ecosystem

- 5 Full Annual Cycle Priority layers (Hemispheric scale)
- 7 Bird Friendliness Index layers (Regional scale)

#### Environmental Benefits

- Improved water quality
- Increased biodiversity contribution
- Improved carbon sequestration
- Decreased erosion

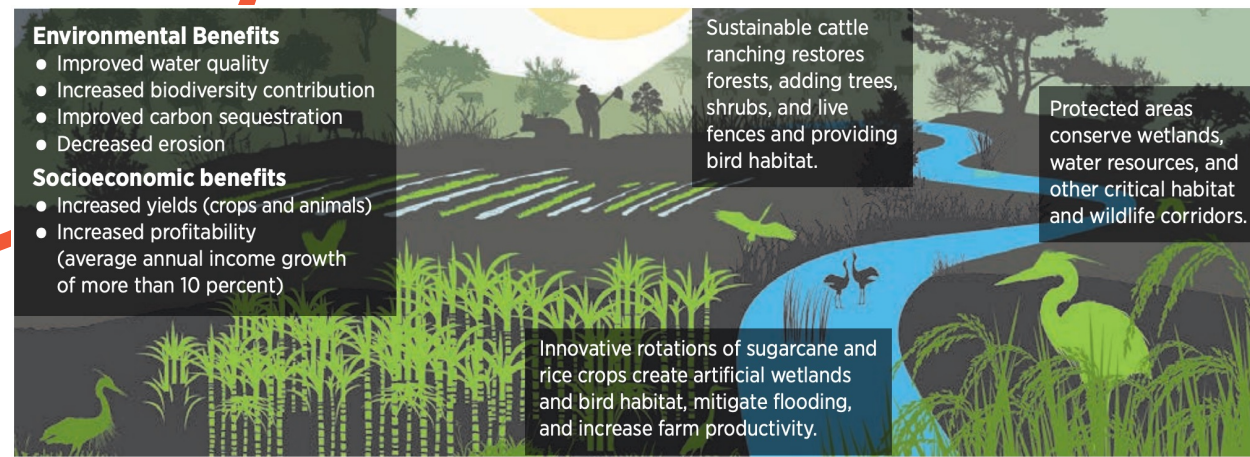
#### Socioeconomic benefits

- Increased yields (crops and animals)
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# Decision-support system

## Alas Seguras

Alas Seguras es una herramienta para conservacionistas que mapea y analiza datos espaciales sobre aves migratorias provenientes de Norteamérica (boreales) para apoyar decisiones de conservación en Colombia.

La herramienta le ayudará a identificar zonas de alto valor ecológico para distintos enfoques temáticos:

- **Módulo Áreas Agrícolas:** Poner en acción la agricultura regenerativa como la reforestación y la reconstrucción del suelo. Ejemplo de caso de uso: Cuanto area de agua superficial de alta valor ecológica para las aves de humedales preserva un area particular de ecosistemas agrícolas?
- **Módulo Áreas Ganaderas:** Avanzar la transformación hacia un modelo de ganadería sostenible en armonía con el entorno. Ejemplo de caso de uso: Donde debo establecer relaciones con ganaderos para convencerles plantar arboles para mejorar habitat para aves de bosques de tierras bajas y aumentar conectividad entre parques nacionales para las aves?
- **Módulo Comunidades Amigables con las Aves:** Trabajar con comunidades y grupos de interés en la creación de un movimiento de conservación sólido. Ejemplo de caso de uso: Convencer al gobierno de un municipio el valor de su area para las aves migratorias de bosque y su contribucion a la implementacion de las metas de la ENCA de



