



# The SECAS Third Thursday Web Forum

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Advancing the Southeast Blueprint through analysis and integration  
of high-resolution distribution data for imperiled species



# Agenda

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- Introduction
- Monthly topic
- Q&A and discussion
- Preview of next webinar
- Staff updates

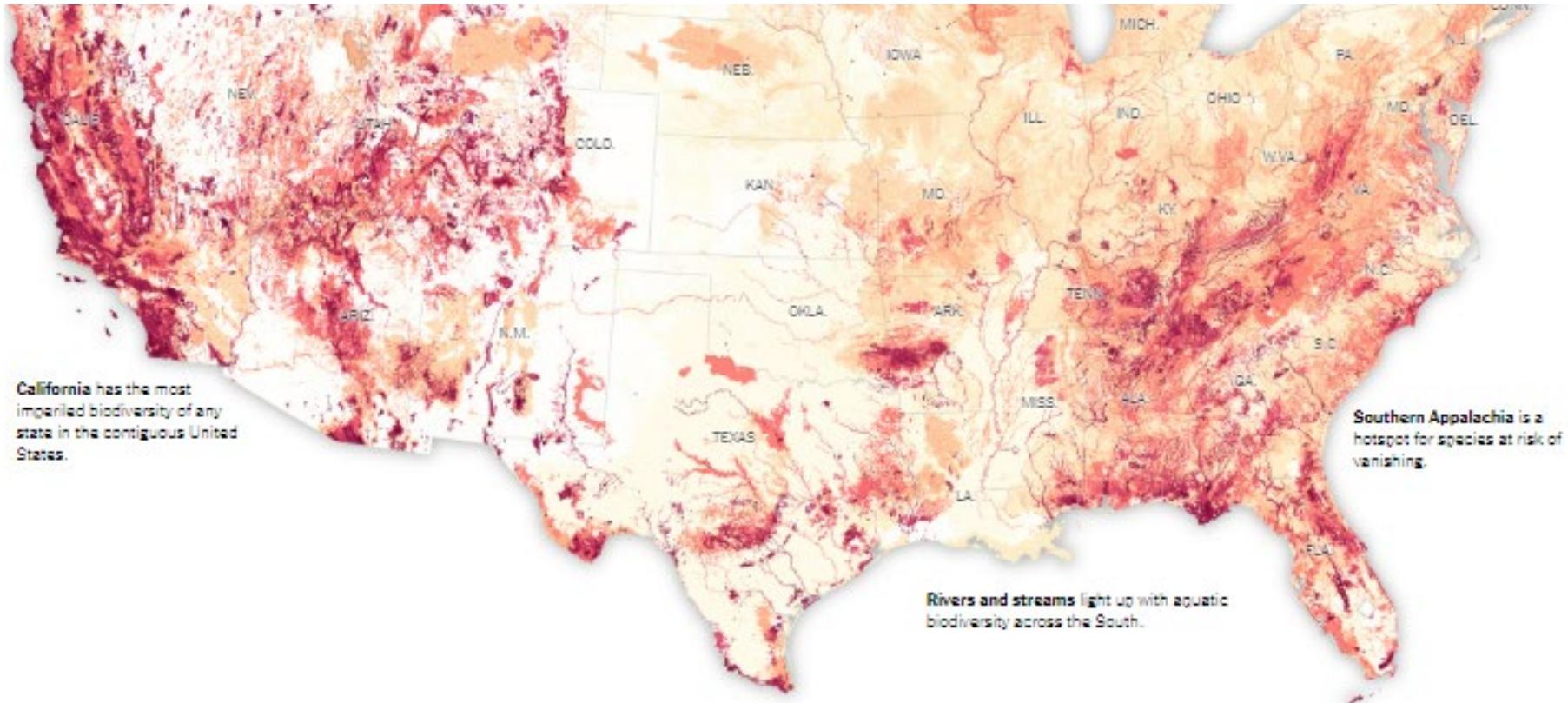


# Advancing the Southeast Blueprint through analysis and integration of high-resolution distribution data for imperiled species

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Gio Rapacciulo, NatureServe

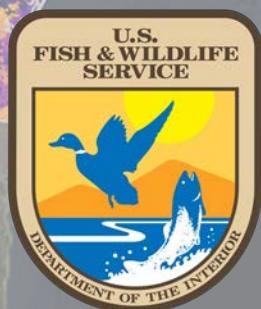
1-19-2023

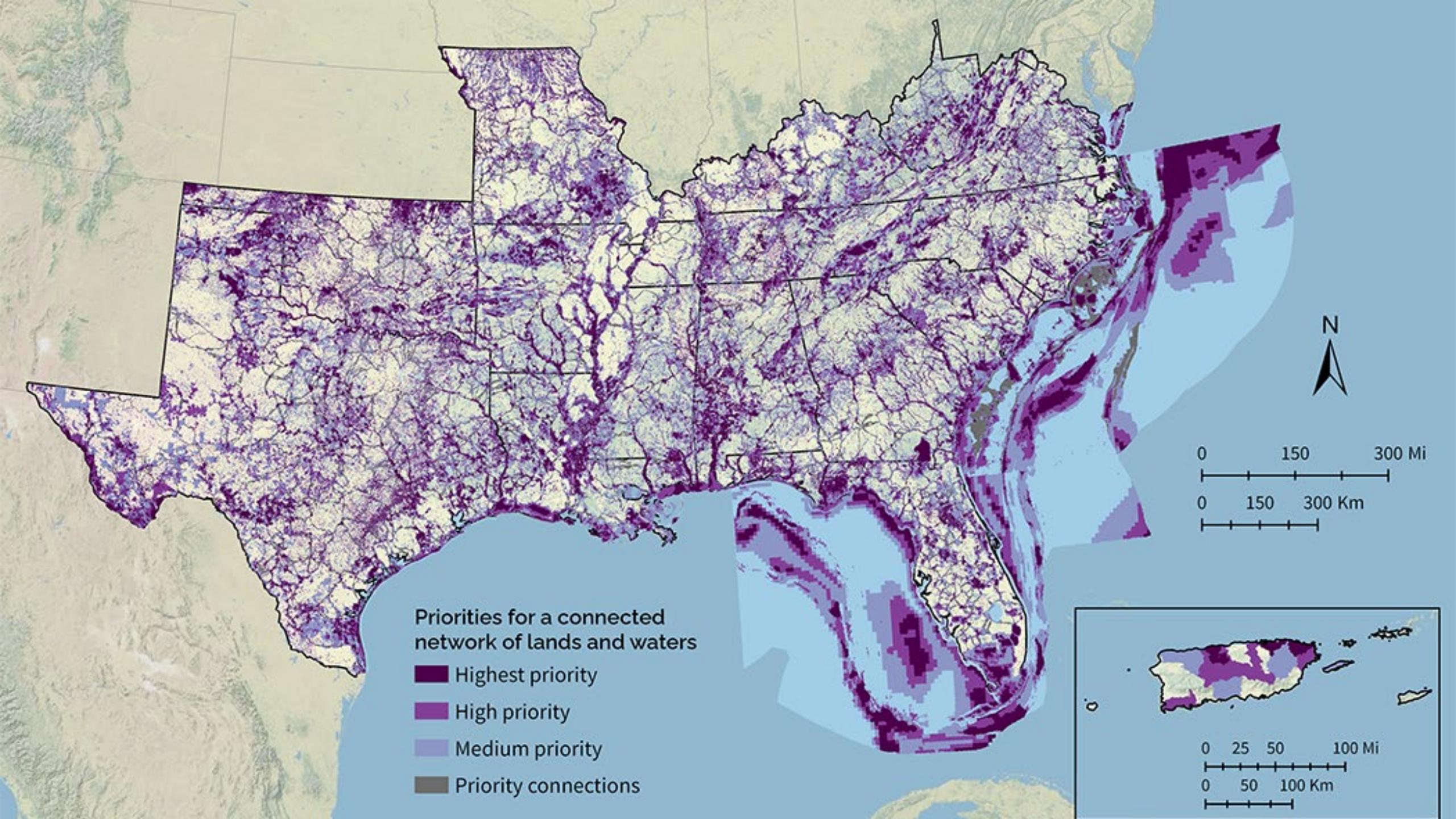


# Advancing the Southeast Blueprint through Analysis and Integration of High-Resolution Distribution Data for Imperiled Species

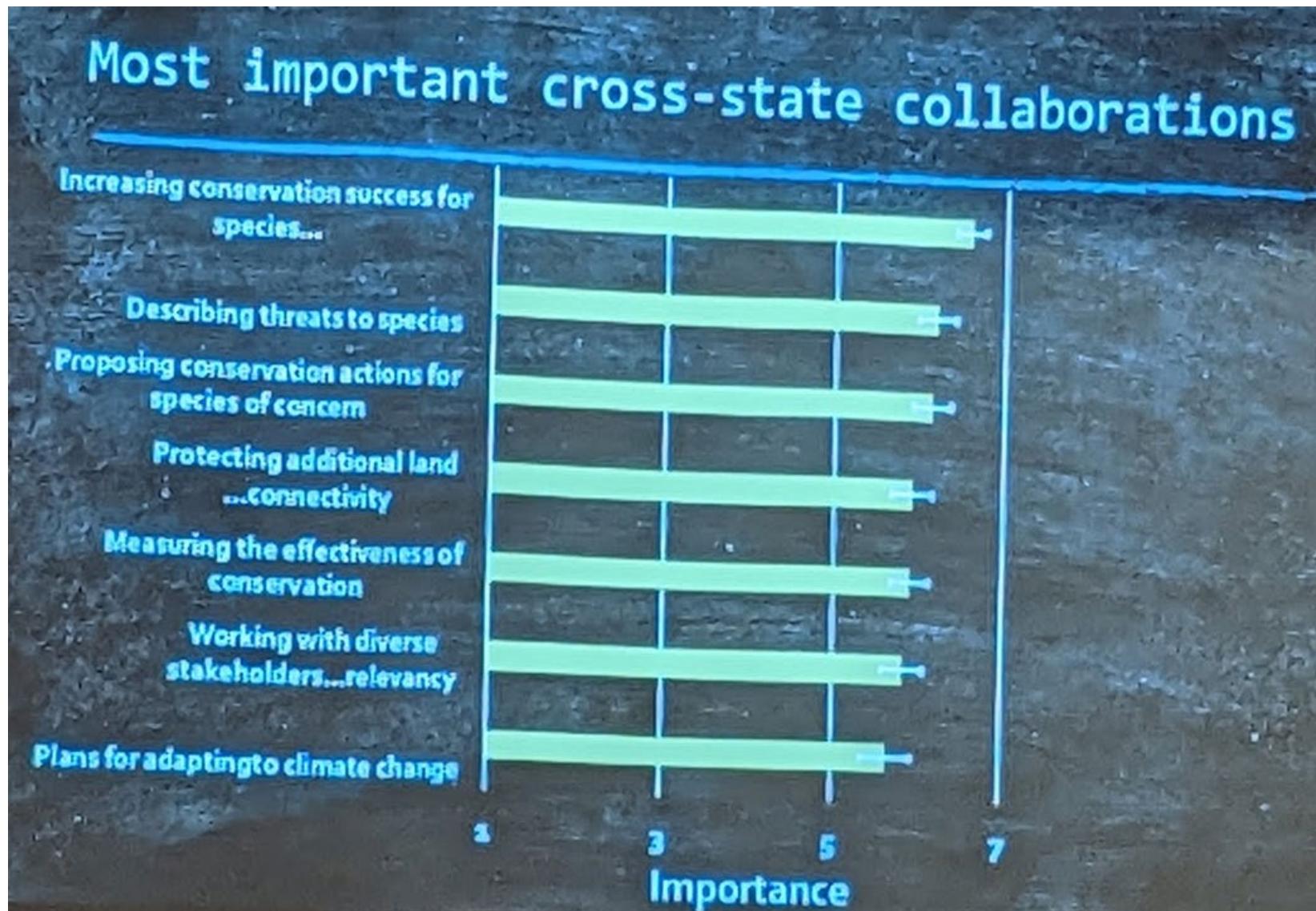
Dr. Gio Rapacciulo

Director of Applied Data Science, NatureServe  
[gio@natureserve.org](mailto:gio@natureserve.org)





# Perceived Needs from SECAS stakeholders



- One of the primary benefits to go across state boundaries is to protect imperiled species
- One of the main reasons is data sharing
- Some of the main barriers are cost and time

# Southeast Blueprint and Imperiled Species Data

## Imperiled Aquatic Species (Southeast Blueprint Indicator)

 Yvonne Allen  
U.S. Fish & Wildlife Service

### Summary

This indicator measures the number of aquatic animal Species of Greatest Conservation Need (SGCN) observed within each 12-digit HUC subwatershed, including fish, mussels, snails, crayfish, and amphibians. SGCN are identified in State Wildlife Action Plans as most in need of conservation action. This indicator originates from state Natural Heritage Program data collected by the Southeast Aquatic Resources Partnership and applies to the Environmental Protection Agency's estimated floodplain, which spatially defines areas estimated to be inundated by a 100-year flood, also known as the 1% annual chance flood.

[Read Less ^](#)

[View Full Details](#)

### Details

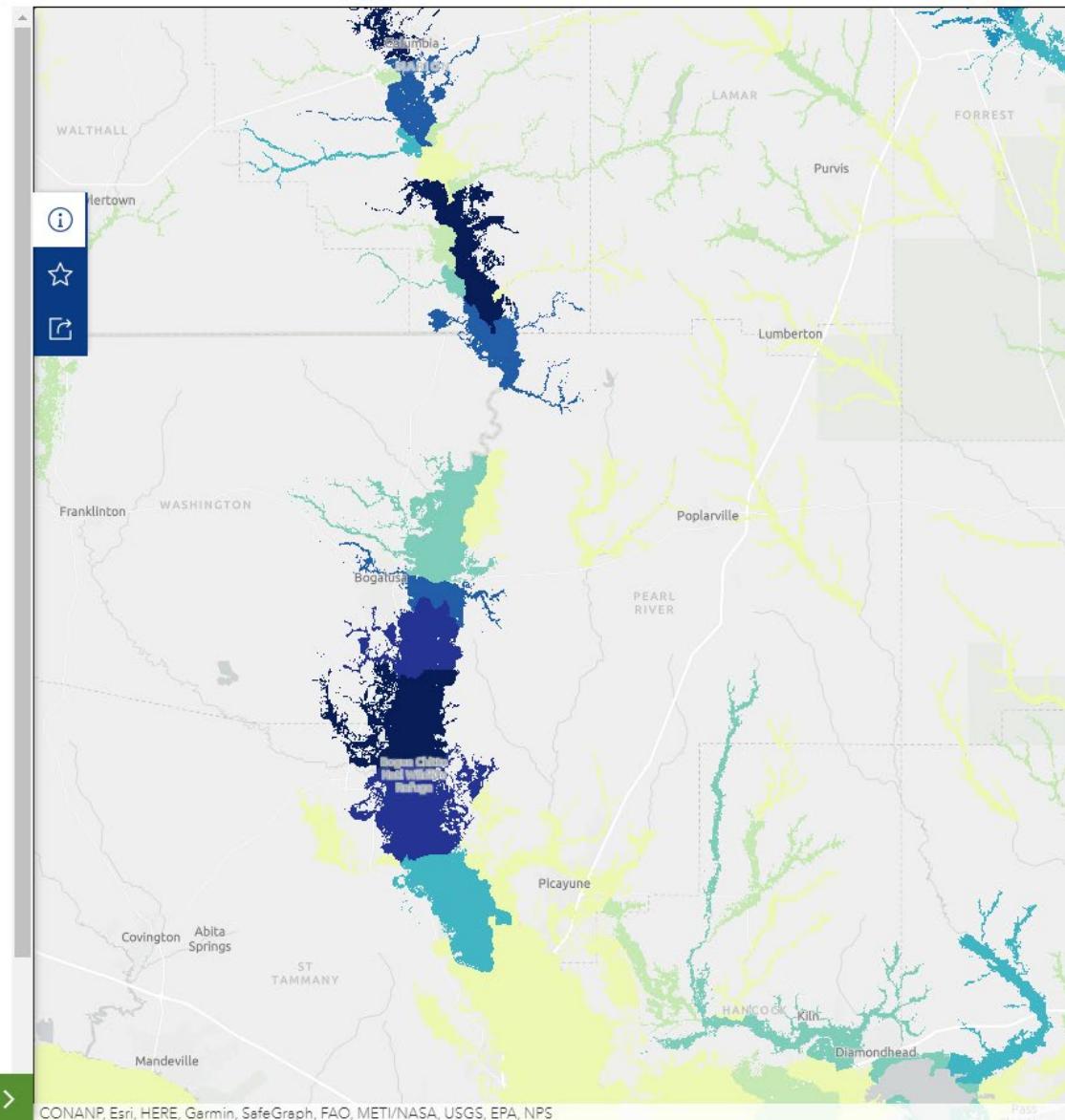
 [Imagery Dataset](#)  
Image Service

 [November 9, 2022](#)  
Info Updated

 [November 9, 2022](#)  
Data Updated

 [September 6, 2022](#)  
Published Date

[I want to use this](#)



- Input data for many imperiled species (terrestrial vertebrates and invertebrates, plants, pollinators) either lacking or represented indirectly or at coarse spatial scales
- Standardized region-wide data for these taxa are needed to ensure blueprint is successful in supporting healthy ecosystems and thriving fish and wildlife populations

*Project objective:* Leverage standardized data on imperiled species distributions from across the NatureServe Network to identify data gaps and potential blind spots in Southeast Blueprint.

