The SECAS Third Thursday Web Forum

Brooding over climate change: Implications for eastern wild turkey reproduction

7-21-2022

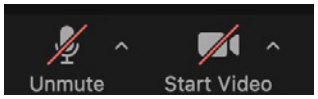
SOUTHEAST
Climate Adaptation Science Center

Southeast Conservation Adaptation Strategy (SECAS)

Agenda

- Logistics and introduction
- Presentation
- Q&A and discussion
- Preview of next Third Thursday Web Forum
- SE CASC symposium reminder

Zoom Basics



Bottom left of your zoom screen
➢ Please keep your video off and stay muted unless speaking during Q&A

Ask questions

Raise your hand,
Applaud the presenters

* We are recording

Brooding over climate change: Implications for eastern wild turkey reproduction

Wes Boone, NC State University

7-21-2022

Brooding over climate change: Implications for eastern wild turkey reproduction

Wesley Boone

Dept. of Forestry & Environmental Resources

North Carolina State University

SOUTHEAST Climate Adaptation Science Center

LSU

UNIVERSITY OF GEORGIA

NORTH CAROLINA Wildlife RESOURCES COMMISSION

Our flock of collaborators

Krishna Pacifici

Christopher Moorman

Adam Terando

Bret Collier

Michael Chamberlain

Rapid global change: carbon

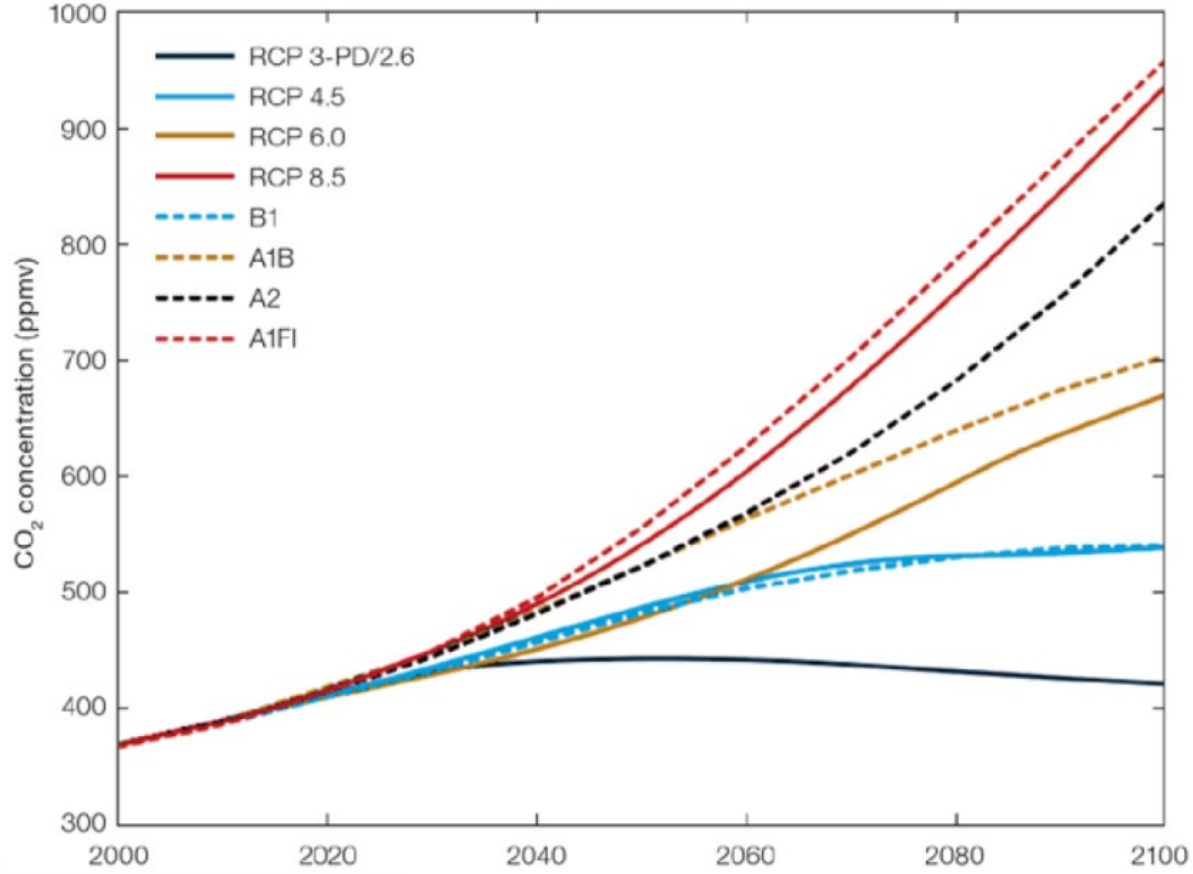
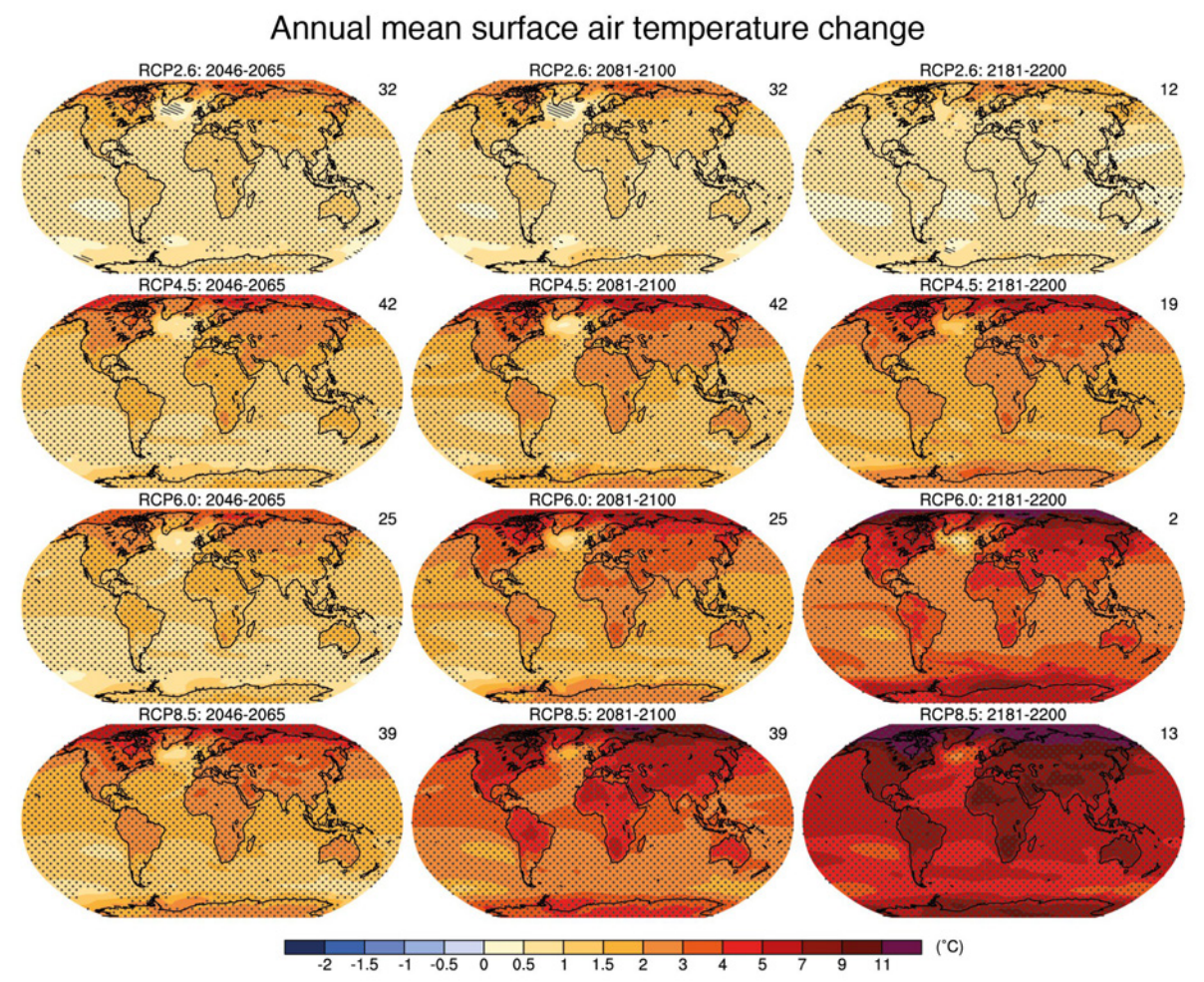
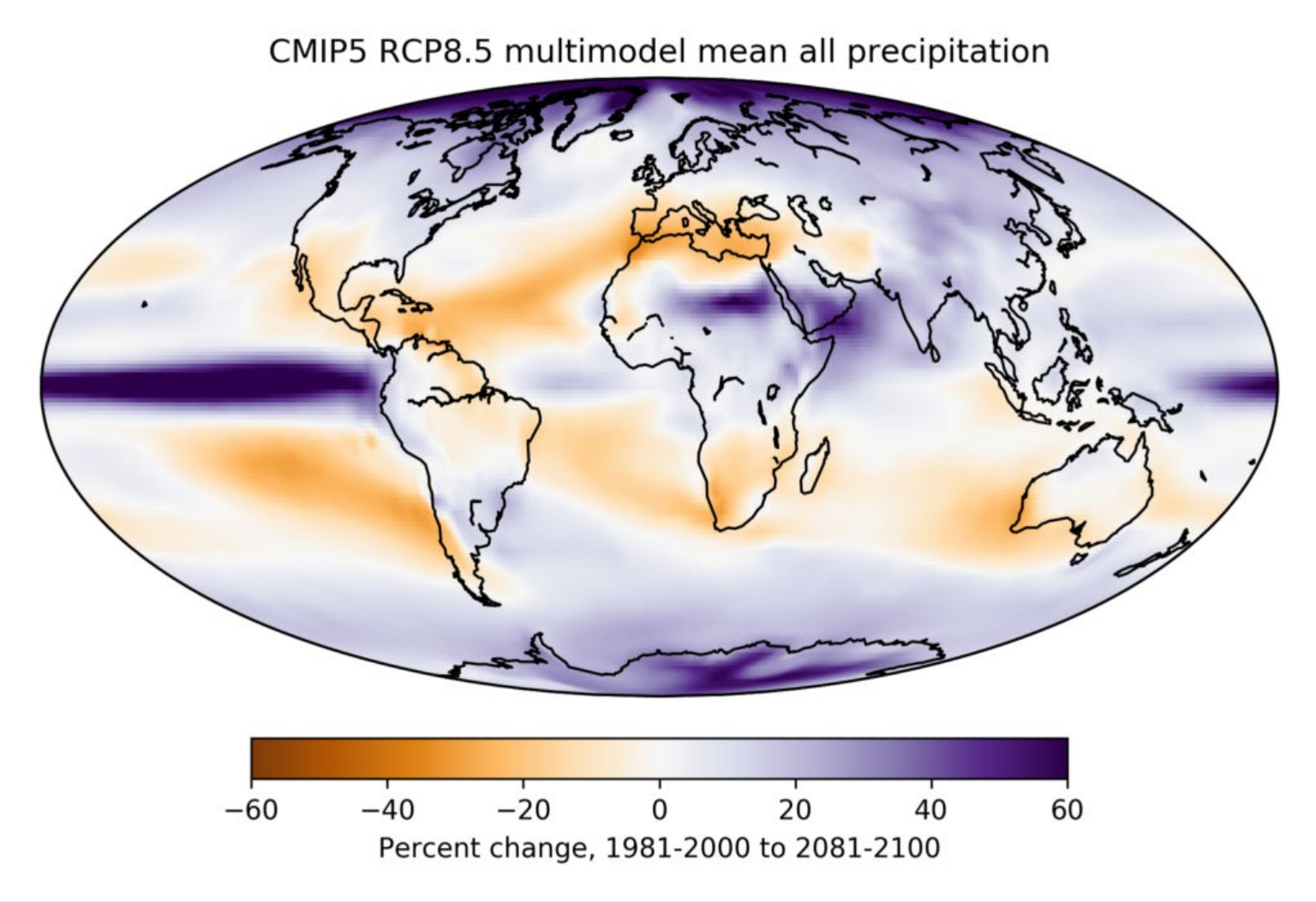


Figure 1.2: Comparison of CO_2 concentrations in parts per million by volume (ppmv) for CMIP3 (SRES, dotted lines) and CMIP5 (RCP, solid lines) emissions scenarios.