<https://gis.audubon.org/alasseguras/>



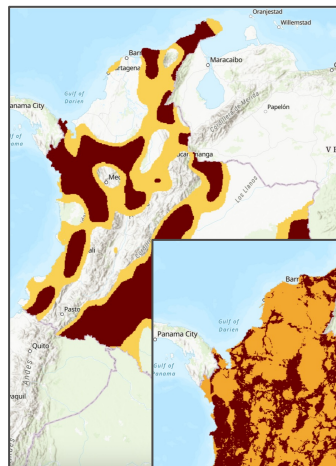
# 1 Define objective

Where should we establish new protected areas to improve ecological connectivity among existing protected areas for forest birds and carbon storage

# 2 Select module

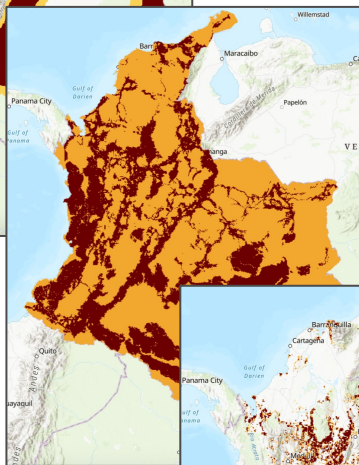
-  Protected areas
-  Agricultural lands
-  Rangelands
-  Bird-friendly communities

# 3 Select spatial data and design model



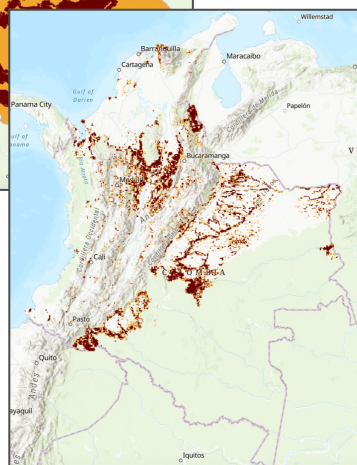
## Forest Bird Hemispheric Priorities

- ✓ Layer importance: 50
- ✓ Focus: High values



## Ecological connectivity

- ✓ Layer importance: 25
- ✓ Focus: High values

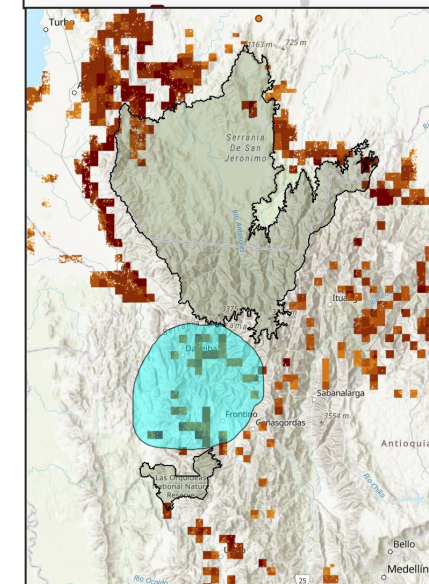
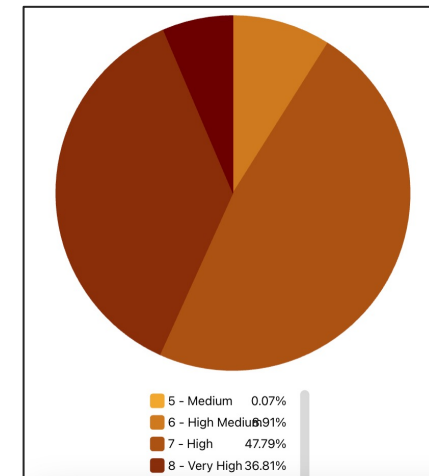


## Carbon Benefits of Avoided Deforestation

- ✓ Layer importance: 25
- ✓ Focus: High values

100%

# 4 Explore and summarize results







## Módulo Áreas Protegidas

- 1 Select layers
- 2 Design model
- 3 Generate chart

### Design model

Beneficios de Carbono de la Conversión Evitada



25 %

- Bajo (21.79999924 - 419)
- Medio (419 - 817)
- Alto (817 - 1682)
- Muy Alto (1682 - 5988)

Conectividad del Paisaje Para las Aves

25 %

- Bajo (1 - 6)
- Alto (6 - 11)