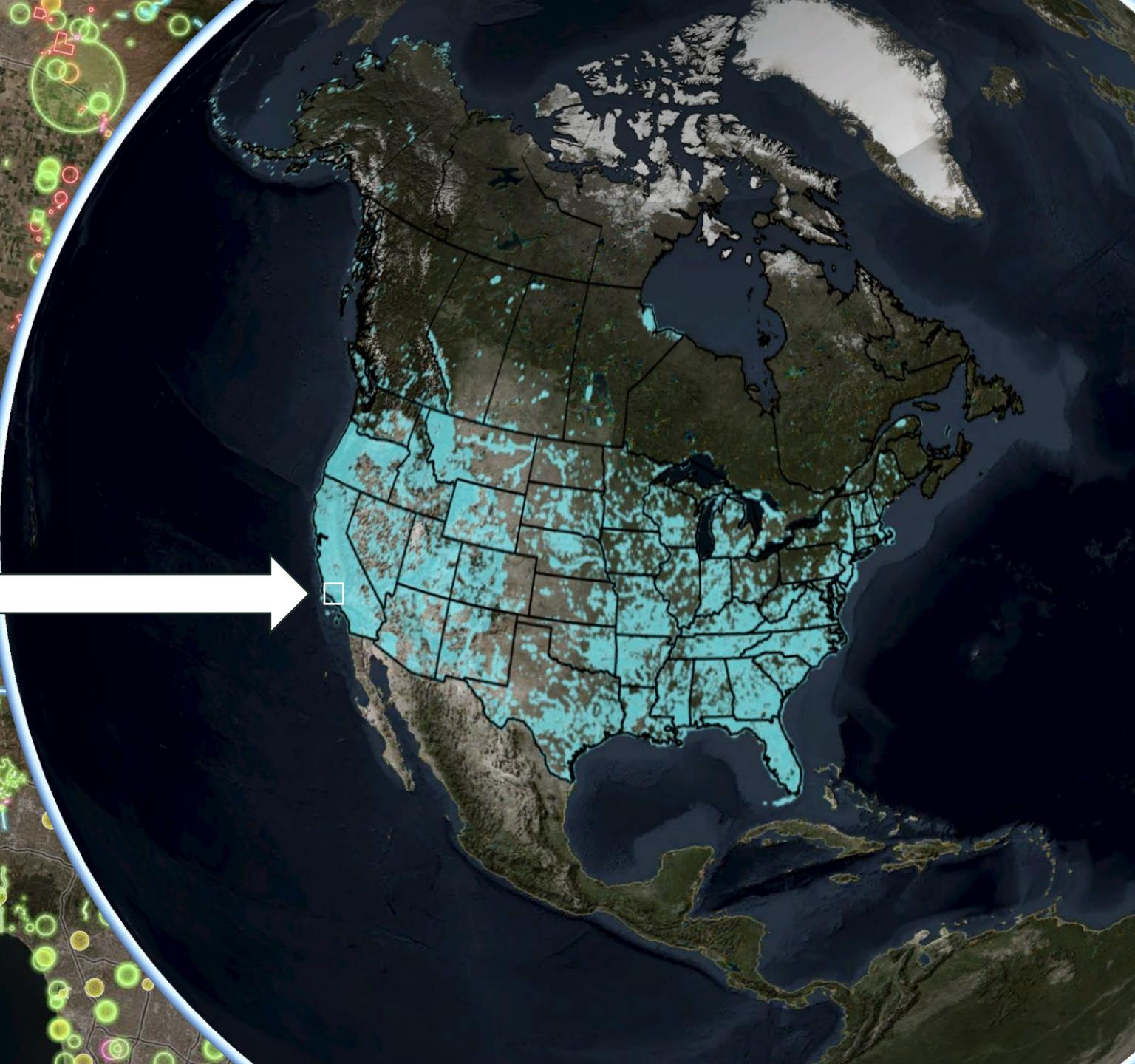
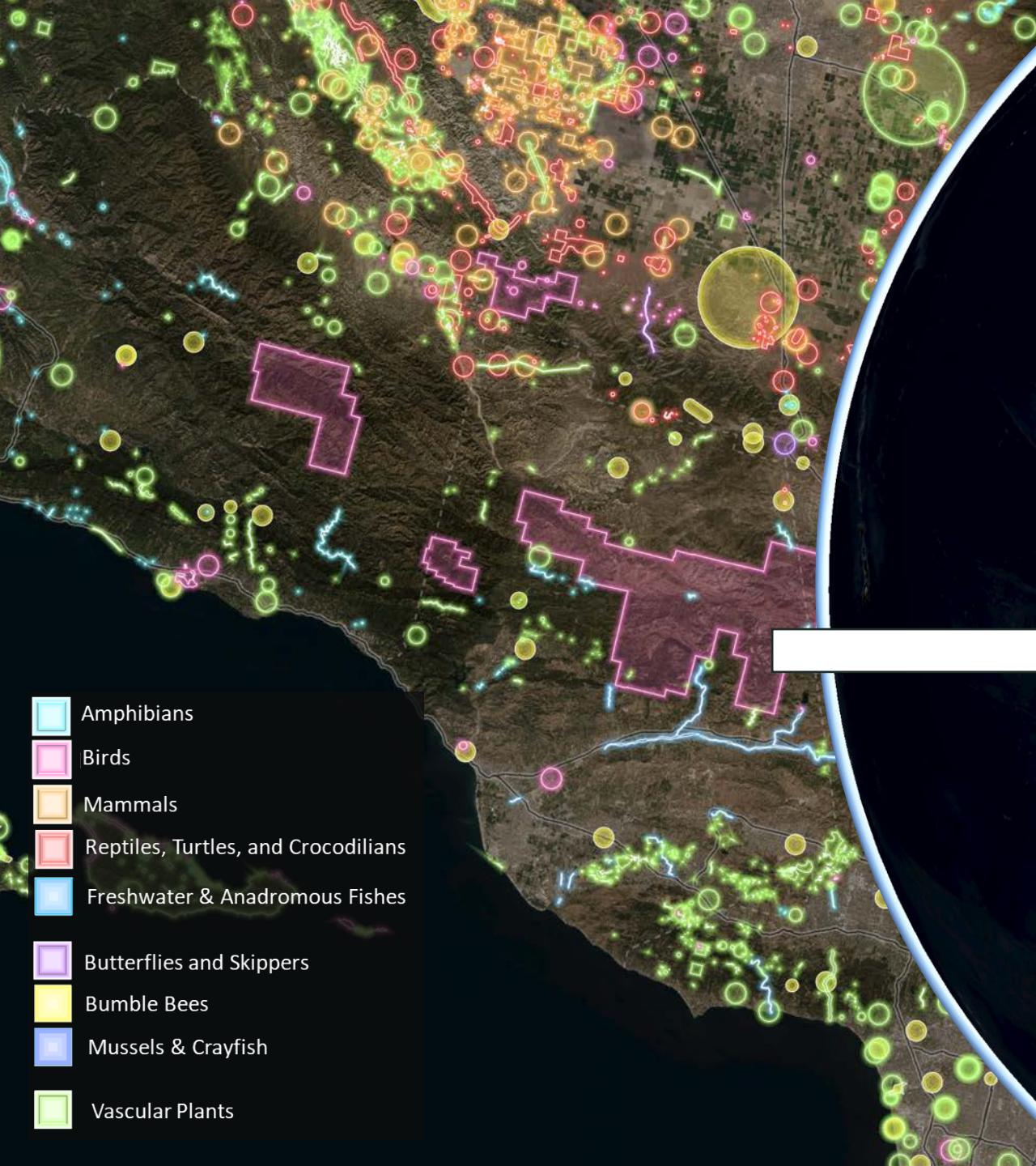


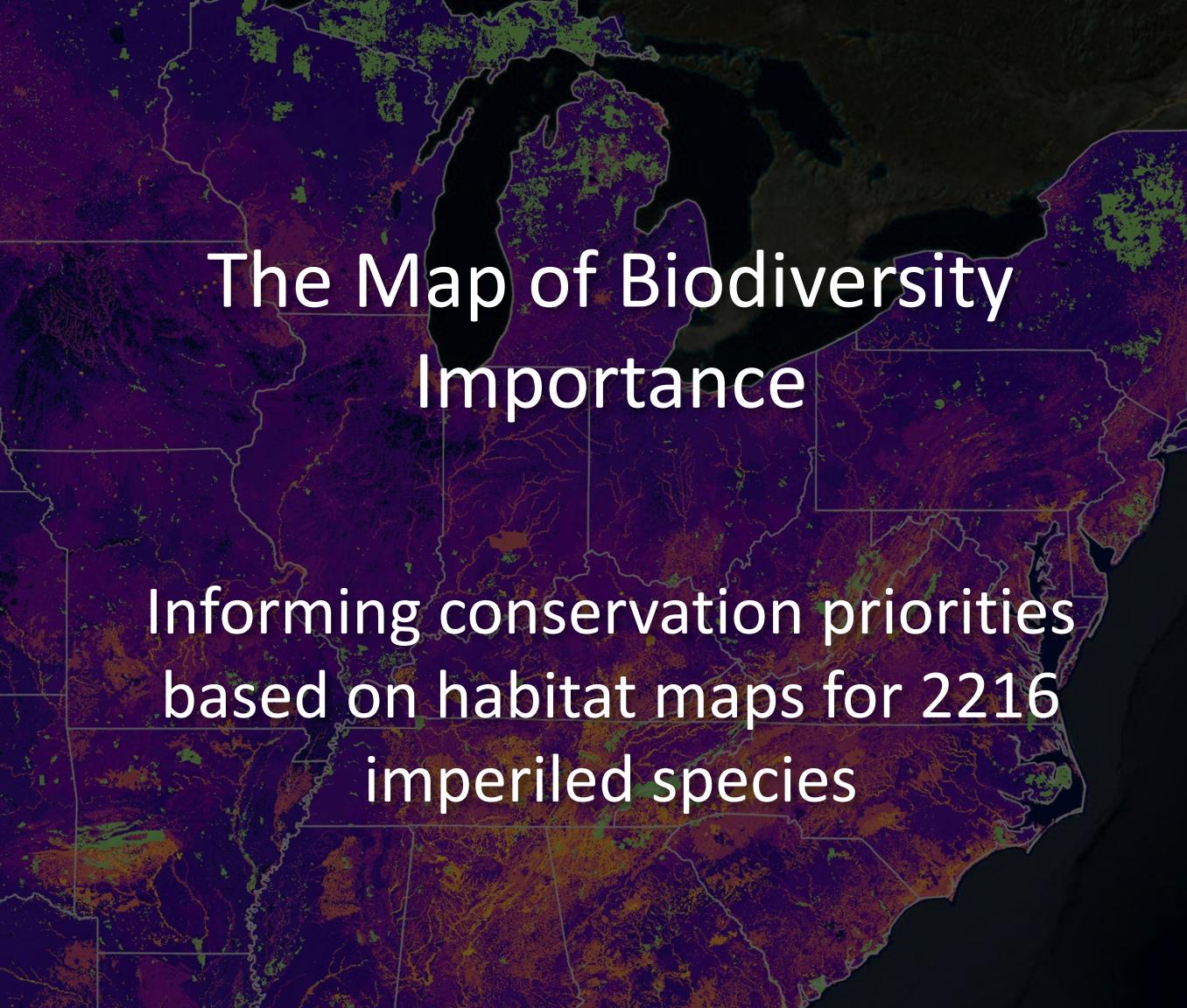
1974-1989  
Heritage Networks

NatureServe



2020's





# The Map of Biodiversity Importance

Informing conservation priorities  
based on habitat maps for 2216  
imperiled species



NatureServe  
Network



1,654 Vascular Plants



Photo by Z. Loughman



144 Tetrapods



Photo by M. Klein

43 Pollinating Insects



236 Aquatic Invertebrates



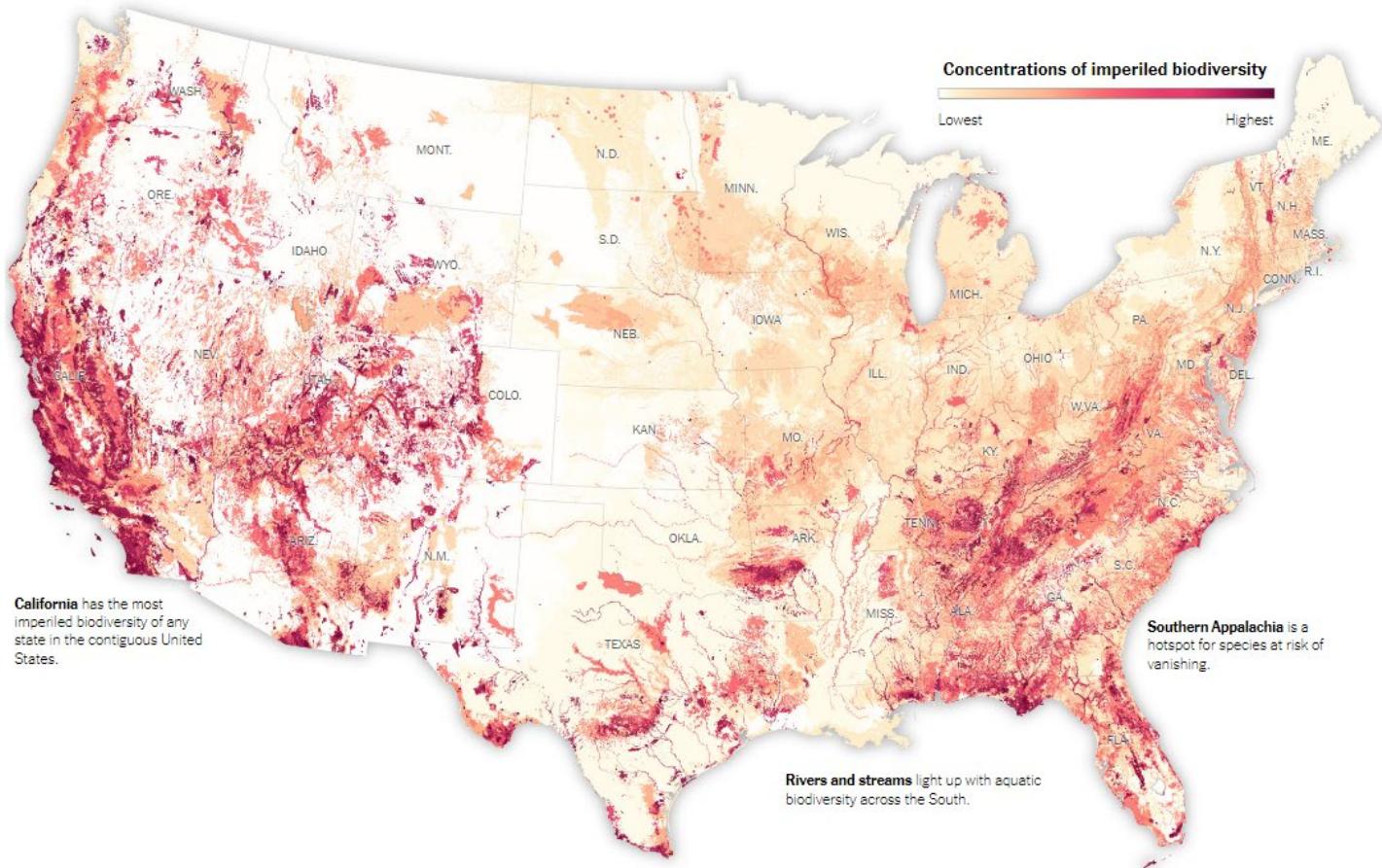
168 Freshwater Fishes

Photo by G. Peebles,  
DNR, Konrad P. Schmidt

# The New York Times

## This Map Shows Where Biodiversity Is Most at Risk in America

By Catrin Einhorn and Nadja Popovich March 3, 2022



## ECOLOGICAL APPLICATIONS

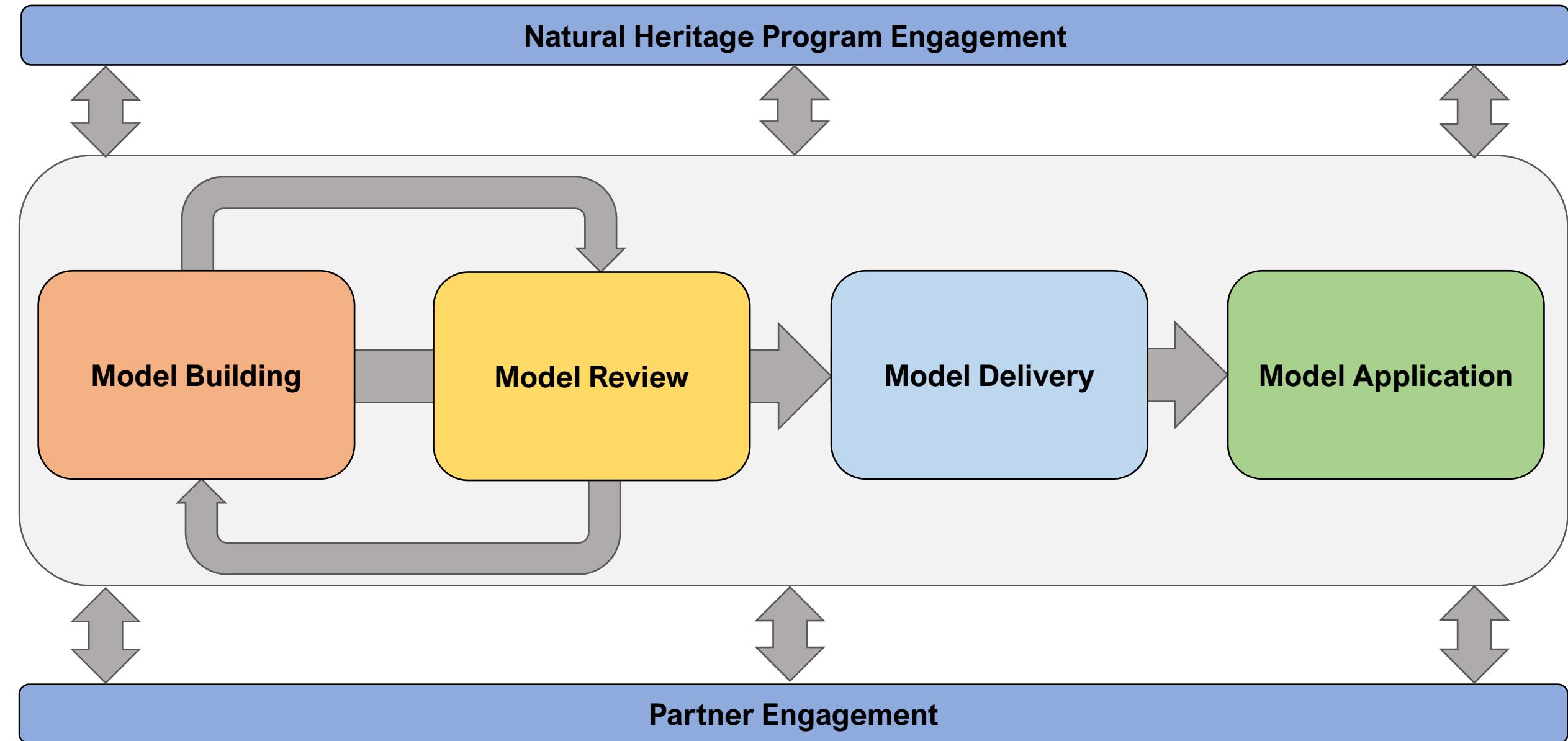
ECOLOGICAL SOCIETY OF AMERICA

ARTICLE | Open Access | CC BY SA

Increasing taxonomic diversity and spatial resolution clarifies opportunities for protecting US imperiled species