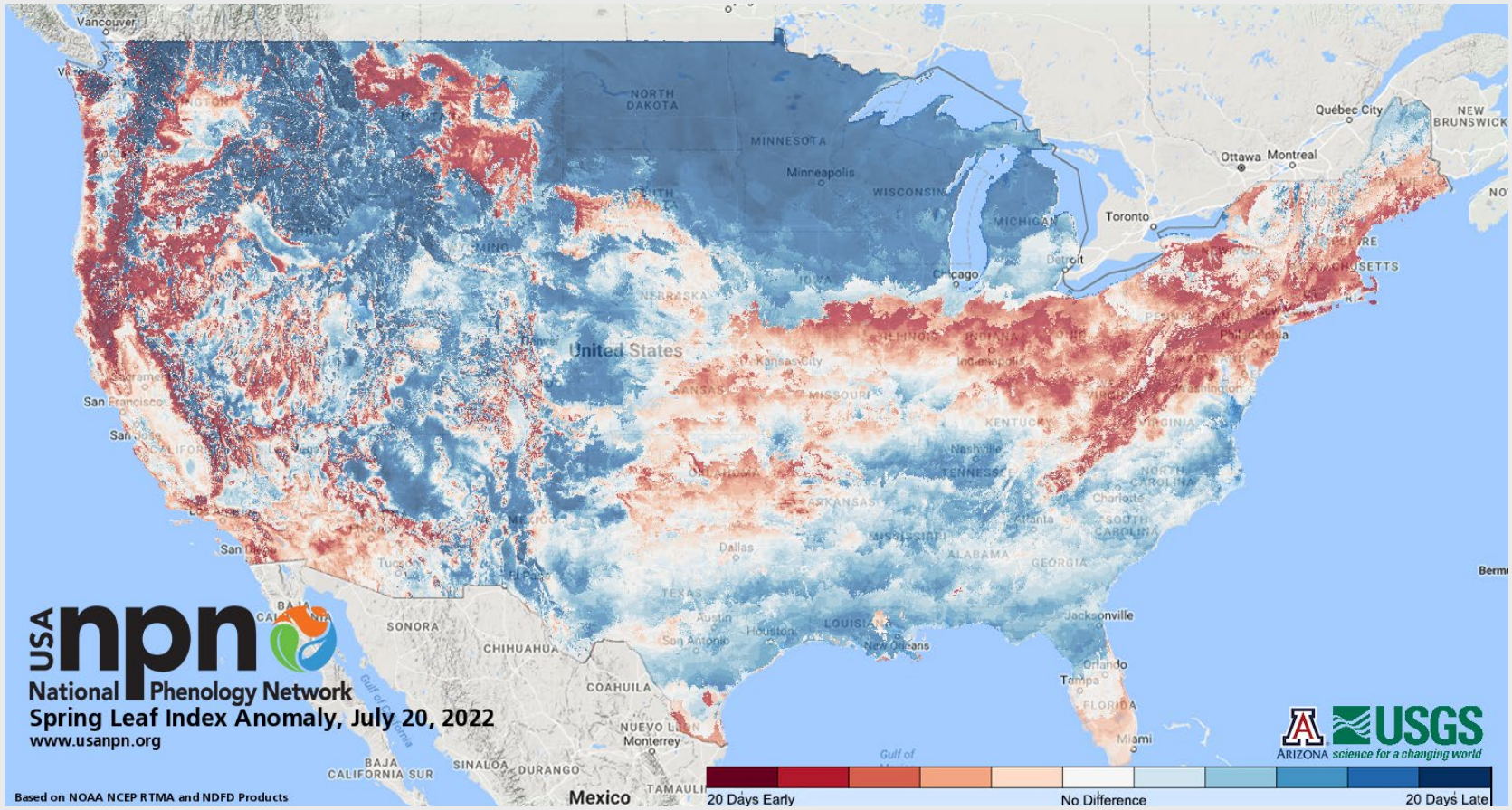
Rapid global change: temperature



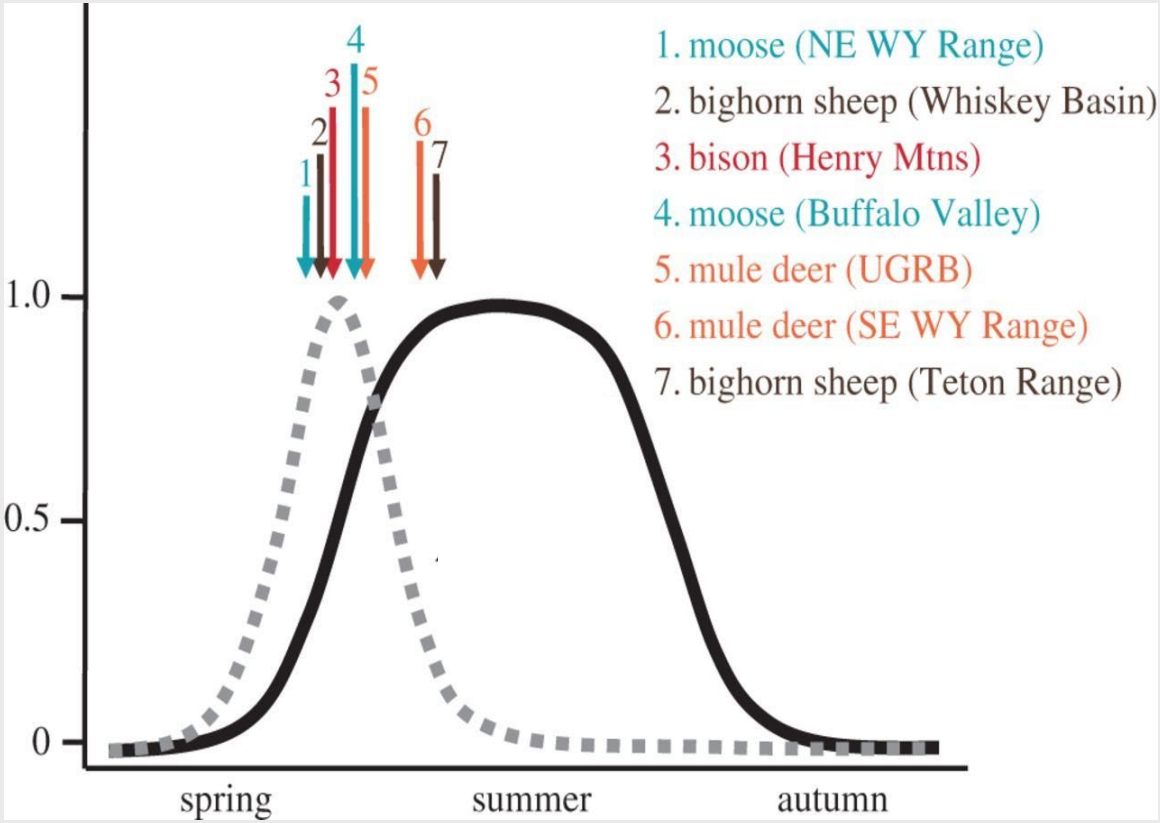
Rapid global change: precipitation



Rapid global change: spring green-up



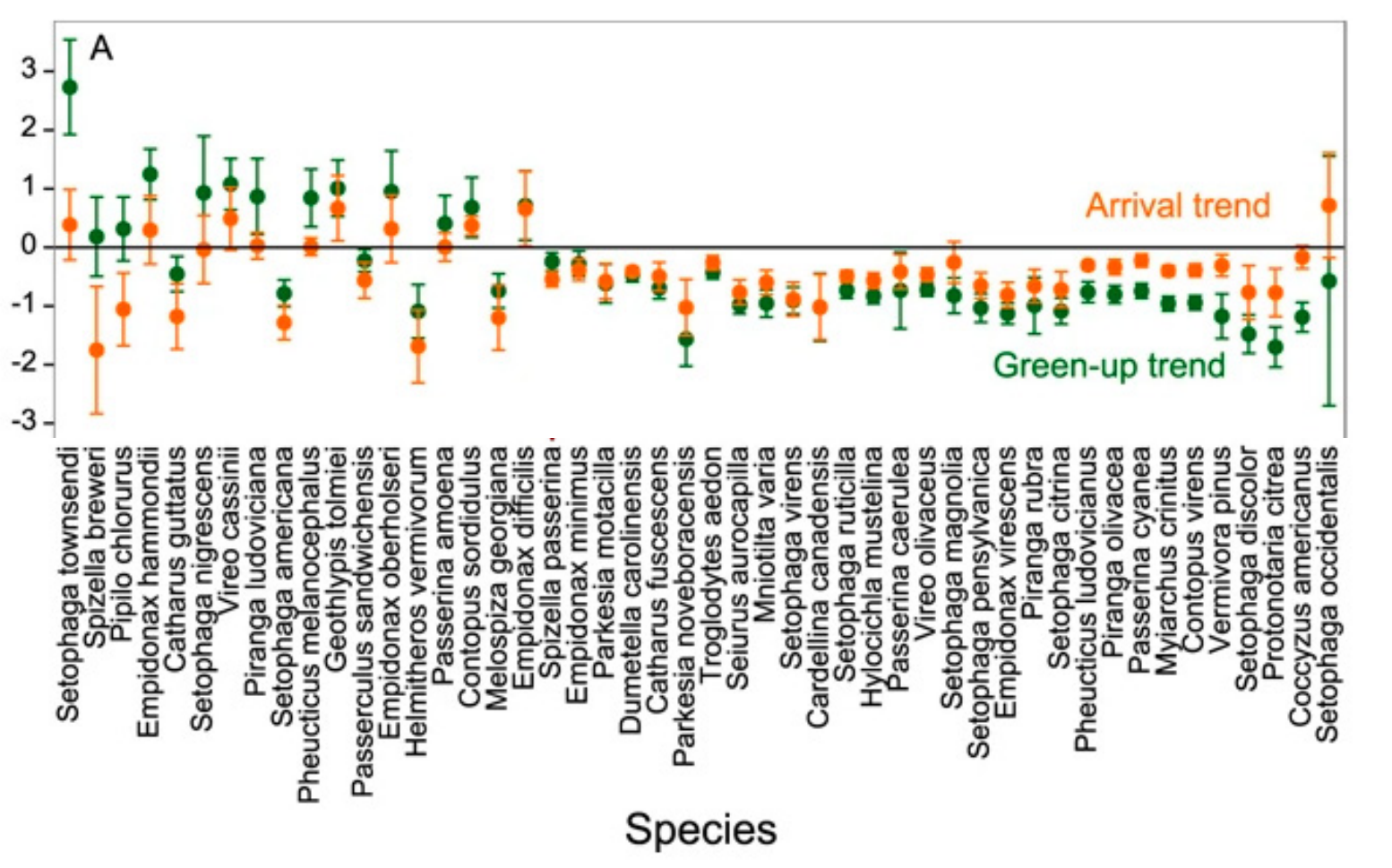
Climate change shifts wildlife phenology



Large herbivores surf waves of green-up during spring

Jerod A. Merkle[1], Kevin L. Monteith[1,2], Ellen O. Aikens[1], Matthew M. Hayes[1], Kent R. Hersey[3], Arthur D. Middleton[4], Brendan A. Oates[1], Hall Sawyer[5], Brandon M. Scurlock[6] and Matthew J. Kauffman[7]

Climate change shifts wildlife phenology



Increasing phenological asynchrony between spring green-up and arrival of migratory birds

Stephen J. Mayor[1,2,3,4], Robert P. Guralnick[4], Morgan W. Tingley[5], Javier Otegui[2], John C. Withey[6], Sarah C. Elmendorf[3], Margaret E. Andrew[7], Stefan Leyk[8], Ian S. Pearse[9] & David C. Schneider[1]

Climate change shifts wildlife phenology

This topic has been (fairly) robustly studied in migratory species.

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Results inconsistent, highlighting need for species-specific studies.