Áreas Prioritarias de Aves Migratorias de Bosques

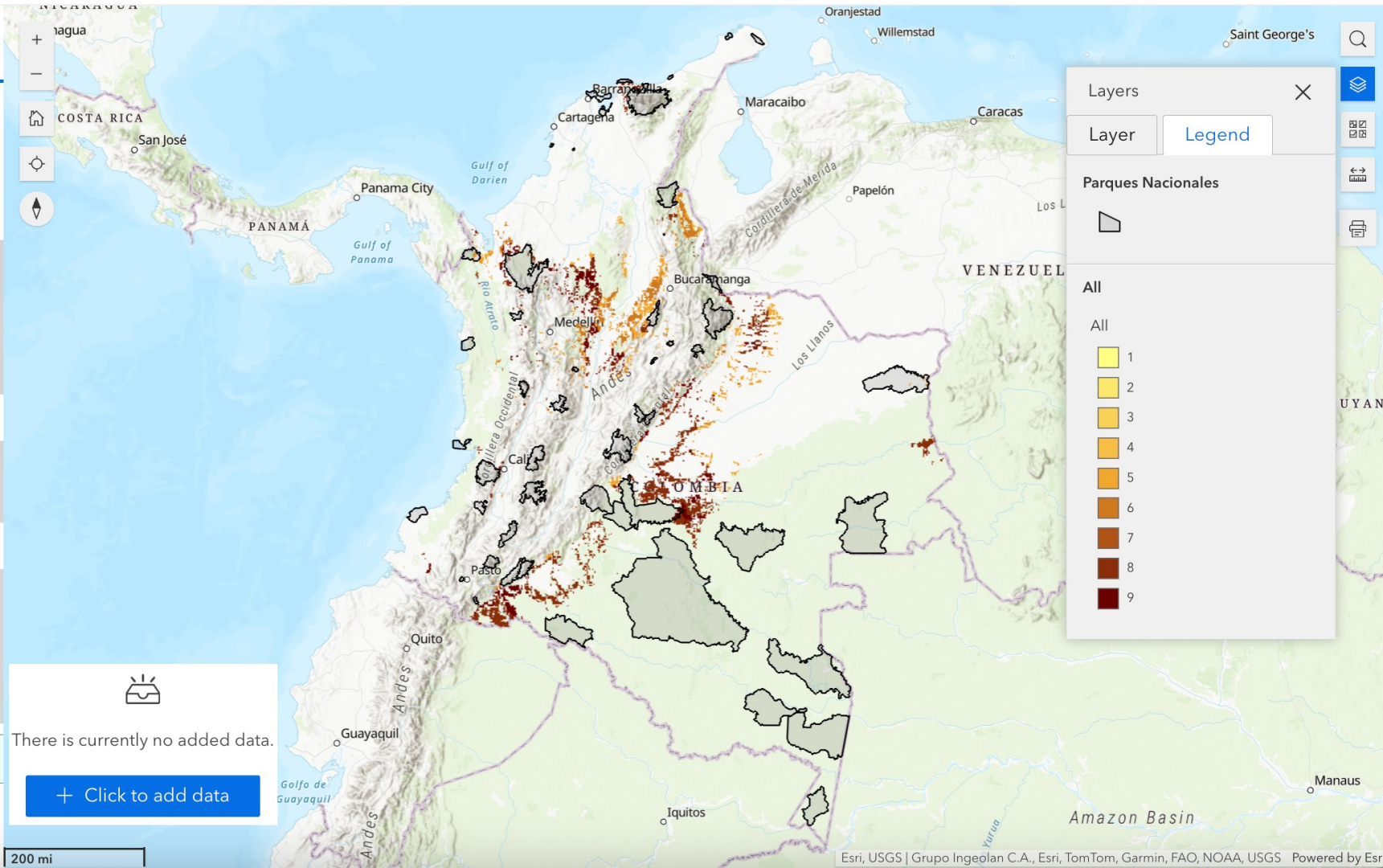
50 %

- Bajo (0.018540021032095 - 0.466)
- Medio (0.466 - 0.627)
- Alto (0.627 - 0.811)
- Muy Alto (0.811 - 2)

**Total** 100%

Clear

Run



There is currently no added data.