Healy Hamilton, Regan L. Smyth, Bruce E. Young, Timothy G. Howard, Christopher Tracey, Sean Breyer, D. Richard Cameron, Anne Chazal, Amy K. Conley, Charlie Frye, Carrie Schloss

# NatureServe's Collaborative Species Habitat Modeling Process



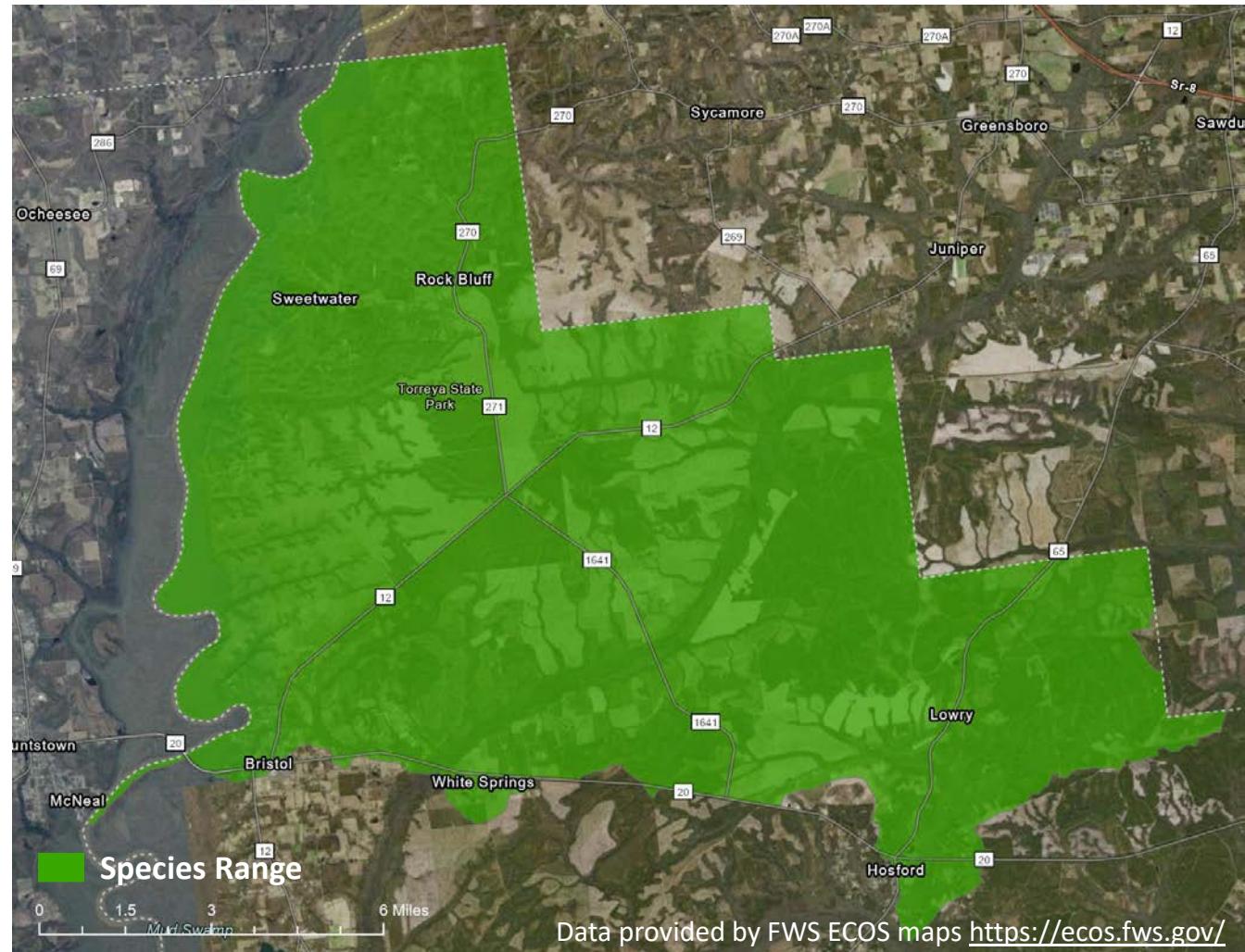
Species Habitat Model Tiers					
		Model Tier			
		Tier 3	Tier 2	Tier 1	
<b>Partner Engagement</b>	Engage partners from the start and throughout modeling process		X	X	X
	Identify and brief species expert reviewers ahead of modeling				X
	Tailor modeling steps based on partner requirements				X
<b>Model Building</b>	Supplement NatureServe data with additional occurrence records		X	X	
	Use high resolution localized environmental predictors if available				X
	Get model inputs reviewed by species experts		X	X	X
	Select highly suitable algorithm(s) to model target species	X	X	X	
	Consider multiple algorithms				X
	Evaluate statistical model performance thoroughly	X	X	X	
<b>Model Review</b>	Produce mapped model predictions and easy-to-read summary pdfs	X	X	X	
	Get model outputs reviewed by NatureServe Network experts	X	X	X	
	Get model outputs reviewed by external partners and stakeholders				X
<b>Model Delivery</b>	Revise model outputs to address expert reviews	X	X	X	
	Communicate model outcomes and confidence via webinars and guidance documents	X	X	X	
	Upload model outputs to NatureServe Explorer Pro				
<b>Model Application</b>	Produce standard set of additional outputs to guide inventory and identify conservation responsibilities/partners	X	X	X	
	Produce additional model outputs based on the needs of partners				X

# Apalachicola False Rosemary

## *Conradina glabra*

G1  
Critically Imperiled

ESA Listing Status:  
Endangered



Data provided by FWS ECOS maps <https://ecos.fws.gov/>

nature reserve.shinyapps.io/MIRT-L-Conradina\_glabra/

Outlook Mail - Data Science... Zoom SharePoint Webex Biotics Unanet TriNet Platform Jira Applied Data Science ArcGIS Azure Explorer PRO Gmail OneNote Evernote Twitter

## 2. Review input species occurrence data

Reliable species occurrence data are key to building robust models. More data are not necessarily better if they are subject to high spatial, temporal, or taxonomic uncertainty. Help us by reviewing potential input species occurrence data from multiple sources.

**Instructions:** You can provide feedback on potential input species occurrence data displayed by navigating the map below and clicking on the relevant polygon or point. A panel will pop up on the right to allow you to provide details about the clicked shape or point, including whether it should be removed, included, or double-checked. For some shapes or points, such as ones corresponding to observations from iNaturalist, GBIF, or HerpMapper when available, a link will be provided to the underlying observation and allow you to navigate to the webpage for the underlying observation and assess additional details about the observation. In addition, you can use the three shape icons on the left of the map window (the line, square, and triangle) to draw shapes on the map and provide comments on broader geographical areas, such as areas for which you know more data should be available or areas where all occurrence data are unlikely to represent the species' true habitat.

**NOTE:** If you are drawing shapes, do not worry about drawing them exactly: err on the side of drawing more inclusive rather than less inclusive shapes. Please add any important details in the Comments box.

**Species Notes:** For this species we have included all available EO's including those from before the year 1990. Species occurrence data shown here have been provided by U.S. FWS Botanist Vivian Negron-Ortiz.

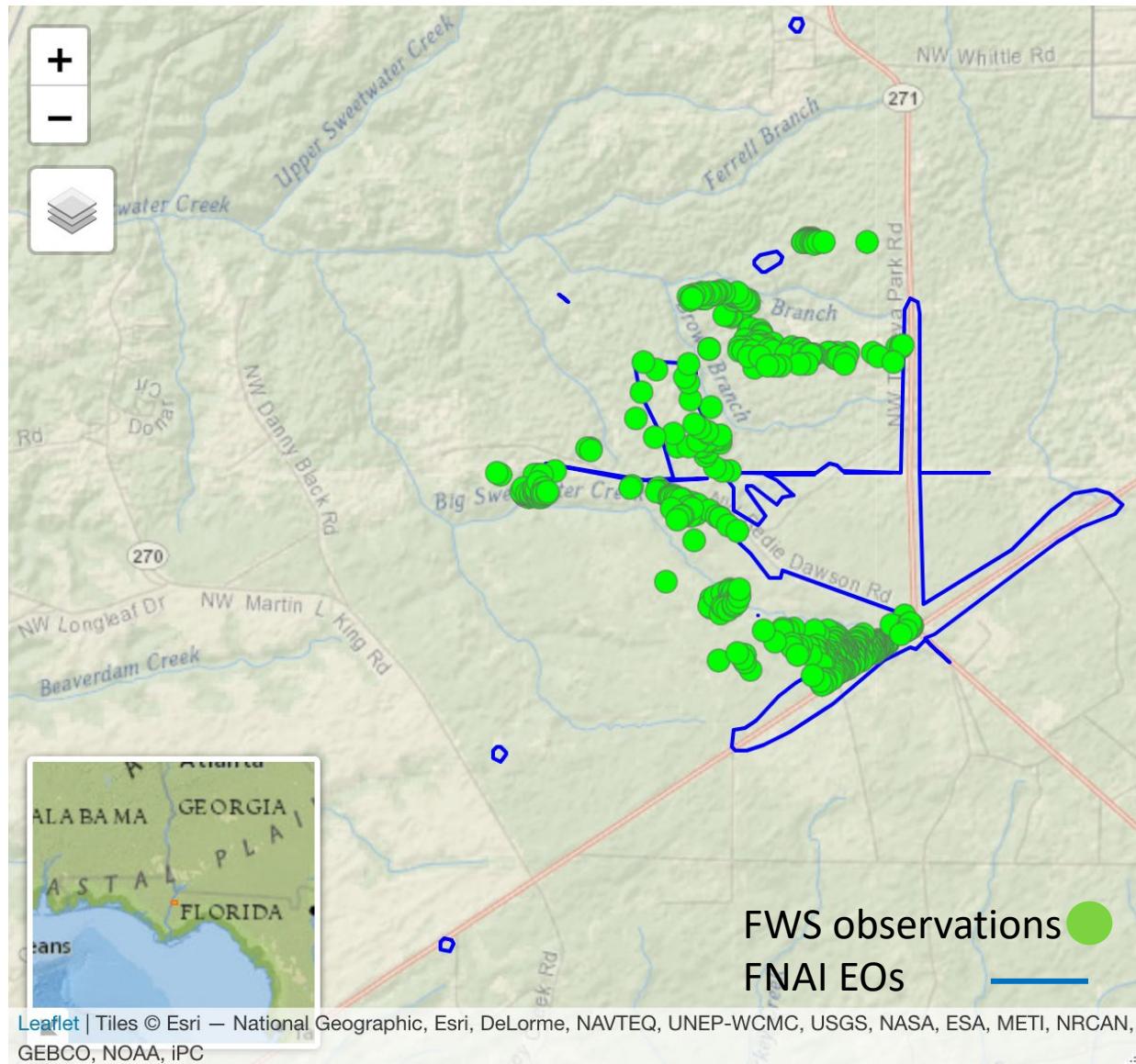
U.S.  
FISH & WILDLIFE  
SERVICE  
DEPARTMENT OF THE INTERIOR

+ - ⌂ ⌃ ⌄ ⌅ ⌆

Esri World Street Map  
Esri World Terrain  
Esri World Imagery  
Open Street Map  
Stamen Terrain

Observations  
Element Occurrences



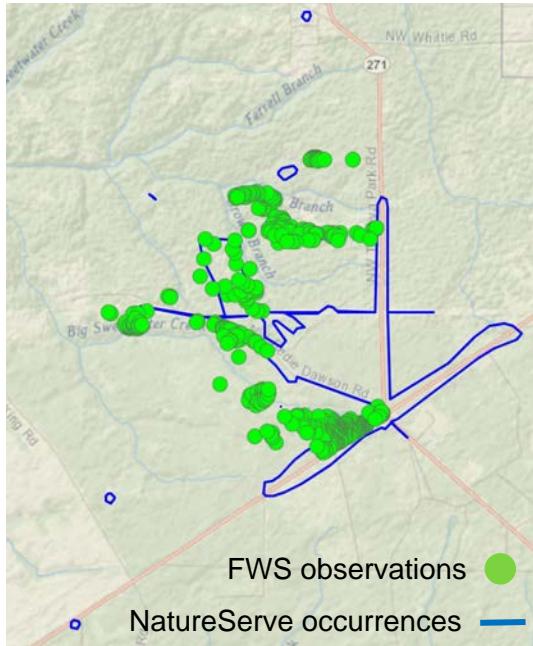




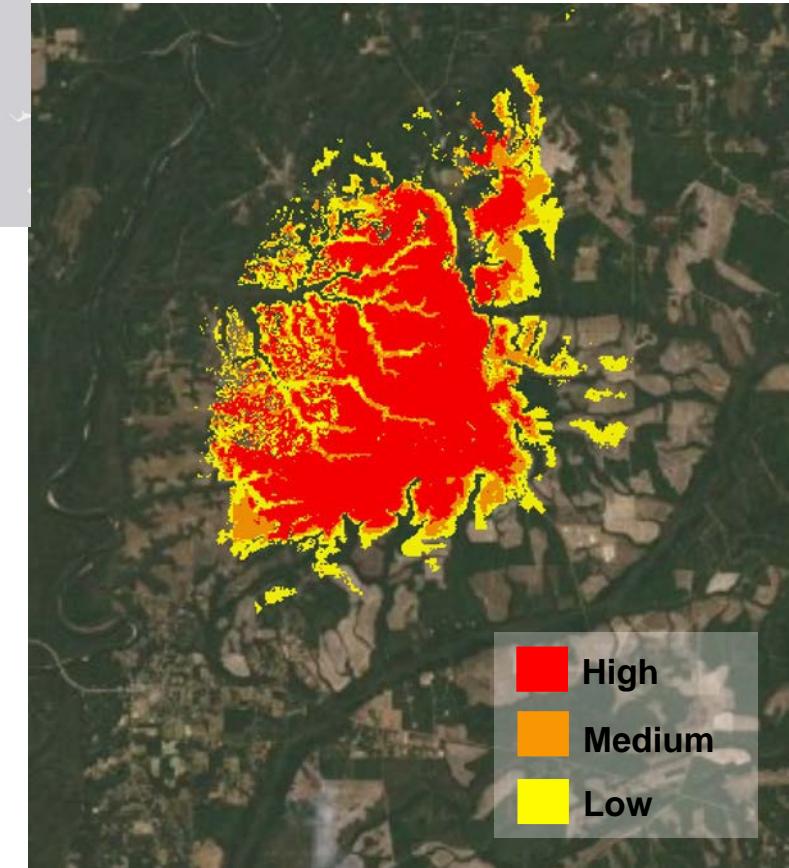
## Model Building

# Produce mapped model predictions and easy-to-read summary pdfs

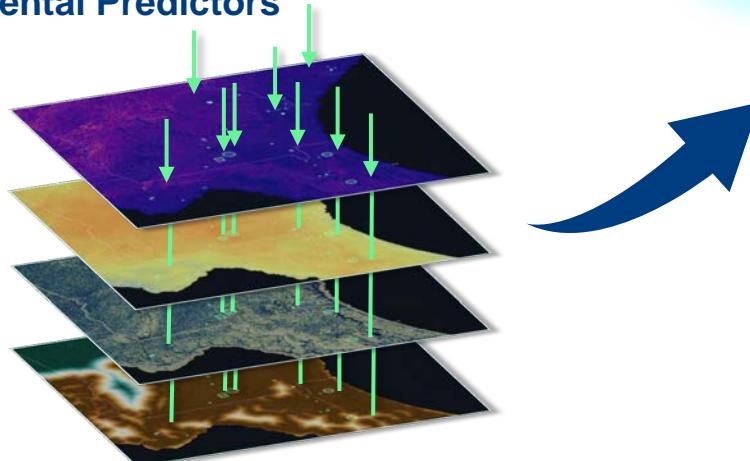
### Species Occurrence Data



Predicted habitat probability



### Environmental Predictors



Modeling Engine





## NatureServe Species Habitat Model

### *Conradina glabra* Apalachicola False Rosemary

NatureServe Element Global ID:  
**ELEMENT\_GLOBAL.2.159260**

NatureServe Global Conservation Rank: **G1**  
Model Creation Date: **2022-08-04**  
Model Algorithm: **Random Forest**  
Model Version: **Cglab\_159260\_rf\_20220804**



#### General Information

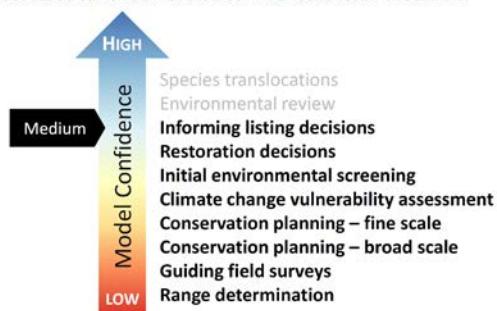
This species habitat model was produced for NatureServe to predict the NatureServe habitat distribution for *Conradina glabra* (Apalachicola False Rosemary).

Species habitat models identify the environmental predictors associated with known occurrences of a species to generate predictions of the potential geographical distribution of habitat for the species across broad landscapes. Geographical maps generated using these models indicate areas of likely habitat based on quantified species/environment relationships. Habitat probabilities are correlated with the occurrence and/or abundance of the species across the modeled area; however, habitat probabilities do not provide direct estimates of species presence or absence.