Climate change shifts wildlife phenology

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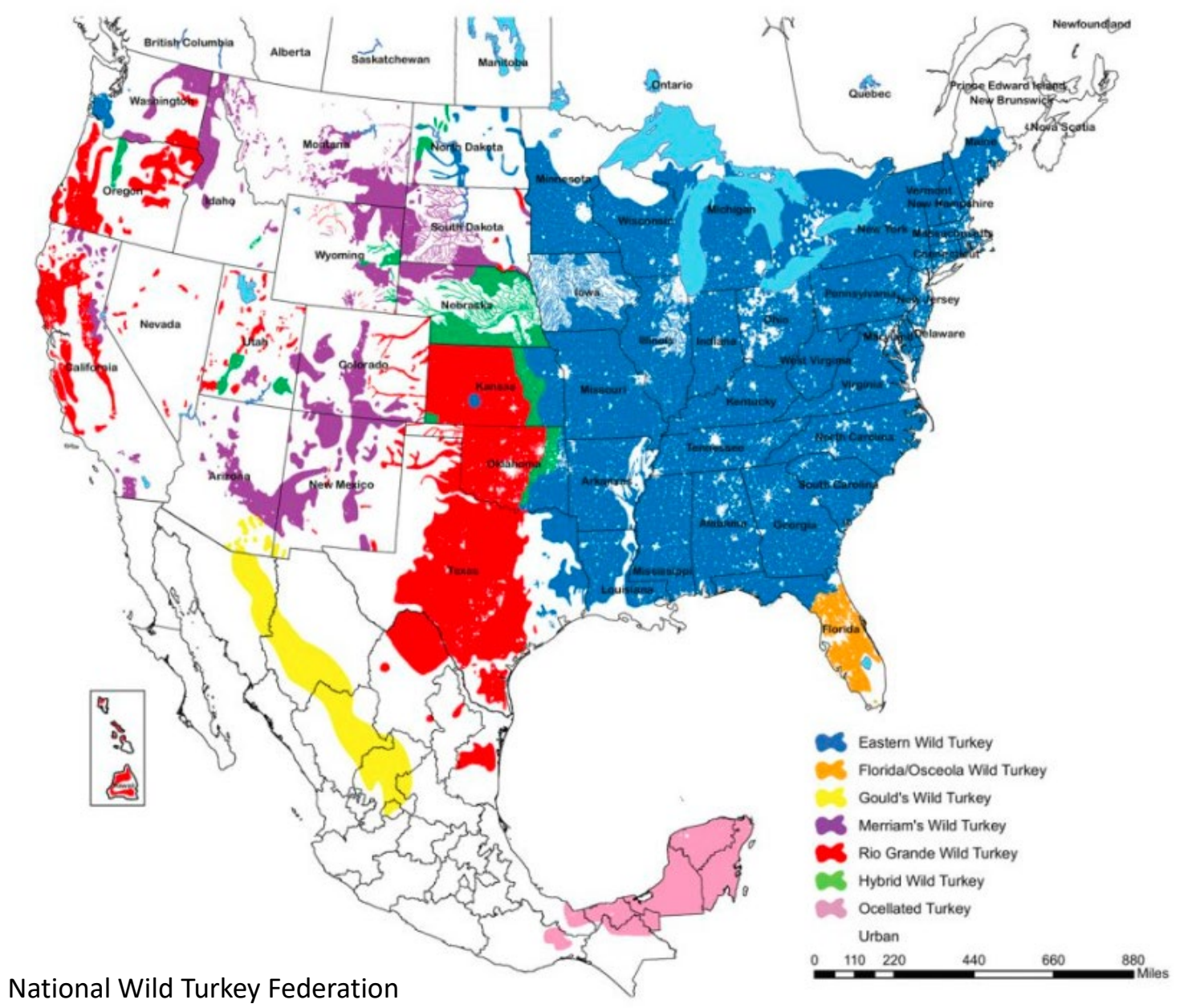
Results inconsistent, highlighting need for species-specific studies.

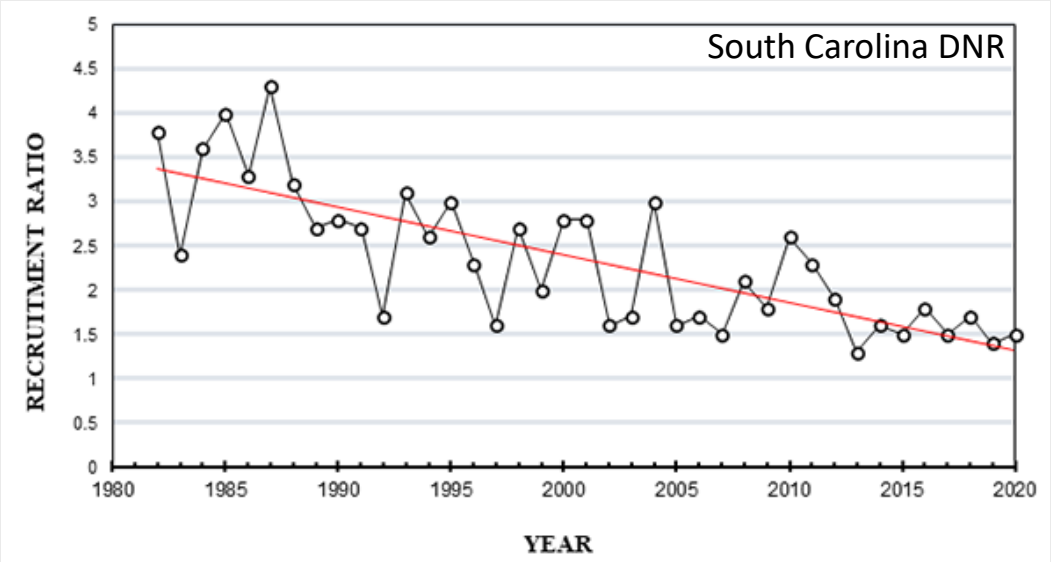
Lack of available research notable in non-migratory species, game species, and species with declining populations.