+ Click to add data

200 mi





**Use Case: Can carbon bonds support sustainable bird-friendly ranching in the Caribbean region of Colombia? What actions will have biggest benefits?**



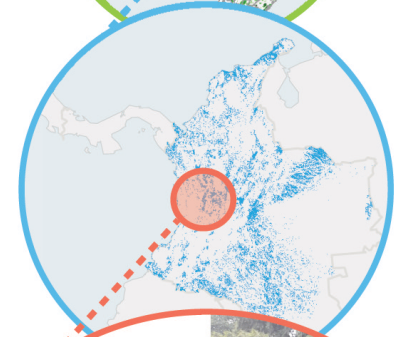
## Alas Seguras is supporting a series of sequential decisions that inform the creation of this project

- 1. Strategy decision:** Are there high-value areas for birds and carbon that warrant pursuing this project concept?
- 2. Planning decisions:** Are there large ranches that overlap with high value areas where projects could be pursued?
- 3. Direct action decisions:** What restoration activities provide the greatest benefits on specific ranches?

Hemispheric



Regional



Local

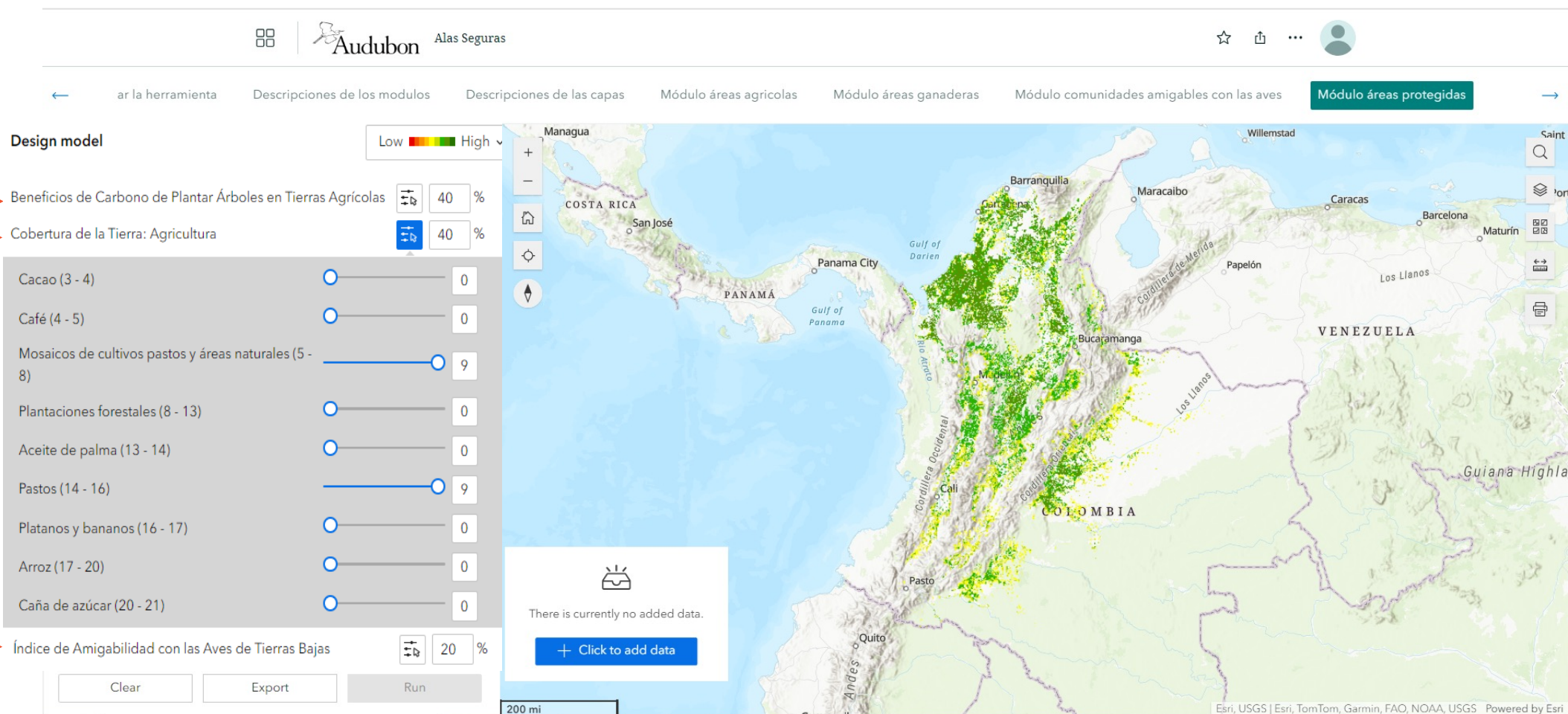


# Strategy Decision: Are there high-value areas for birds and carbon that warrant pursuing this project concept?

Carbon benefits of planting trees on ag lands