For more information about this model, please contact [vratika\\_chaudhary@natureserve.org](mailto:vratika_chaudhary@natureserve.org). For more information on how model confidence was assessed, see the [NatureServe Network Habitat Model Standard](#).

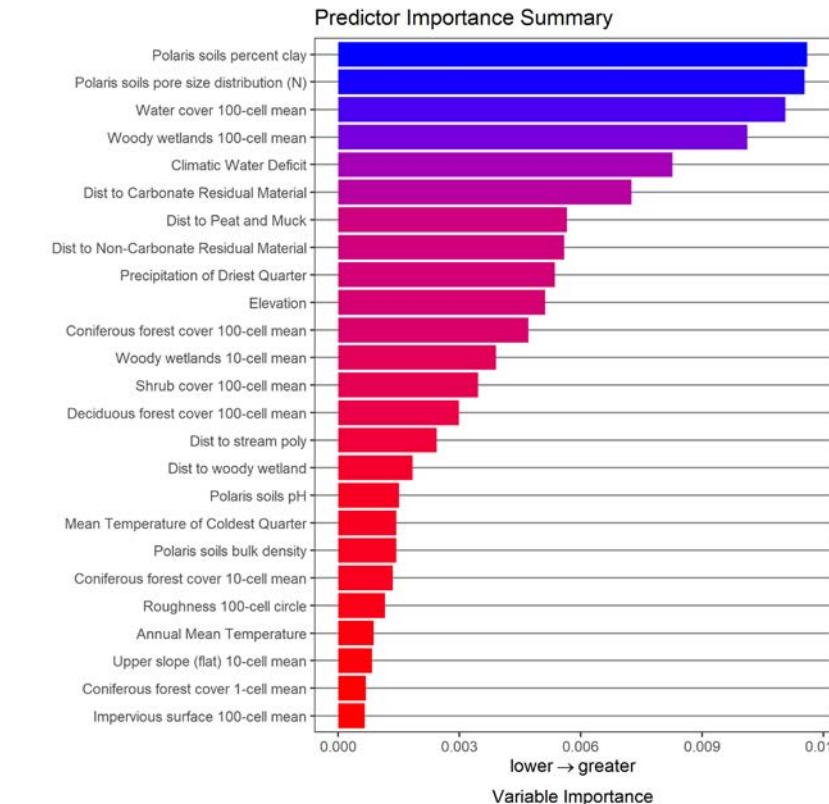
#### Recommended Uses

This species habitat model has been assessed to have an overall confidence level of **medium**.



Based on the overall confidence level for this model, we conclude that the model is appropriate for the recommended uses in bold in the figure on the right. However, we cannot recommend that this model be used for the applications in light grey.

#### Environmental Predictors



**Figure 2.** Relative importance of environmental predictors included in the full model. Variable importance of each variable was assessed by the decrease in accuracy caused by the removal of that variable from the model. See Appendix 1 for detailed descriptions of environmental predictors.

## Model Review

**Get model outputs reviewed by external partners and stakeholders**



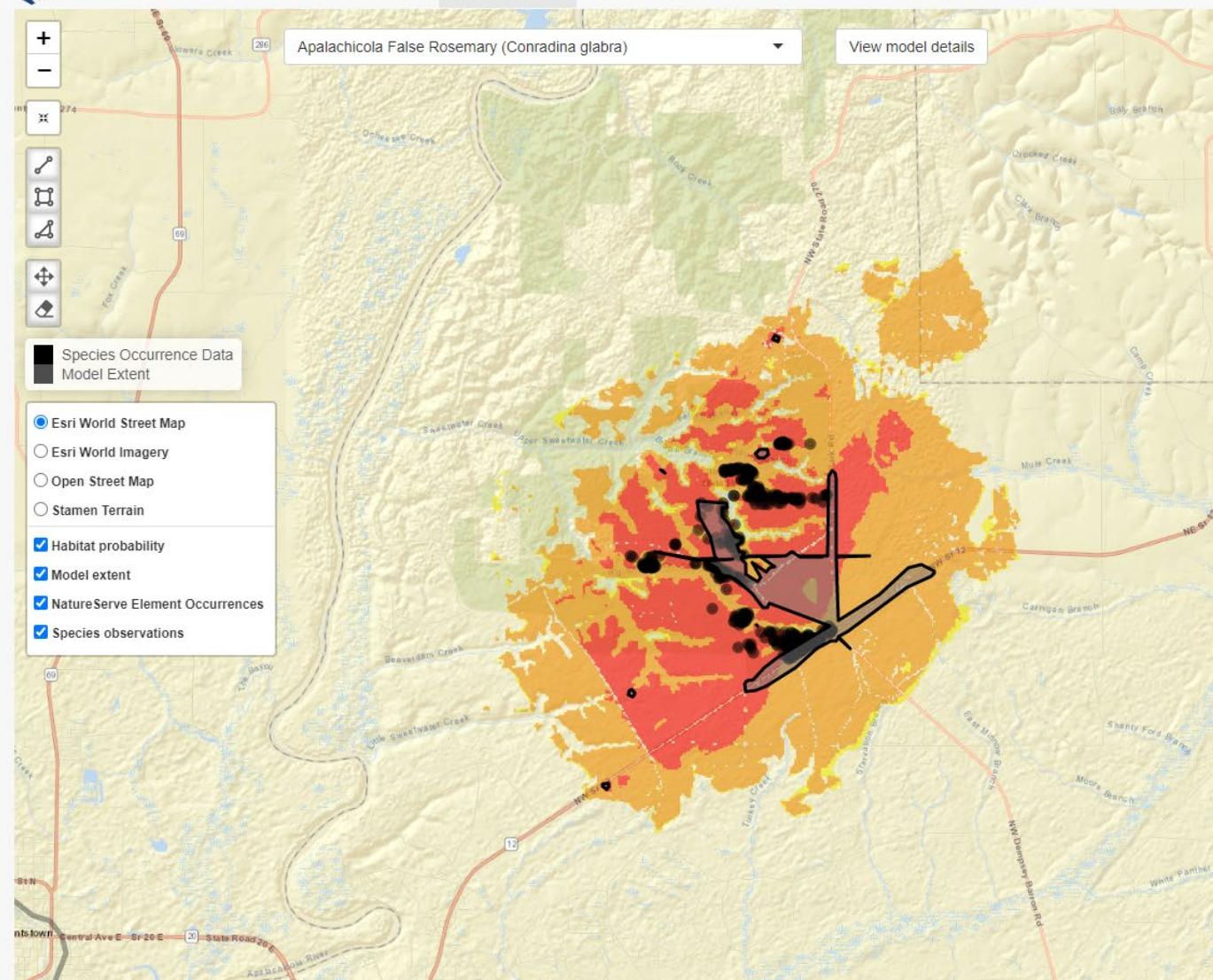
NATURESERVE Model Outputs Review Tool    Current Version    Revision History

Apalachicola False Rosemary (*Conradina glabra*)    View model details

Species Occurrence Data    Model Extent

Esri World Street Map    Esri World Imagery    Open Street Map    Stamen Terrain

Habitat probability    Model extent    NatureServe Element Occurrences    Species observations



3. Review Environmental Predictors

Precipitation of Driest Quarter

Elevation

Dist to Carbonate Residual Material

Precipitation of Wettest Quarter

Dist to Non-Carbonate Residual Material

Coniferous forest cover 100-cell mean

Dist to Peat and Muck

importance

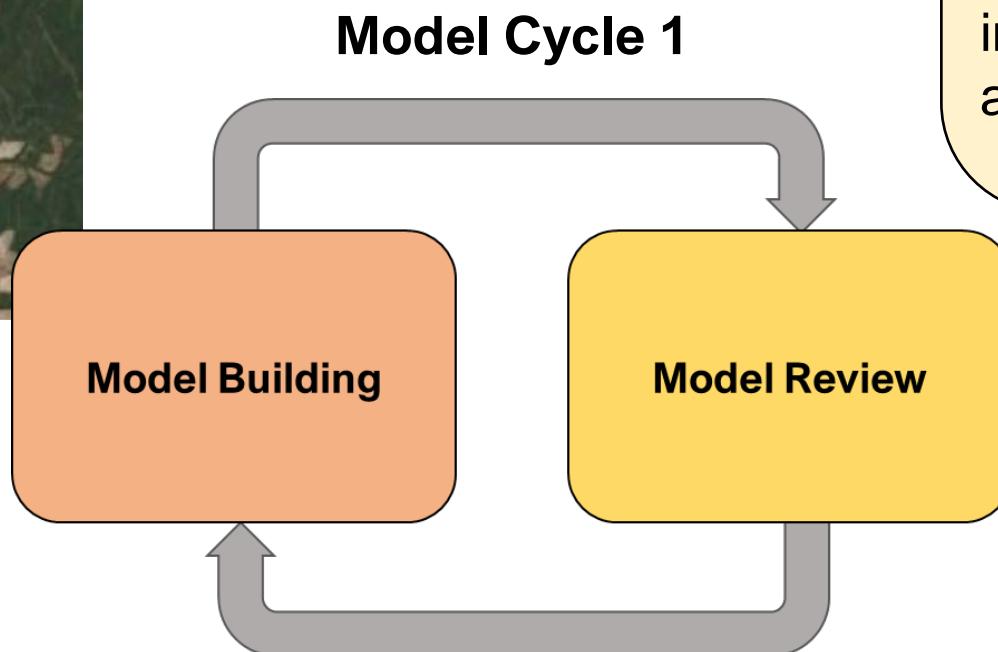
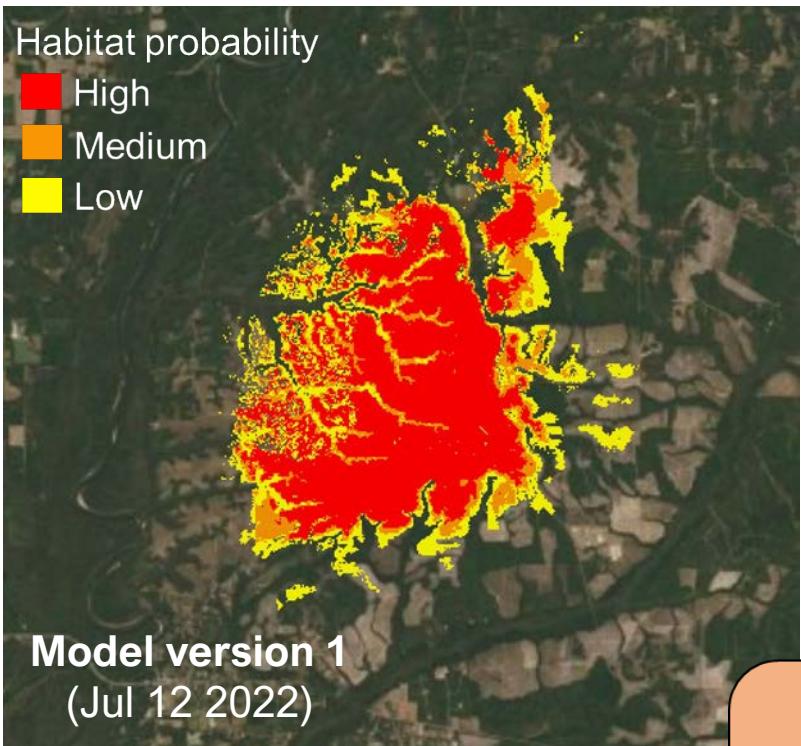
Comments on predictors:

Previous step    Next step

## Model Review

**Get model outputs reviewed by external partners and stakeholders**





"I think this model does fairly well at predicting suitable habitat within a reasonable range for the species [...]. But I would be interested to see what it does in the HUC to the north I indicated in the map should be added to the extent."

Reviewer 2

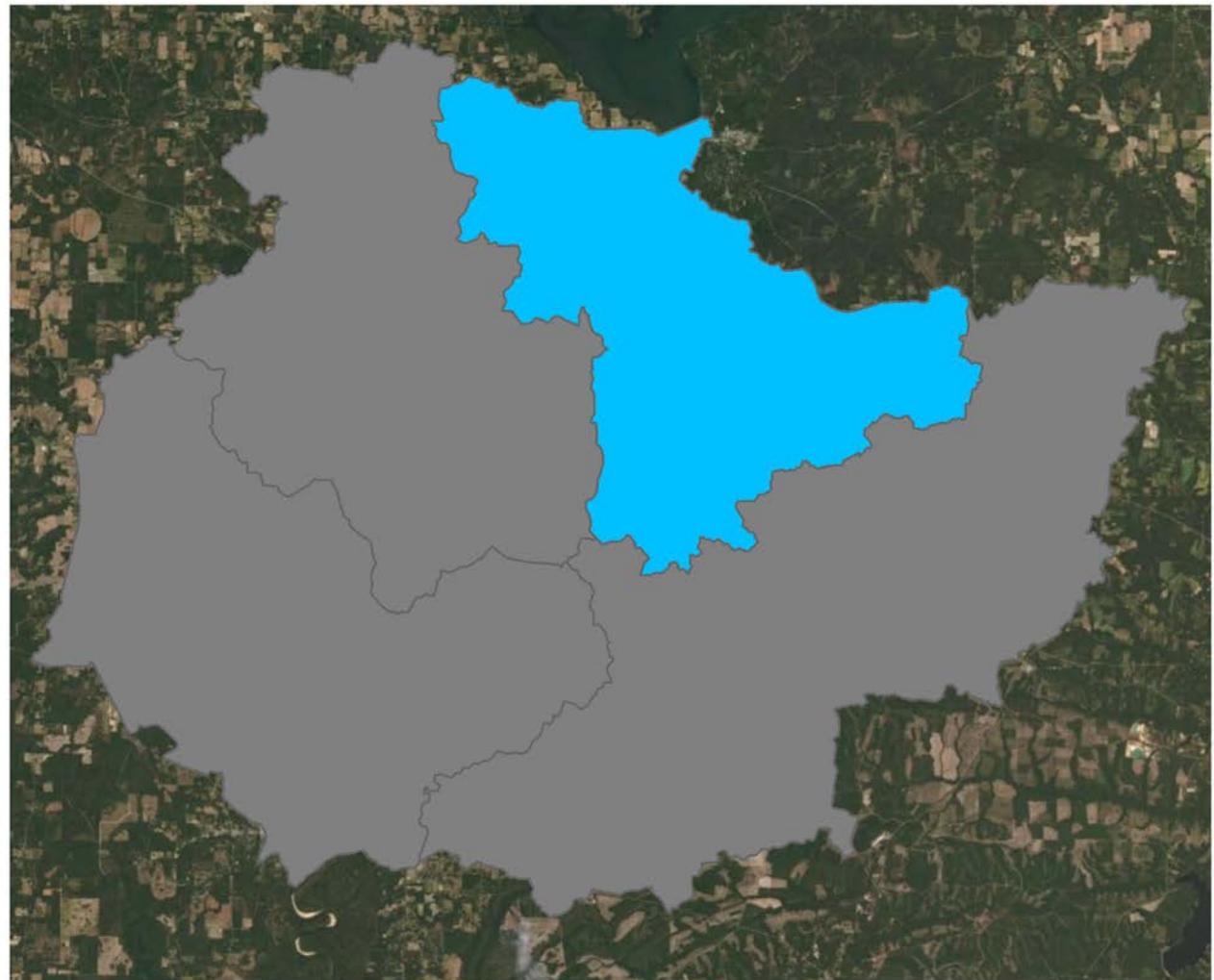
Model rating



**Model Revision 1**

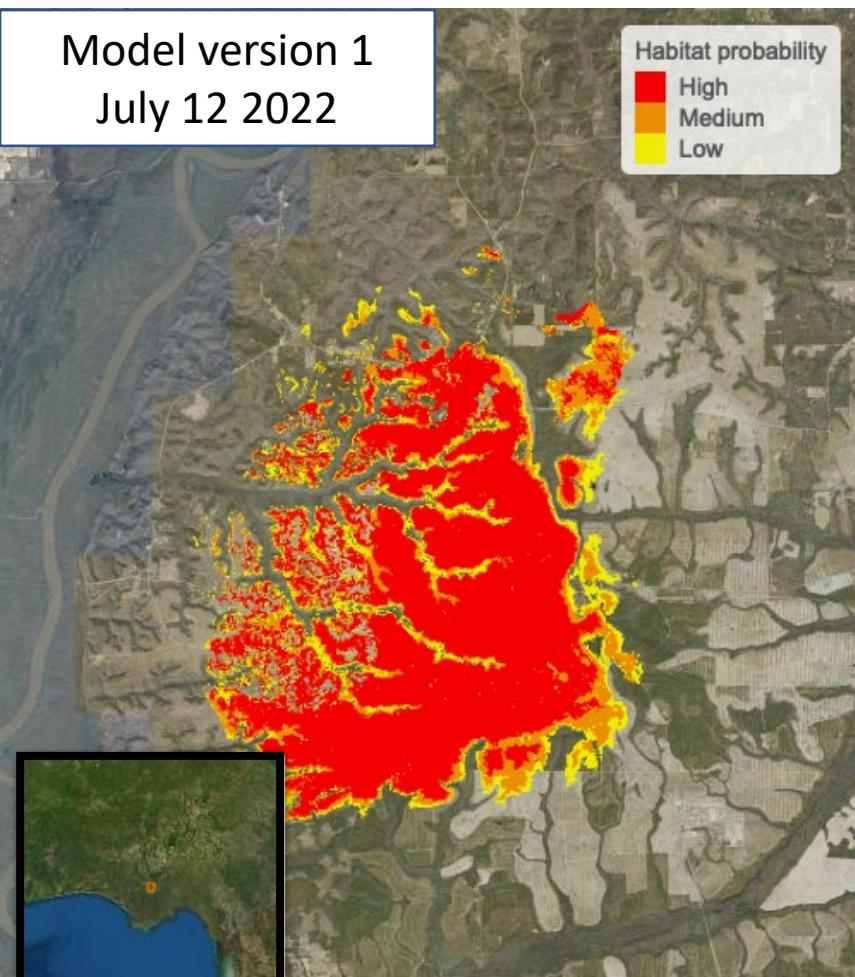
Reviewer 2: "But I would be interested to see what it does in the HUC to the north I indicated in the map should be added to the extent."