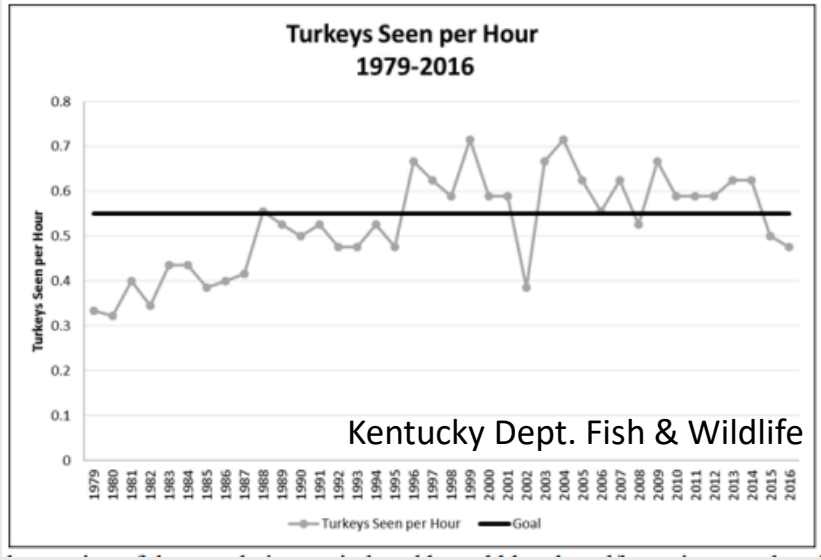
Eastern wild turkey

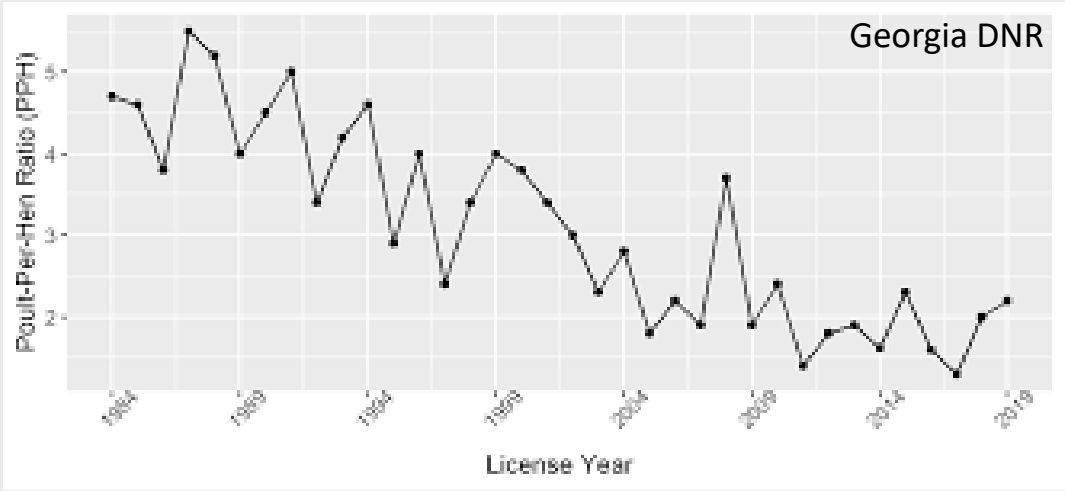


National Wild Turkey Federation
Modified from Ericksen et al. 2015

Eastern wild turkey:
A subspecies in decline







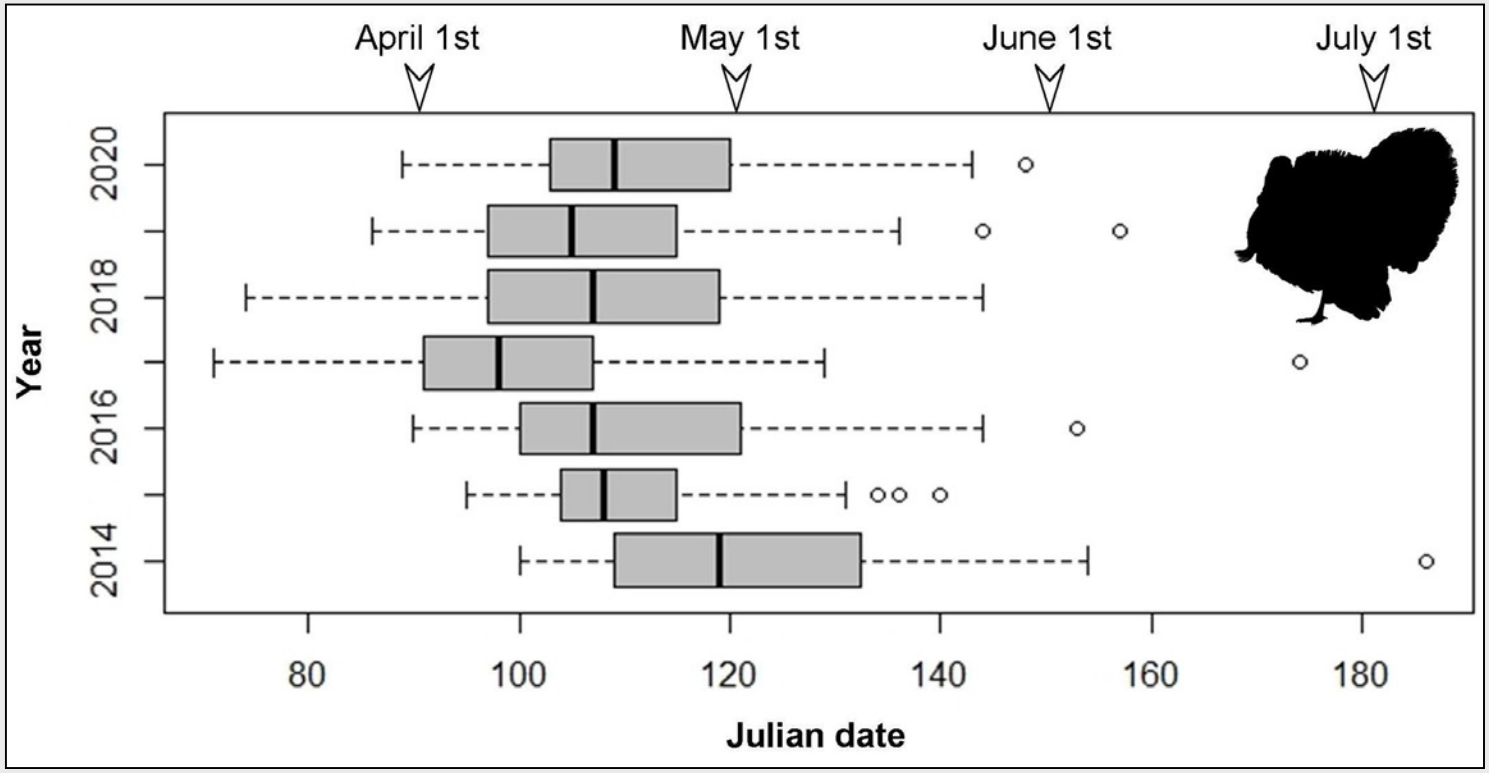
Eastern wild turkey: A subspecies in decline