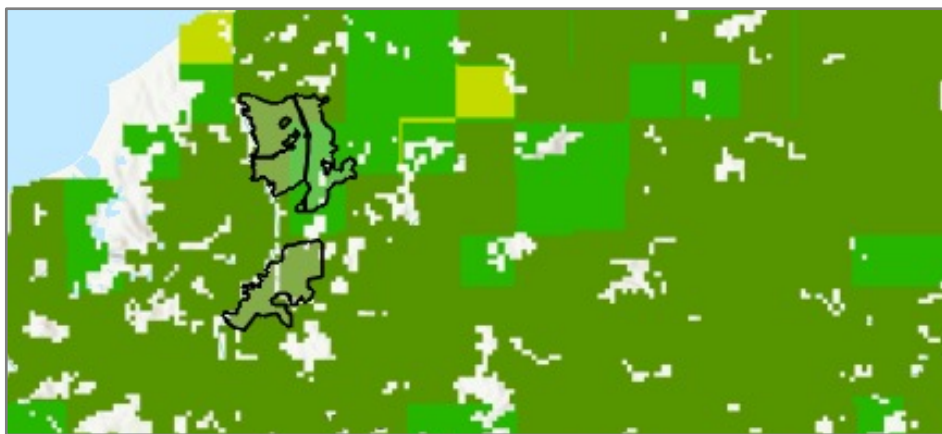
Land cover: Agriculture

Importance for lowland forest birds

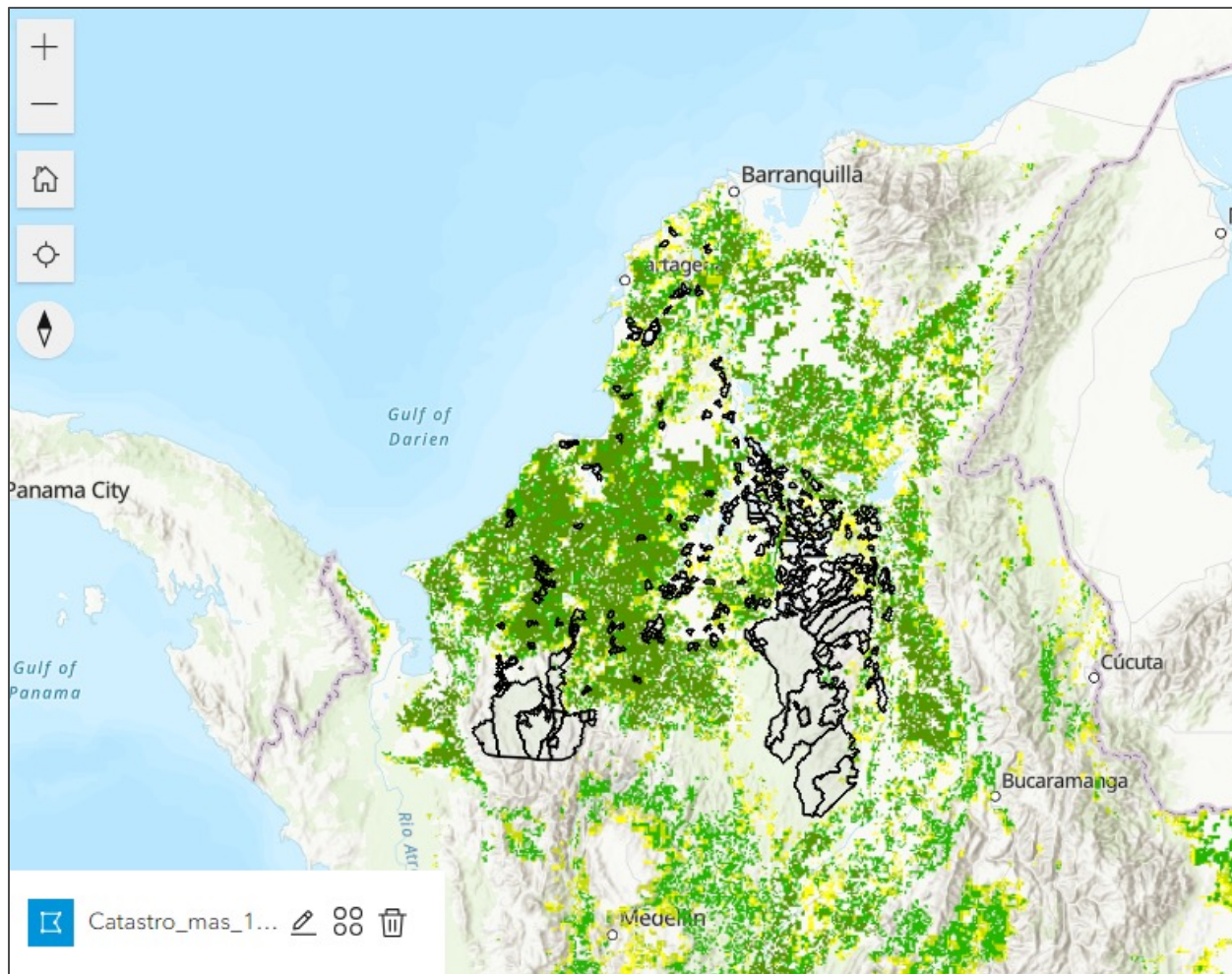




# Planning Decision: Are there large ranches that overlap with high value areas where projects could be pursued?

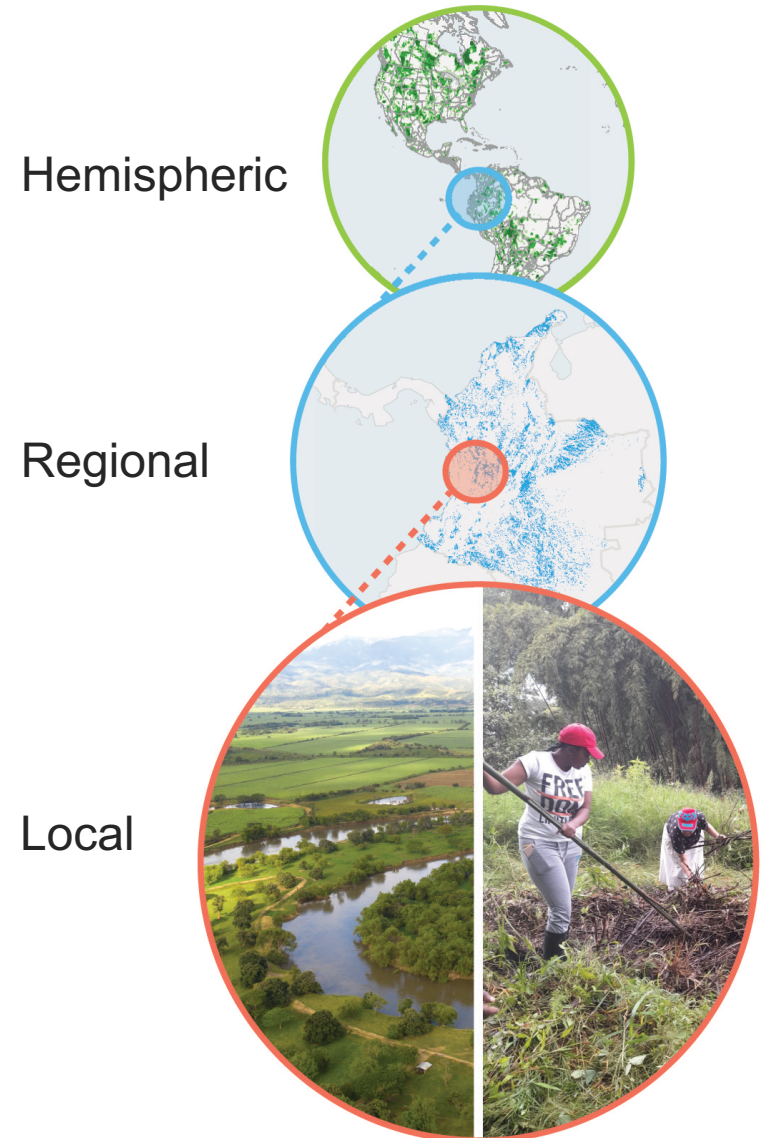


Added farm layer to id ranches > 1000 ha



## Direct action decisions: next step for Audubon

What restoration or management activities will provide the greatest benefits on ranches that meet their criteria?





## Other use cases under development

- Scoping new Key Biodiversity Areas for congregatory birds in Colombia
- Where to restore wetlands for birds on agricultural lands in the Cauca Valley
- Carbon and connectivity analysis of Conserva Aves natural reserves
- Conservation planning for Chingaza National Park