- Areas kept from previous model extent
- Areas added to previous model extent
- Areas removed from previous model extent

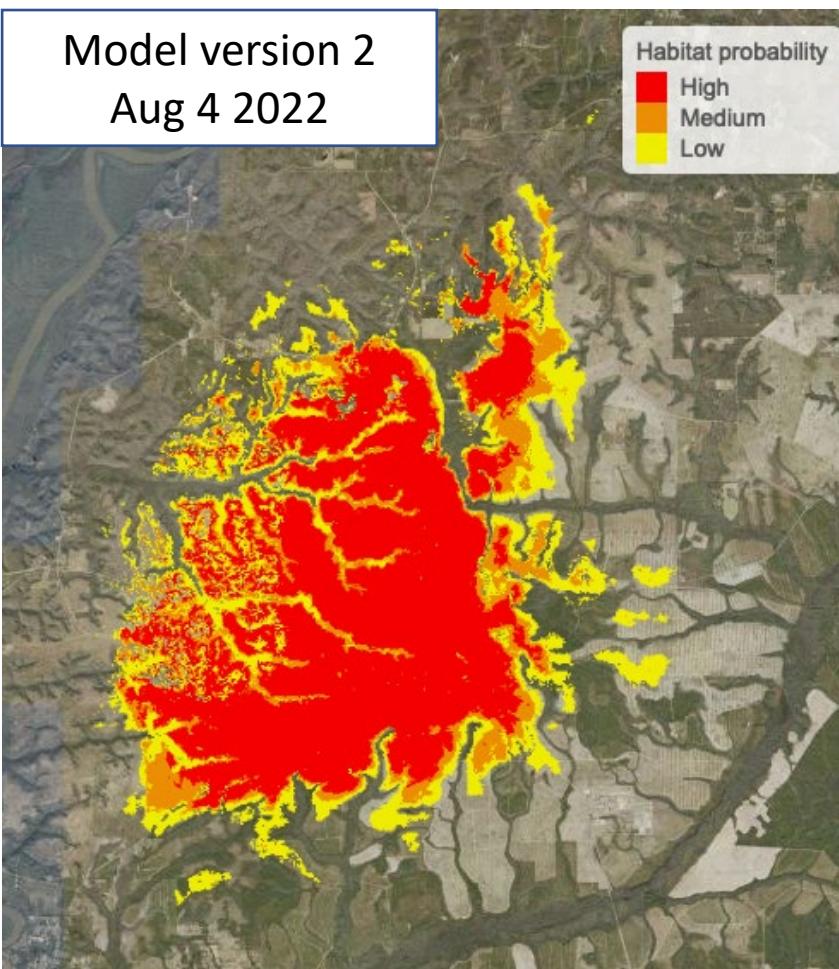


## Revise model outputs to address expert reviews

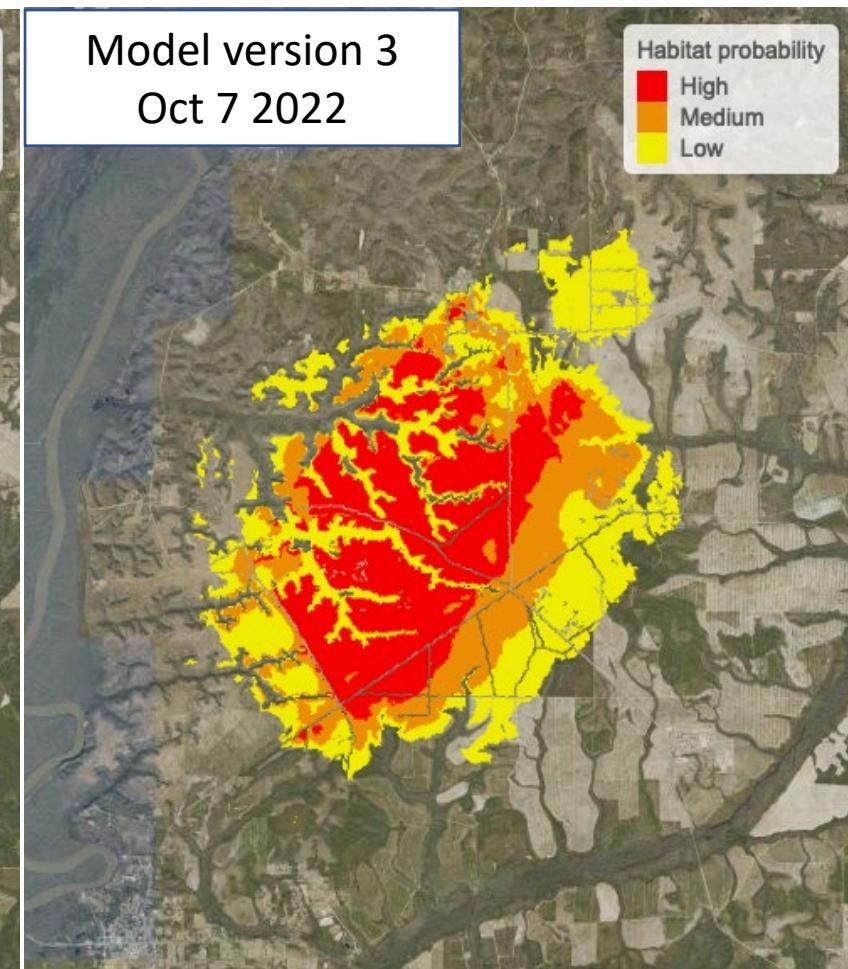
Model version 1  
July 12 2022



Model version 2  
Aug 4 2022



Model version 3  
Oct 7 2022



Model rating



Model rating



Model rating



**Integrity of Inputs and Methods**



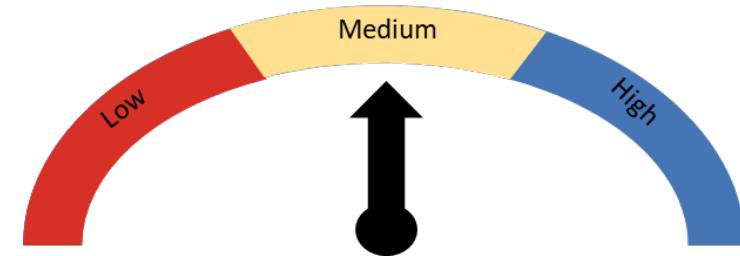
**Model Validation Statistics**



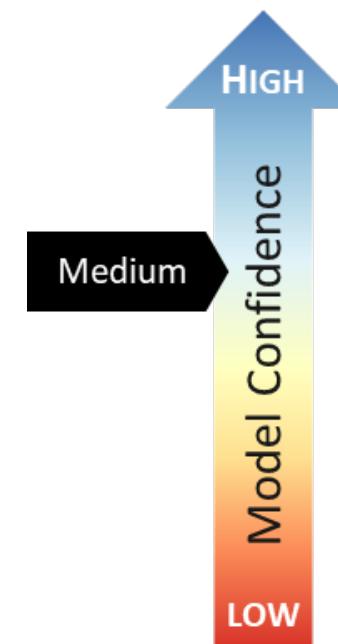
**Expert Review**



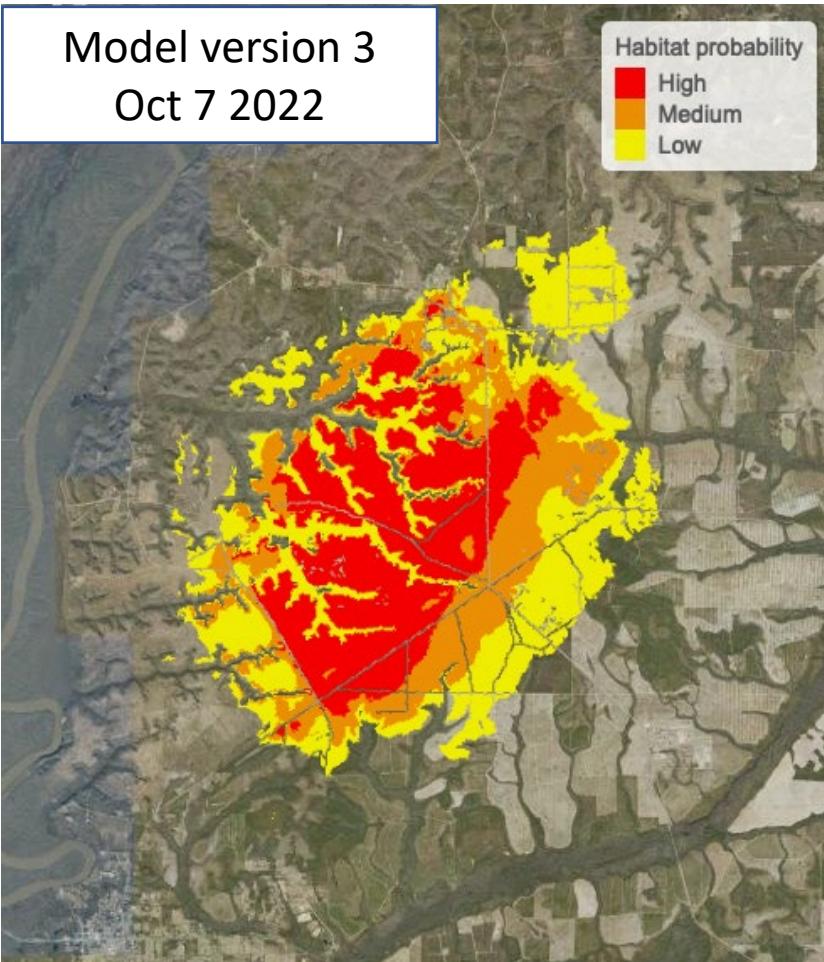
## Model Confidence



## Recommended Uses



- Species translocations
- Environmental review
- Informing listing decisions**
- Restoration decisions
- Initial environmental screening
- Climate change vulnerability assessment
- Conservation planning – fine scale
- Conservation planning – broad scale
- Guiding field surveys
- Range determination



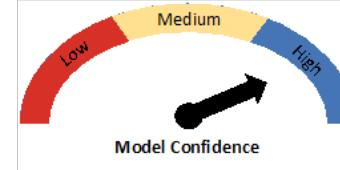
### Model rating



### *Conradina glabra* Apalachicola False Rosemary

NatureServe Element Global ID:  
[ELEMENT\\_GLOBAL.2.159260](#)

NatureServe Global Conservation Rank: **G1**  
Model Creation Date: 2022-10-07  
Model Algorithm: Random Forest  
Model Version: Cglab\_159260\_rf\_20221007

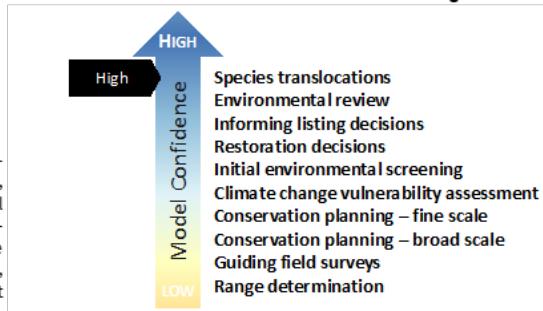


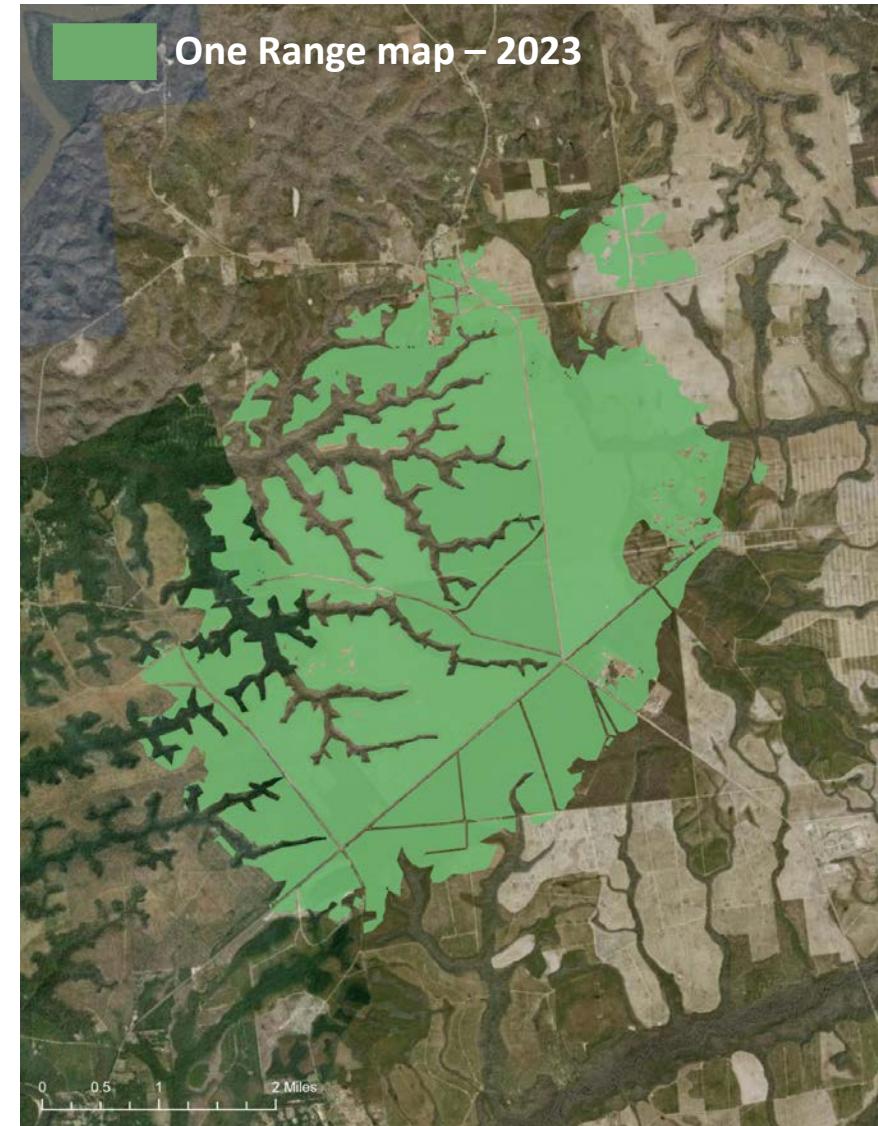
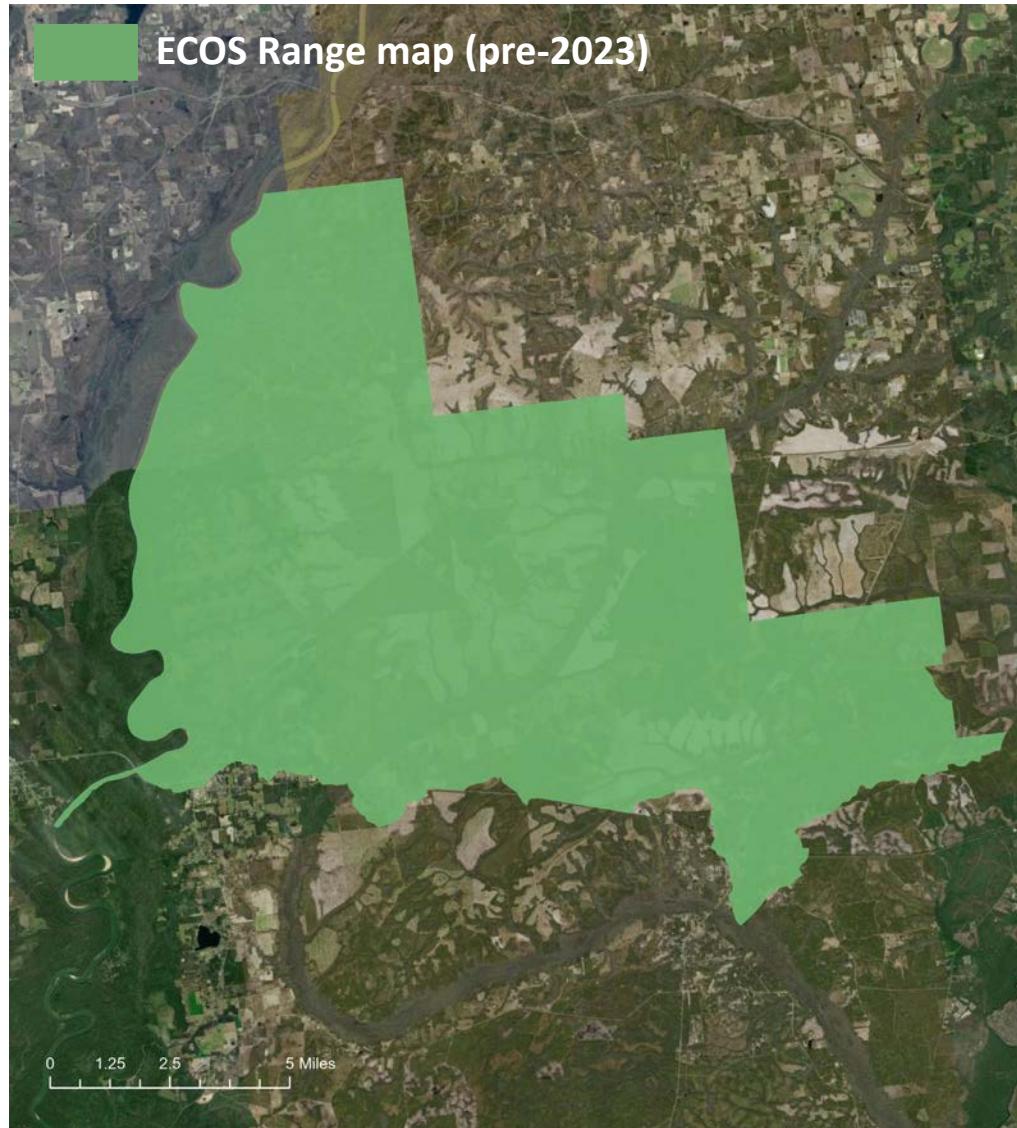
#### General Information