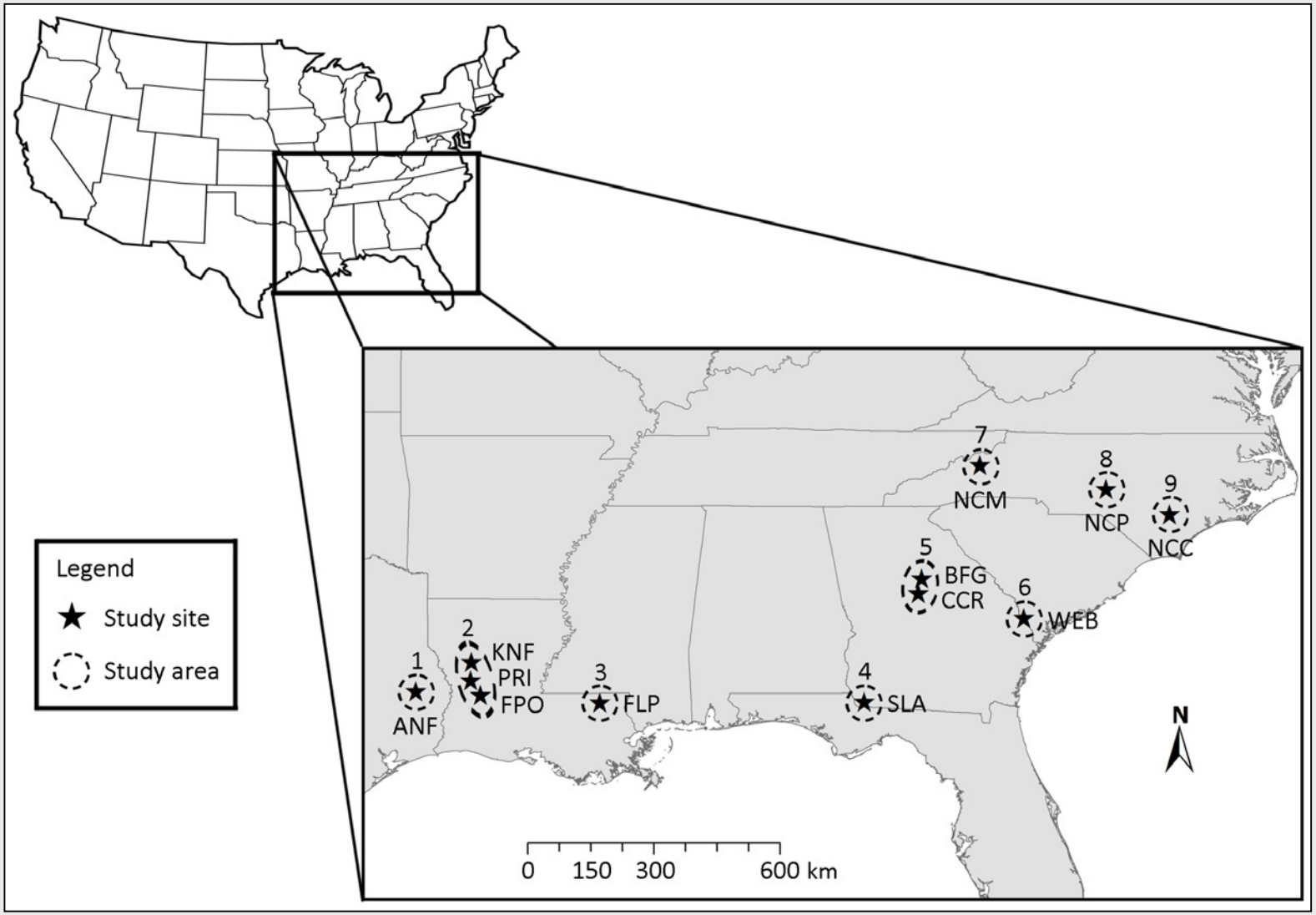
Objectives

(1) Assess climactic factors potentially influencing eastern wild turkey **nest initiation date.**

(2) Assess climactic factors potentially influencing eastern wild turkey **nest survival.**

Nest initiation date





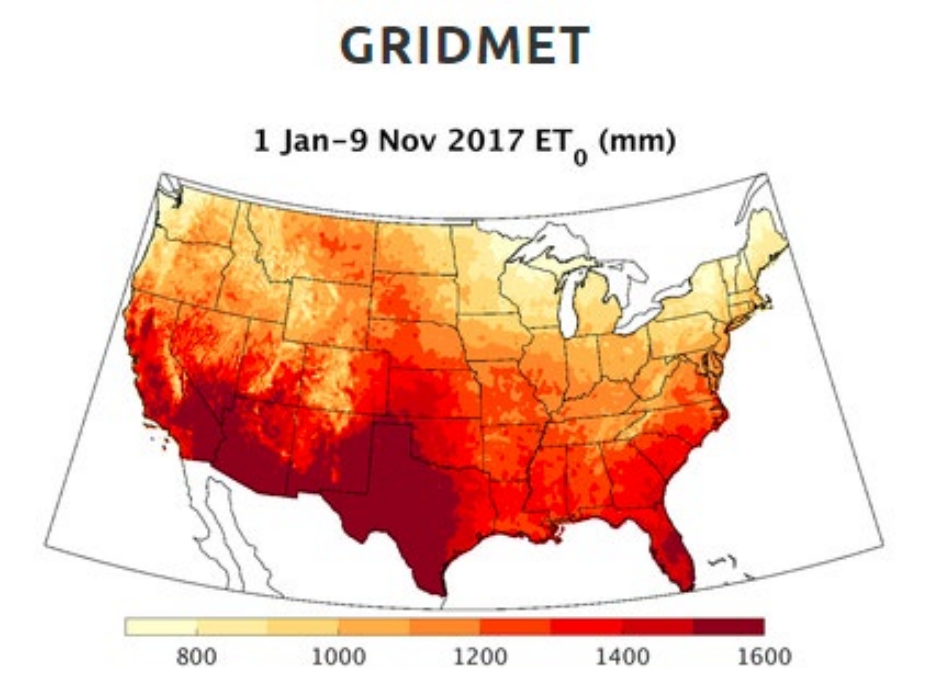
2014 – 2021

717 (first) nests

“SOST” = date of green-up

Days between green-up and nest initiation.
250 m spatial resolution.
Daily temporal resolution.
Only available through 2020.

Minimum average temperature.
Minimum temperature variance.
Maximum average temperature.
Maximum temperature variance.
Precipitation total.
Avg min temp X Precipitation total.



4 km spatial resolution.
Daily temporal resolution.
Available through yesterday.

January February March *30-days prior

Modeling approach

Cox’s proportional hazards model (a.k.a. time-to-event model).

Modeling approach

Cox's proportional hazards model (a.k.a. time-to-event model).

-Tested all possible combinations including ≤ 4 variables.
-Exclude combinations of excessively correlated variables.
-Rank models by AICc.
-Run models for the full database and core 70% database.

Modeling approach

Cox's proportional hazards model (a.k.a. time-to-event model).