Lesser Yellowlegs. Photo: John Troth / Audubon Photography Awards

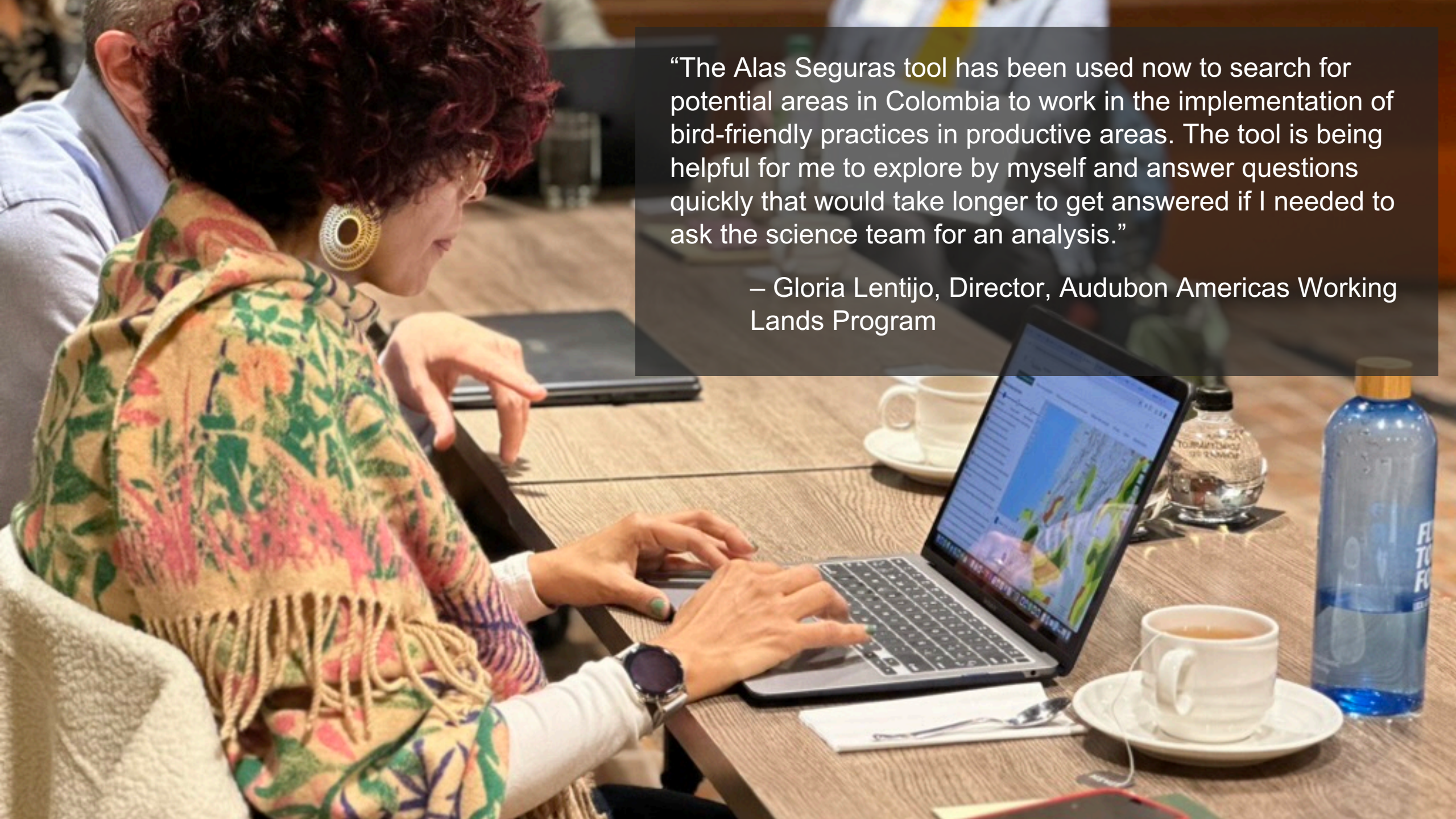




## Outcomes

- Post-project survey & comparison to pre-project survey results
- Next phase of work with Audubon and BirdLife
  - Expansion to Latin America and Caribbean
  - Species distribution models to forecast effects of climate change and map climate strongholds
  - Expand to include resident bird species



A woman with curly hair, wearing a colorful shawl and large gold earrings, is seated at a wooden table. She is focused on a laptop in front of her, with her hands on the keyboard. The table also holds a white coffee cup on a saucer, a blue water bottle, and a small glass bottle. In the background, another person is partially visible, also working on a laptop. The scene is set in a well-lit, modern environment.

“The Alas Seguras tool has been used now to search for potential areas in Colombia to work in the implementation of bird-friendly practices in productive areas. The tool is being helpful for me to explore by myself and answer questions quickly that would take longer to get answered if I needed to ask the science team for an analysis.”

– Gloria Lentijo, Director, Audubon Americas Working Lands Program



## Project team

- Nat Seavy
- Jorge Velásquez-Tibatá
- Christina Farber
- Daniela Linero
- William DeLuca
- Nicole Michel
- Sarah Saunders
- Tim Meehan
- Benjamin Poulter
- Andres Baresch Aristizabal

## End users

- Sebastian Hertzog
- Gloria Lentijo
- Noemi Moreno
- Maria Toscano
- Lina Sánchez-Clavijo
- Karina Fierro
- Luis Fernando Castillo Cortés
- Carlos José Ruiz Guerra
- Giovanni Cardenas
- Camilo Cardozo



Barbara and Earl Doolin



The **Cornell Lab**   
Data provided by **eBird**

>250 tracking data holders