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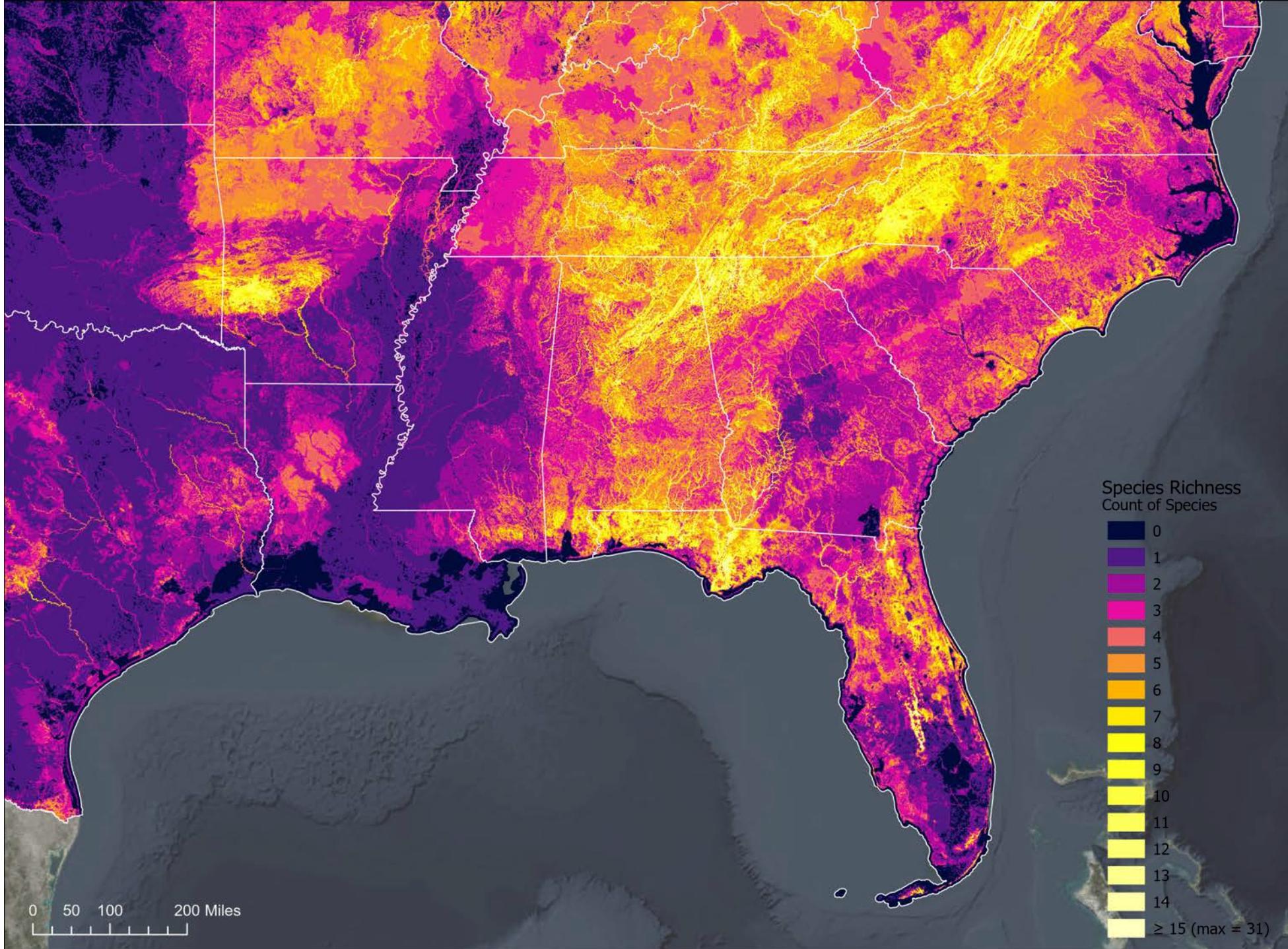
#### Recommended Uses

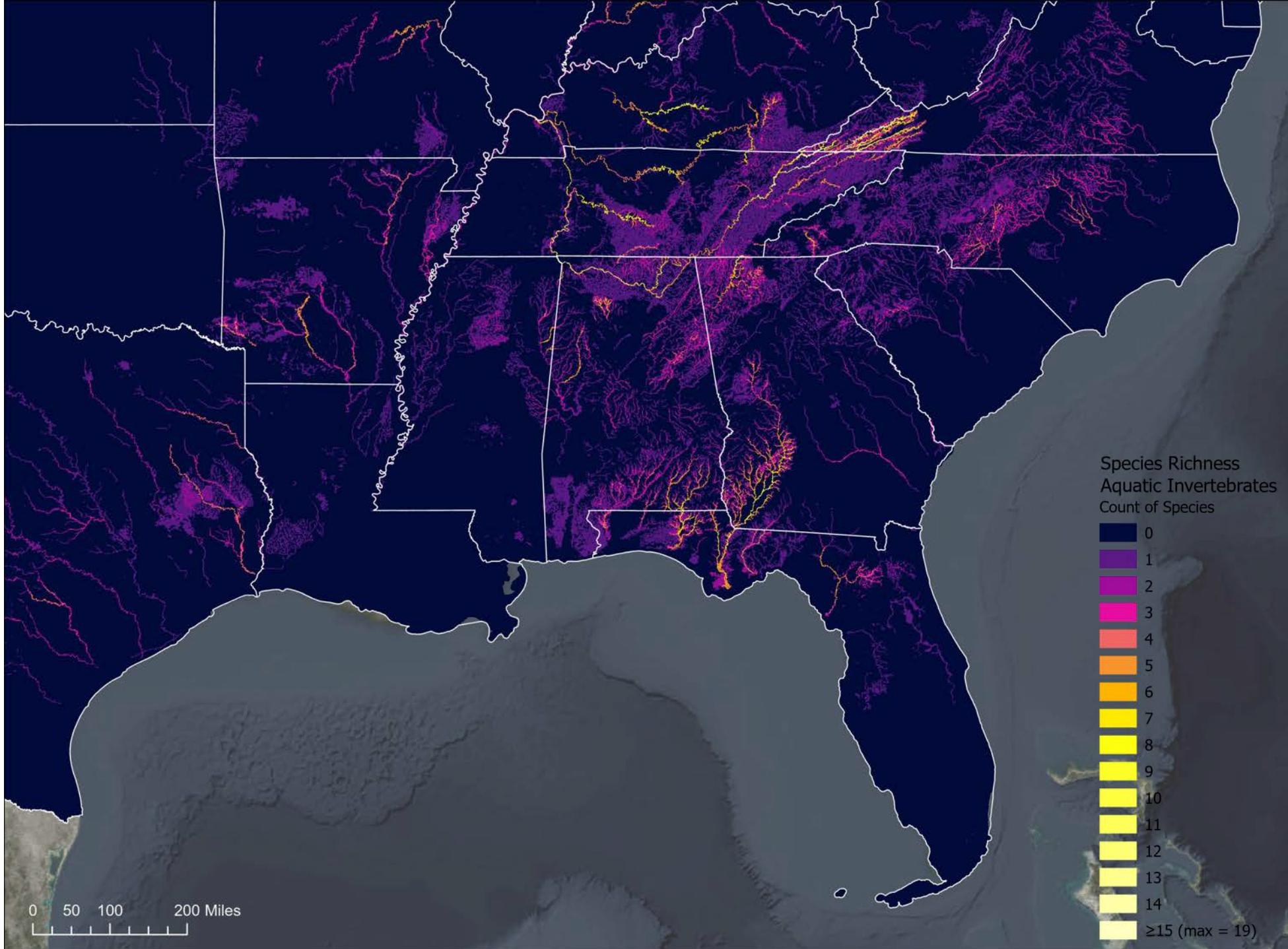
This species habitat model has been assessed to have an overall confidence level of **high**.

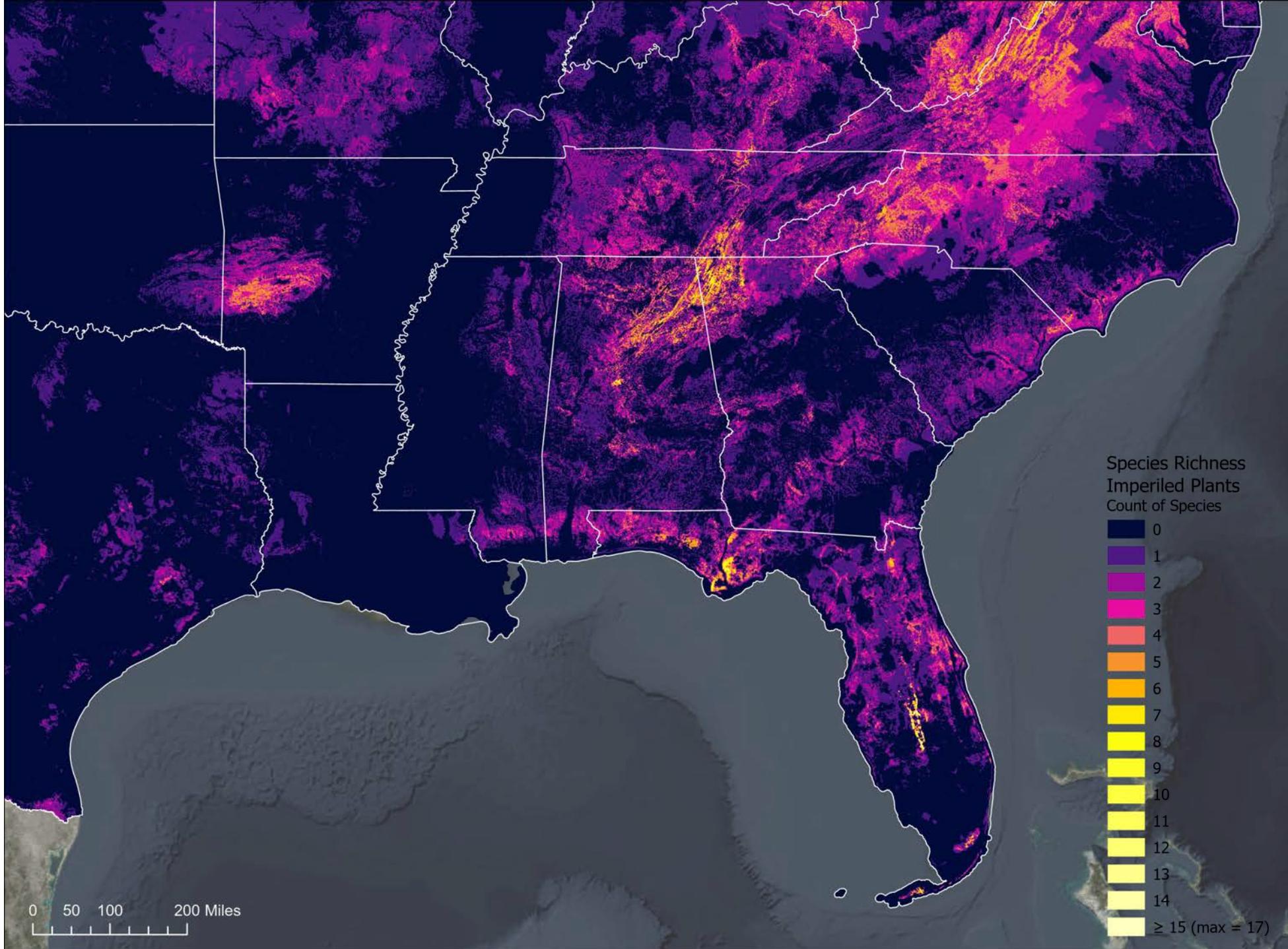


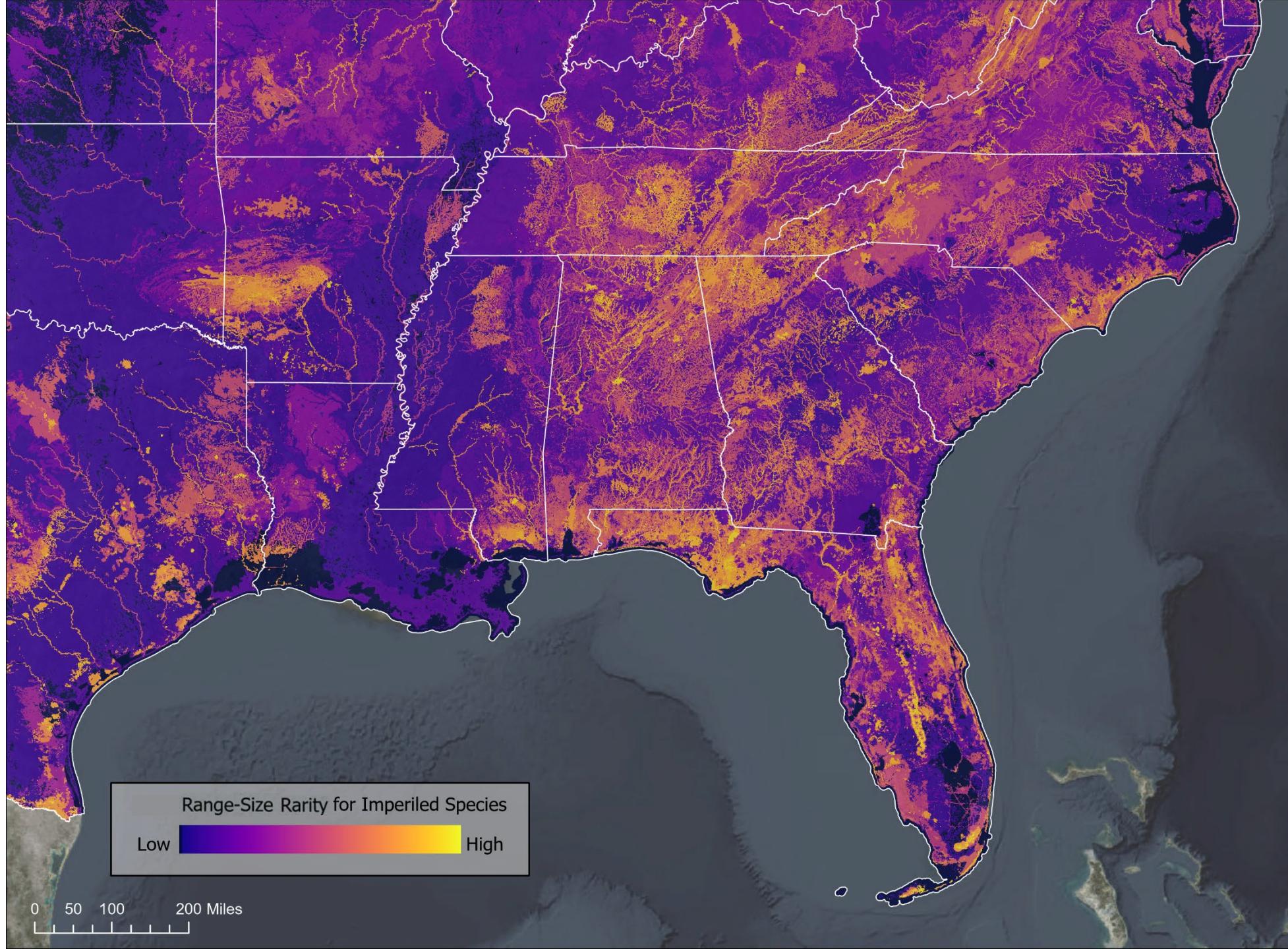


90% reduction in estimated area of habitat

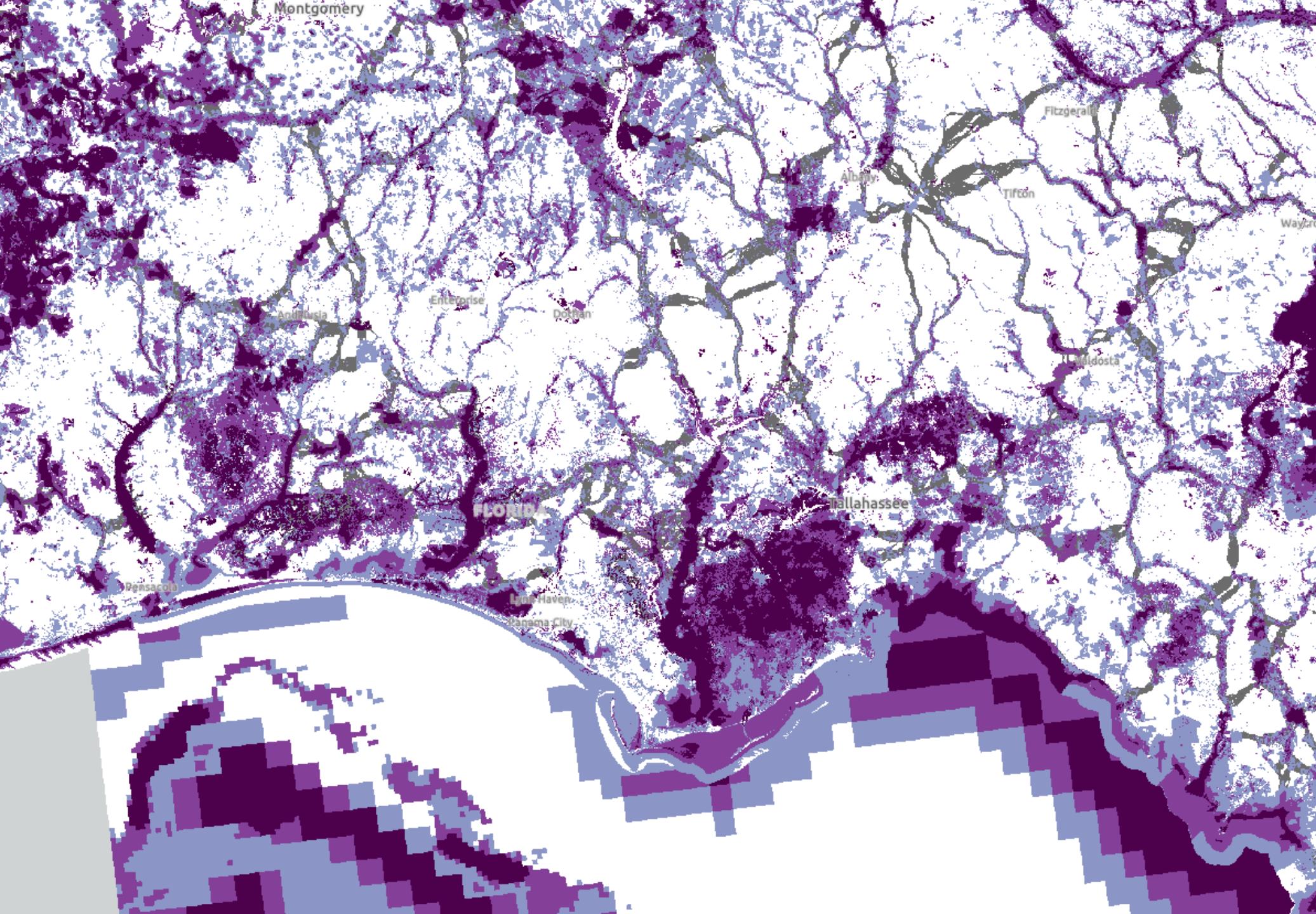


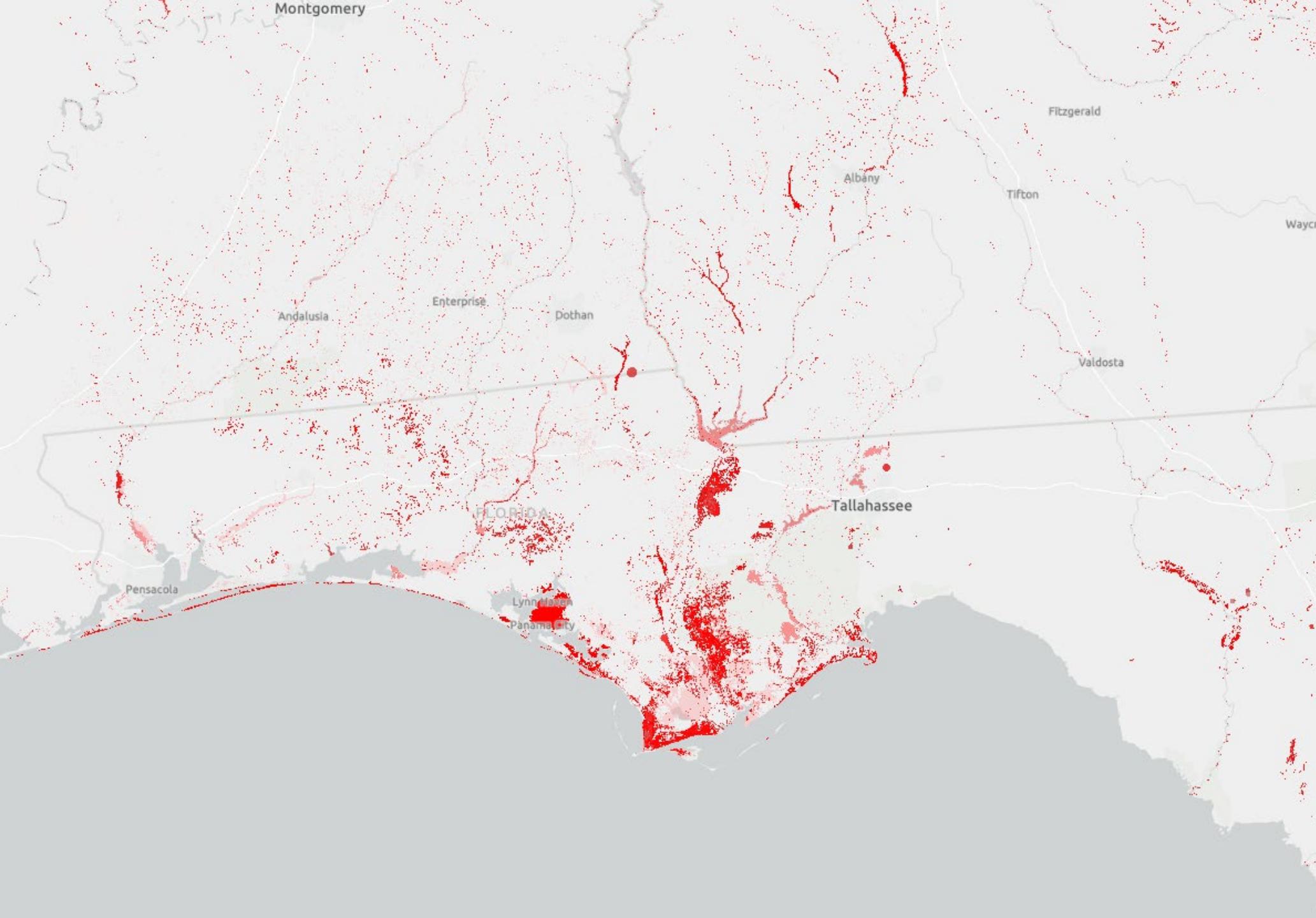






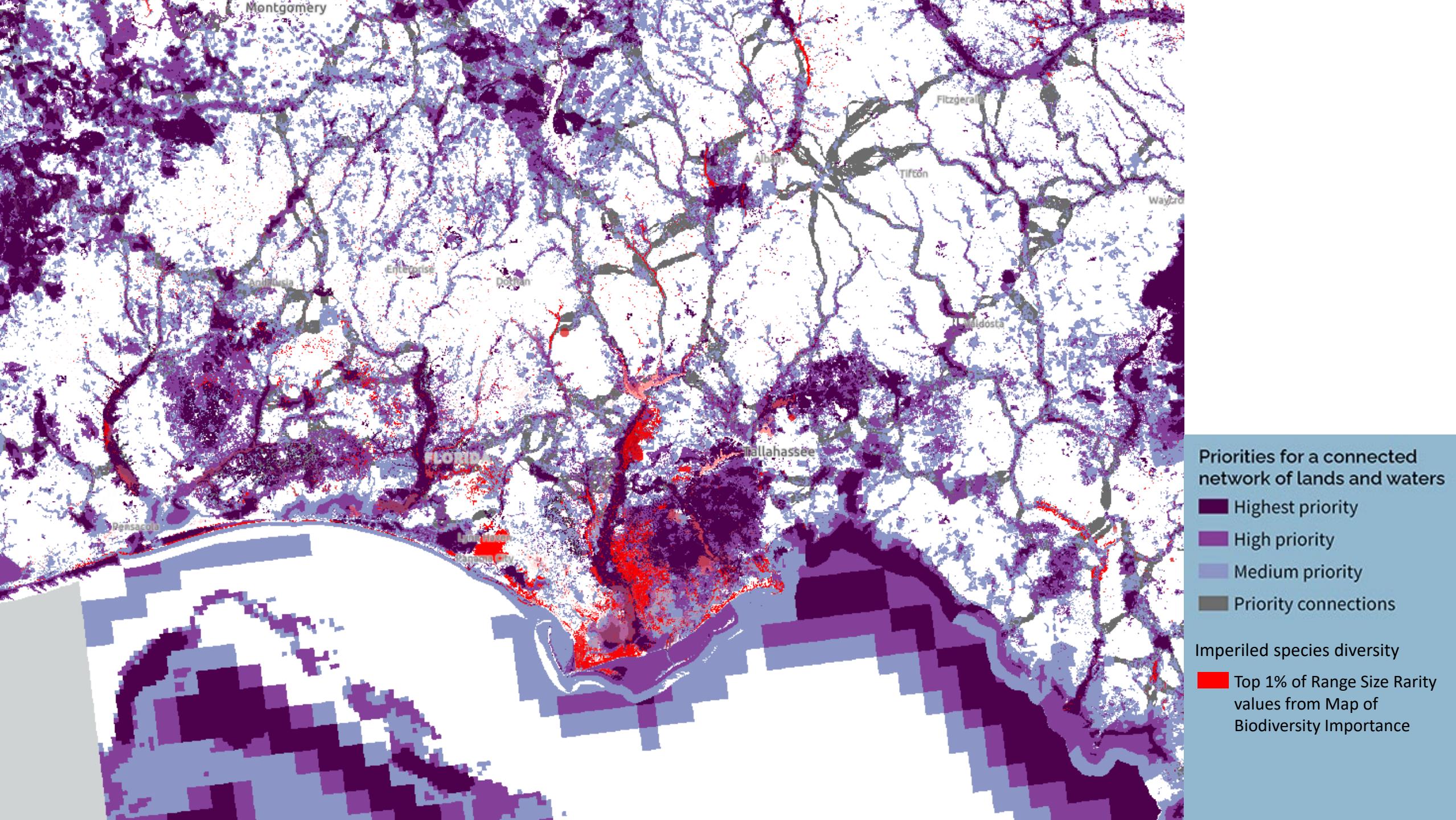
Montgomery

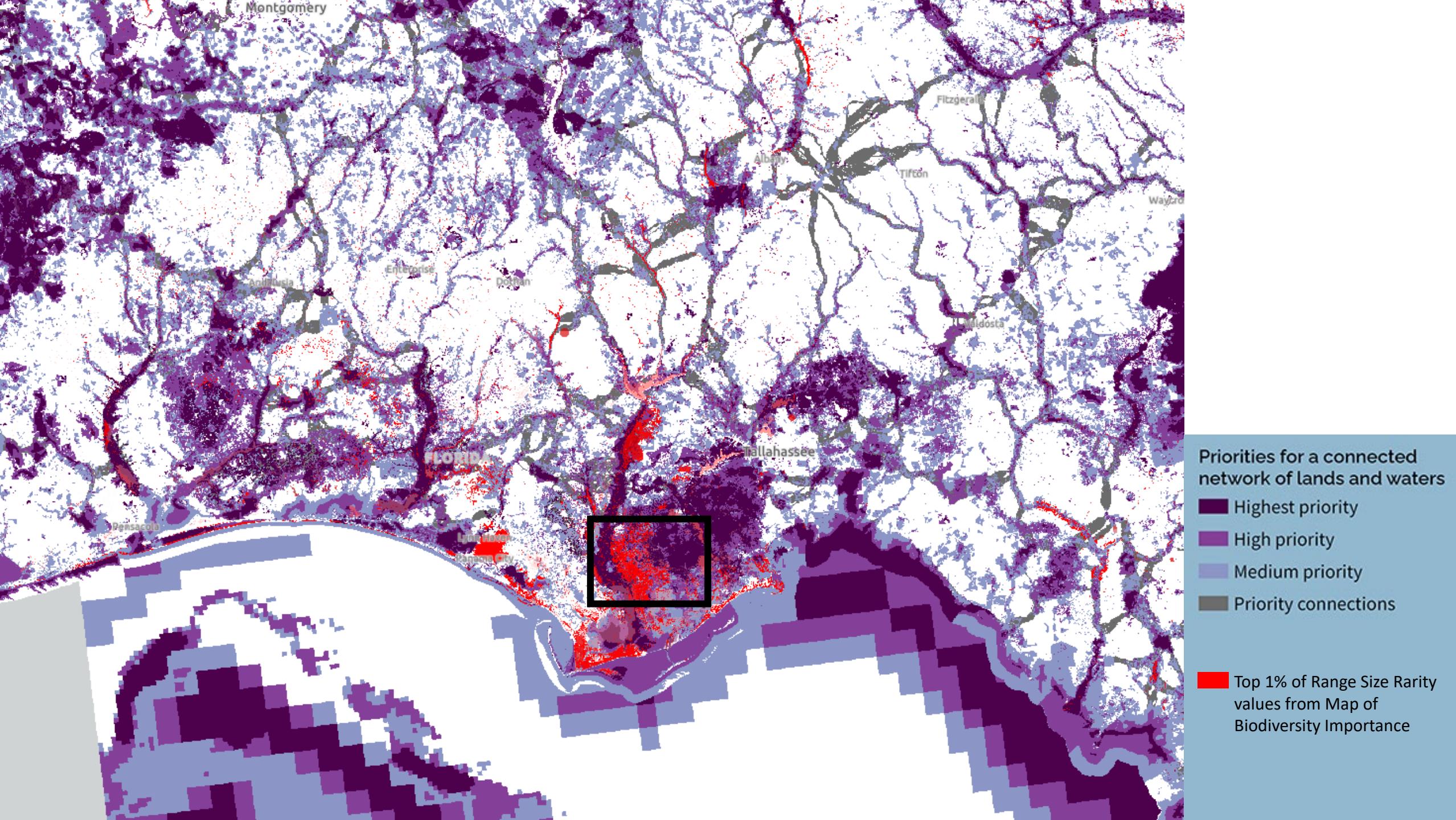


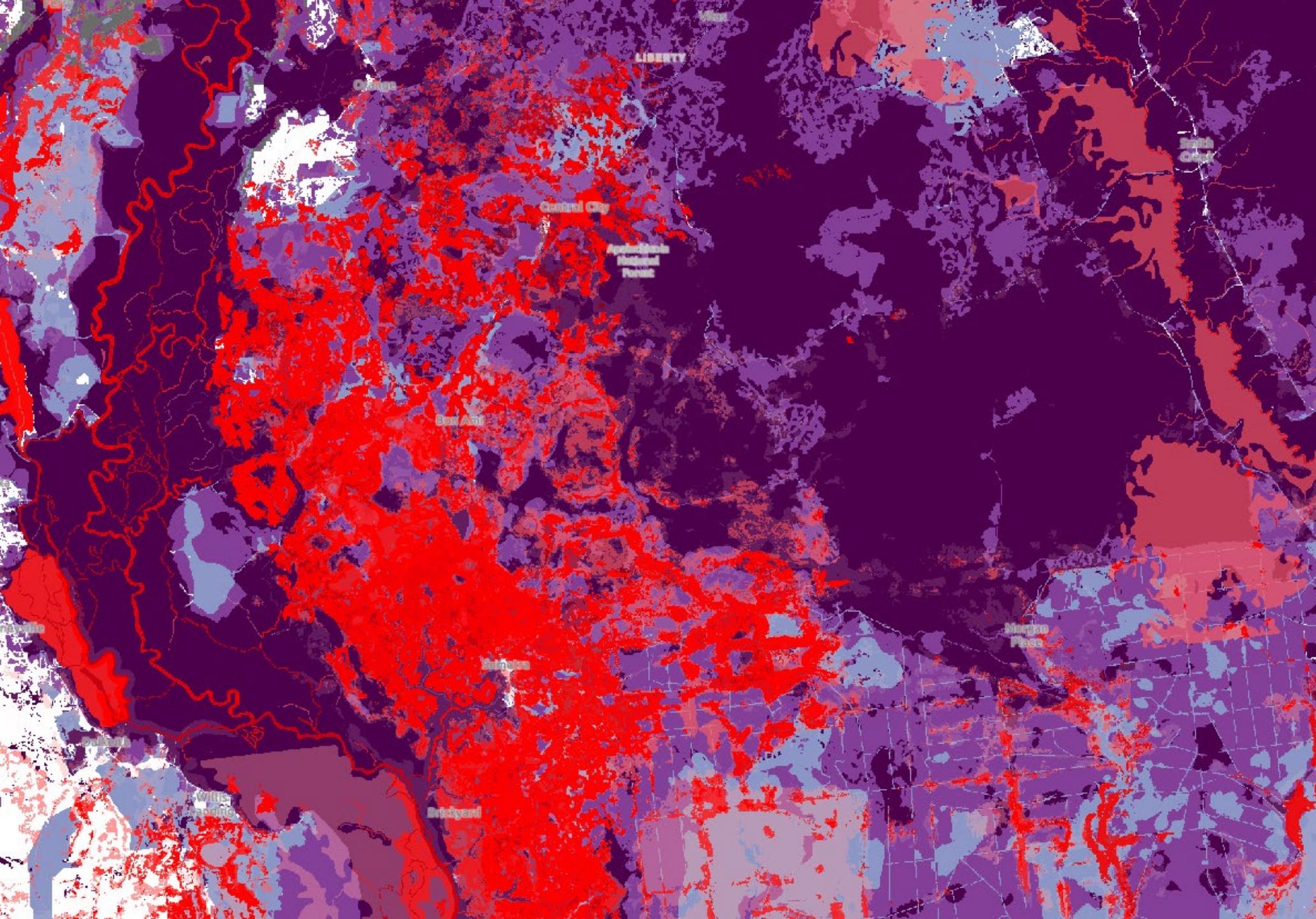


Imperiled species diversity

■ Top 1% of Range Size Rarity  
values from Map of  
Biodiversity Importance



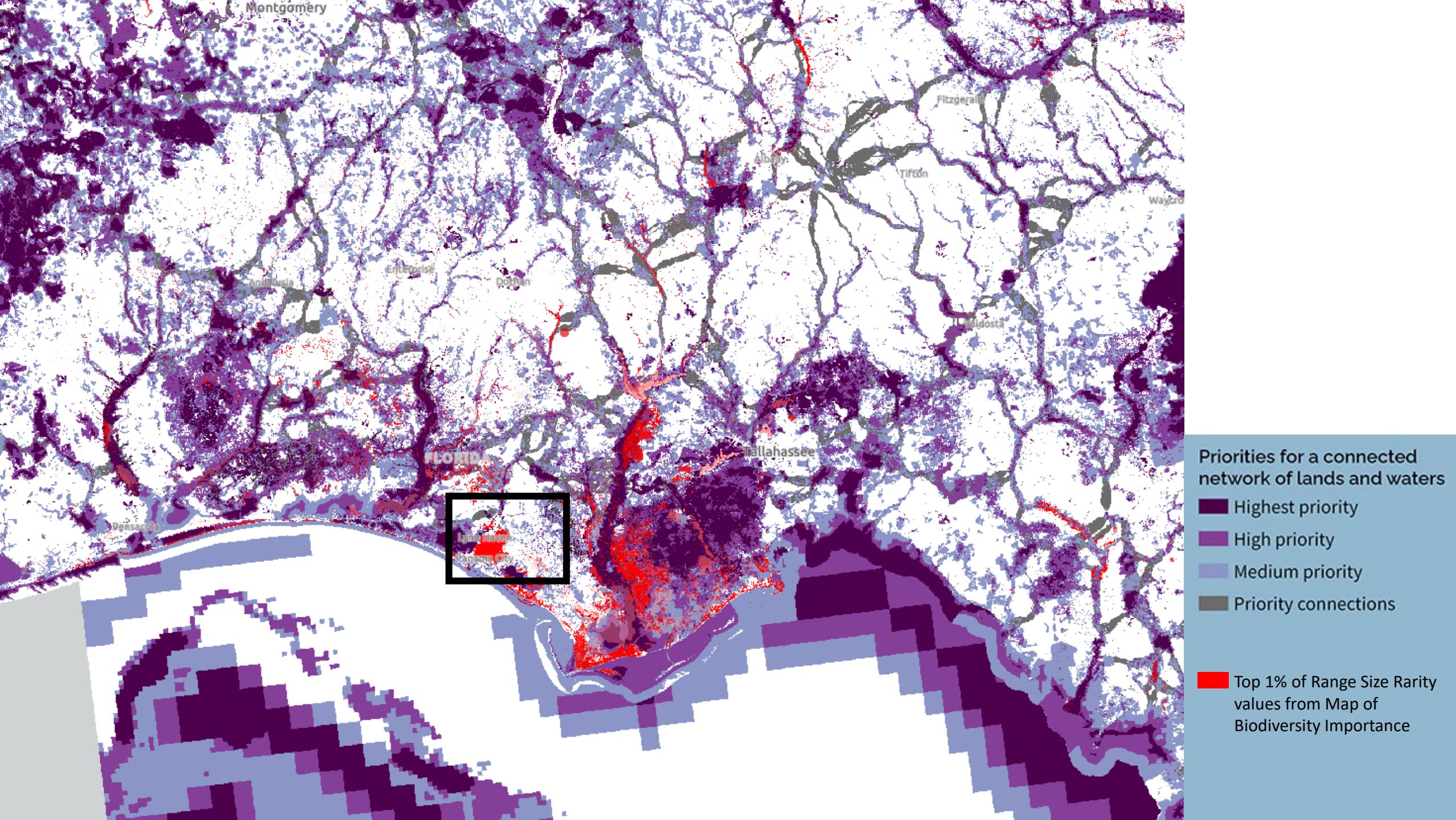


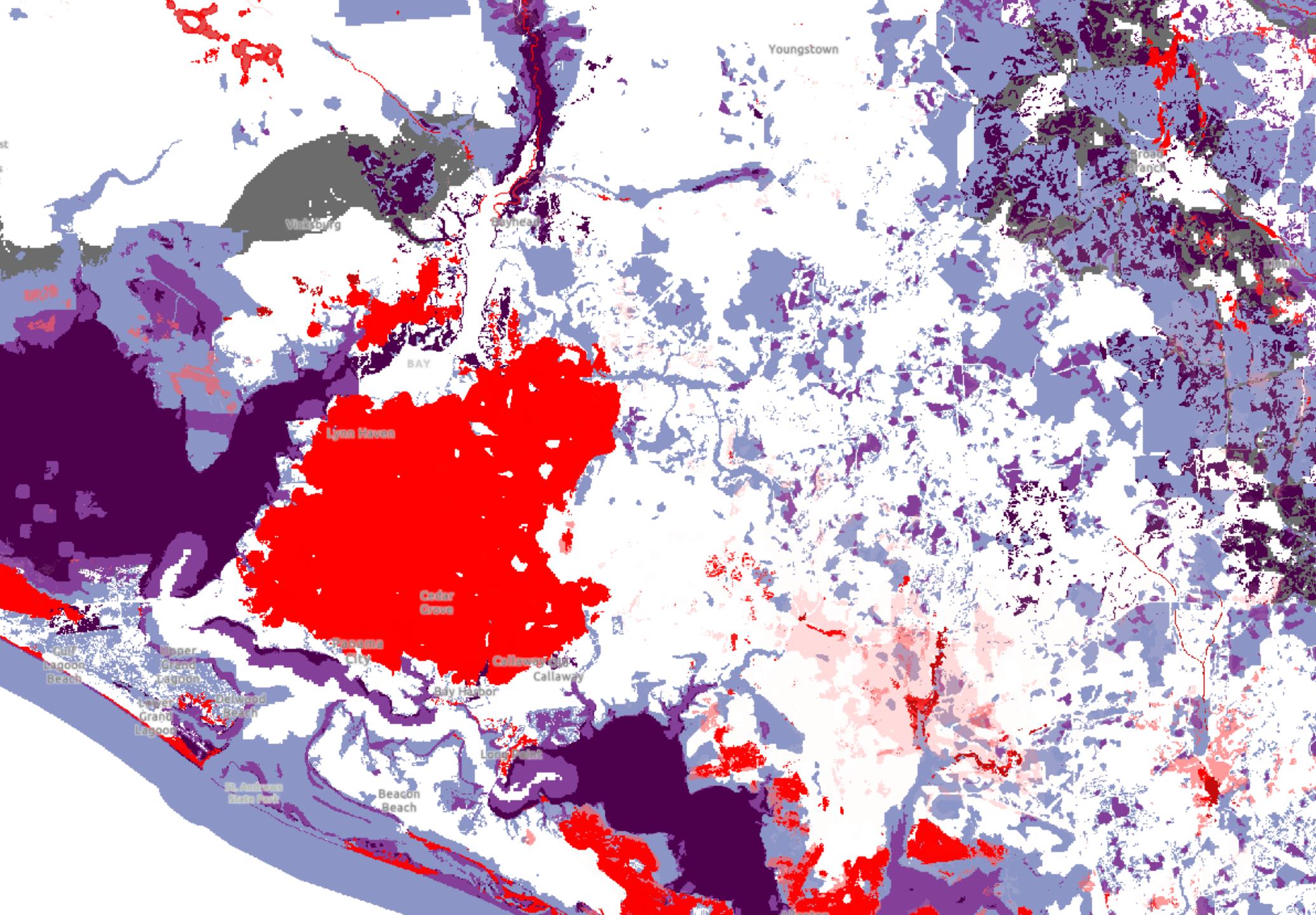


Priorities for a connected network of lands and waters

- Highest priority
- High priority
- Medium priority
- Priority connections

Top 1% of Range Size Rarity values from Map of Biodiversity Importance



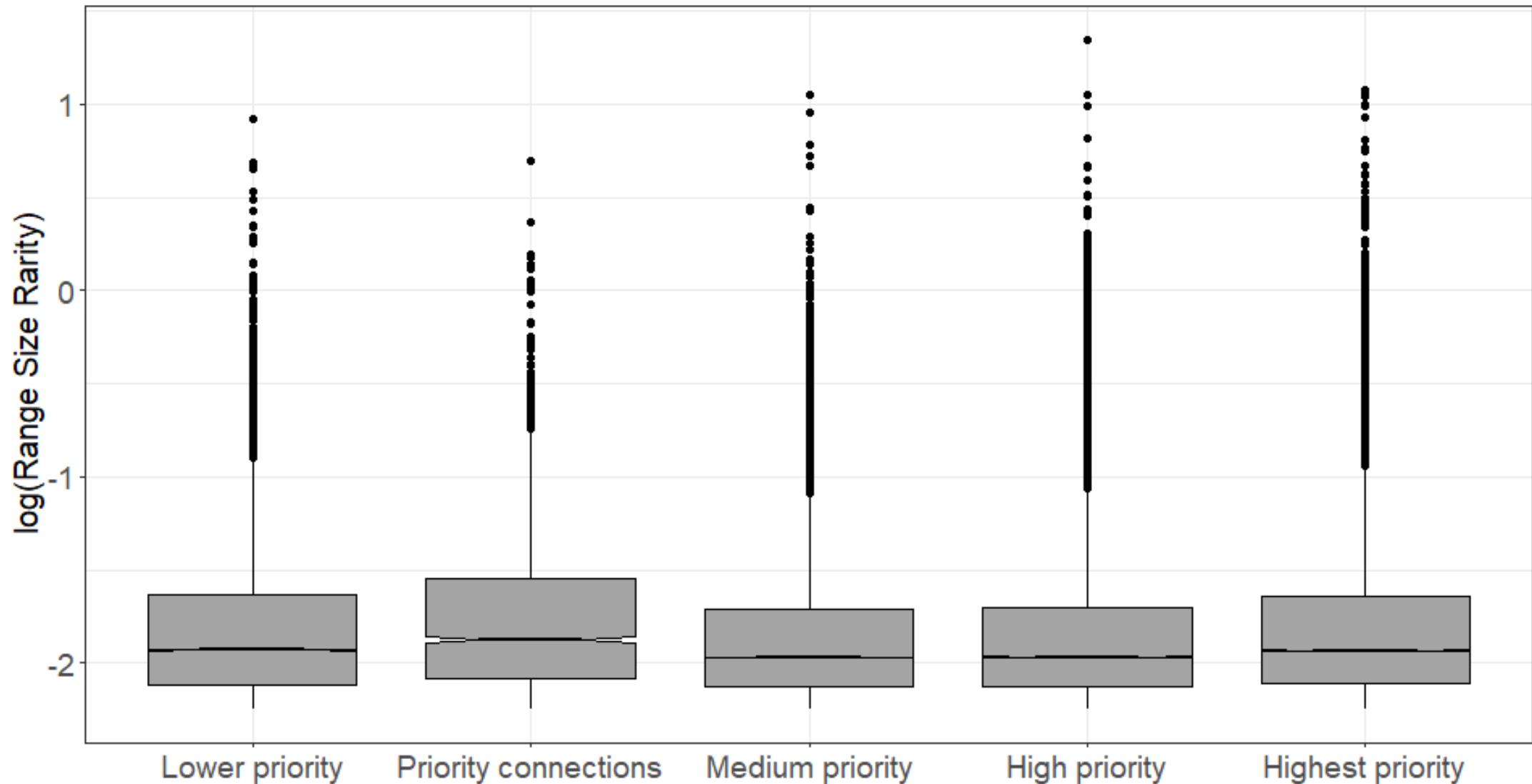


Priorities for a connected network of lands and waters

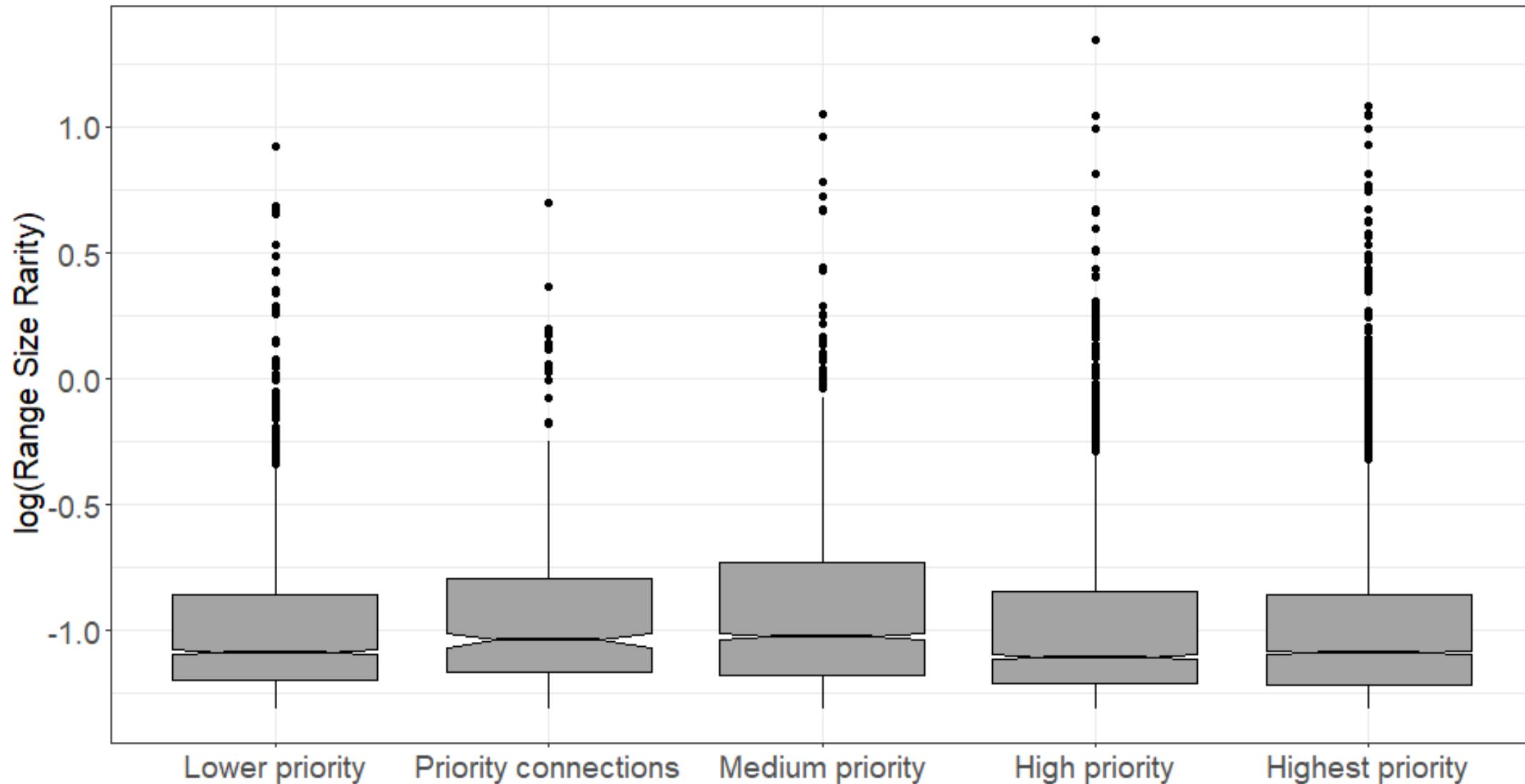
- Highest priority
- High priority
- Medium priority
- Priority connections

Top 1% of Range Size Rarity values from Map of Biodiversity Importance

# Top 1% of Imperiled Species Range Size Rarity Values



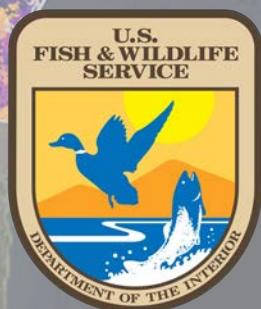
# Top 0.1% of Imperiled Species Range Size Rarity Values

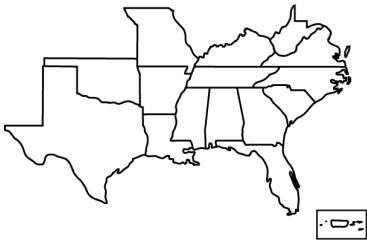


# Advancing the Southeast Blueprint through Analysis and Integration of High-Resolution Distribution Data for Imperiled Species

Dr. Gio Rapacciulo

Director of Applied Data Science, NatureServe  
[gio@natureserve.org](mailto:gio@natureserve.org)





Next Third Thursday  
Web Forum

2-16-2023

10:00 am ET

Roger Cain

Office of  
Environmental  
Services and Historic  
Preservation of the  
United Keetoowah  
Band of Cherokee in  
Oklahoma

[secassoutheast.org](http://secassoutheast.org)

## River cane ecosystem conservation and connection to Keetoowah traditional practices



A photograph of a waterfall in a lush, green forest. The waterfall flows down several tiers of dark, mossy rocks, creating a misty spray at the bottom. The surrounding trees are dense and vibrant.

# Staff updates

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- Progress on Southeast Conservation Blueprint 2023

# Progress on Southeast Conservation Blueprint 2023

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- This year, we're focusing on Puerto Rico, the U.S. Virgin Islands, and the Atlantic and Gulf marine environment

# How to get involved in SECAS

- Sign up for the SECAS newsletter

[secassoutheast.org](http://secassoutheast.org)

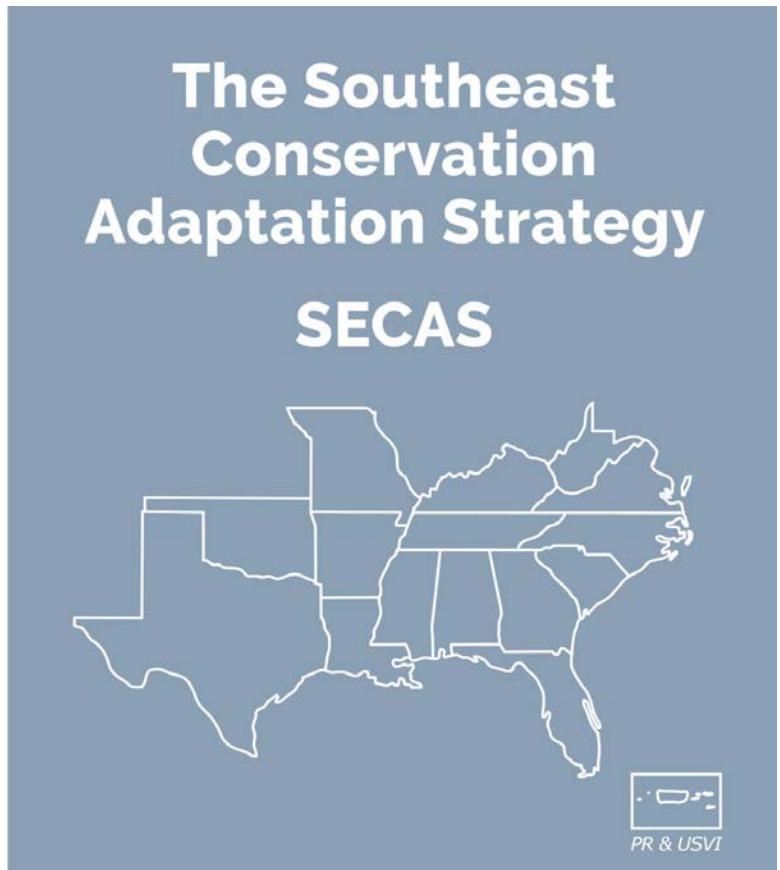
- Connect with SECAS staff or partners

[secassoutheast.org/staff](http://secassoutheast.org/staff)

[secassoutheast.org/partners](http://secassoutheast.org/partners)

- Explore the Southeast Conservation Blueprint

[secassoutheast.org/blueprint](http://secassoutheast.org/blueprint)





# Questions?