-Tested all possible
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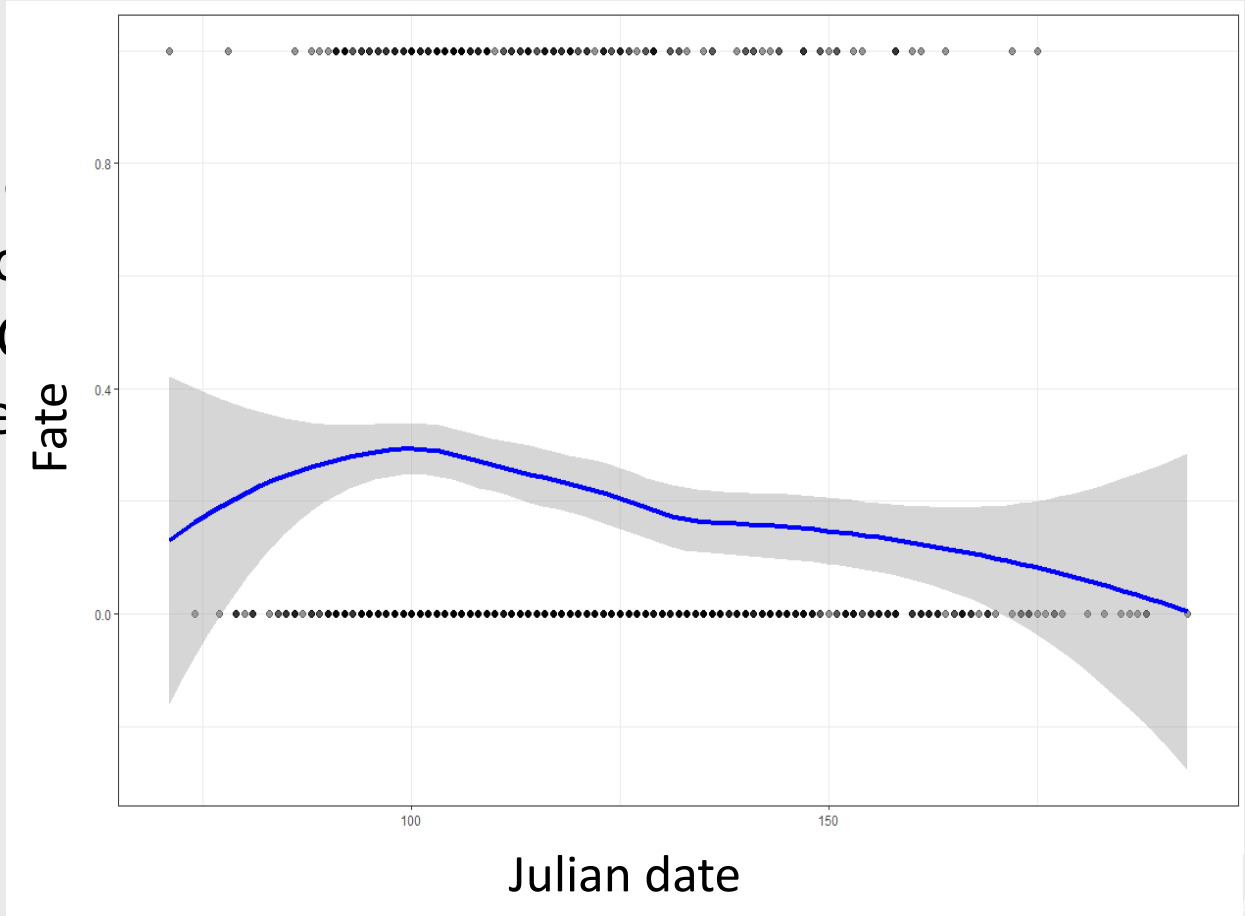
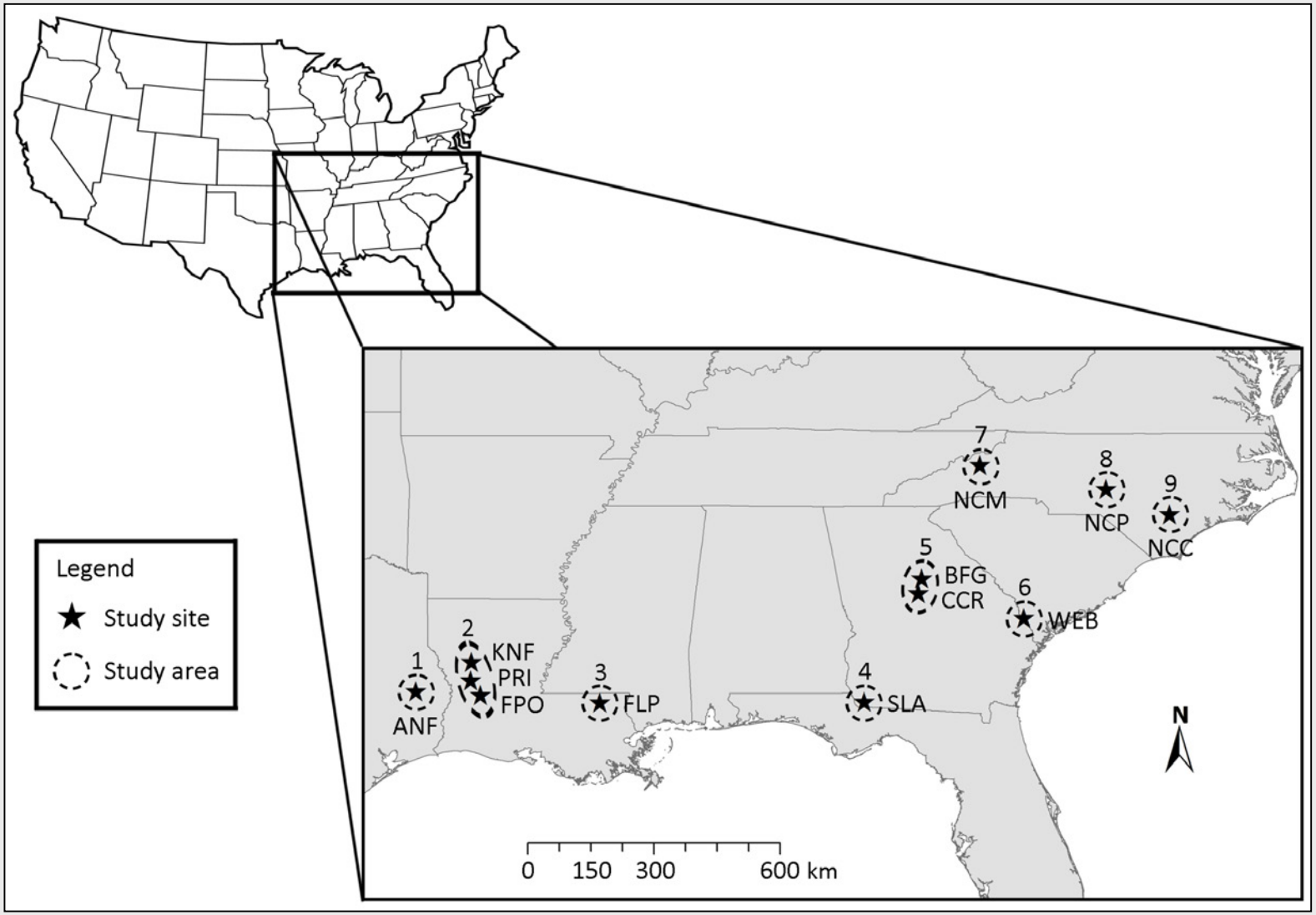
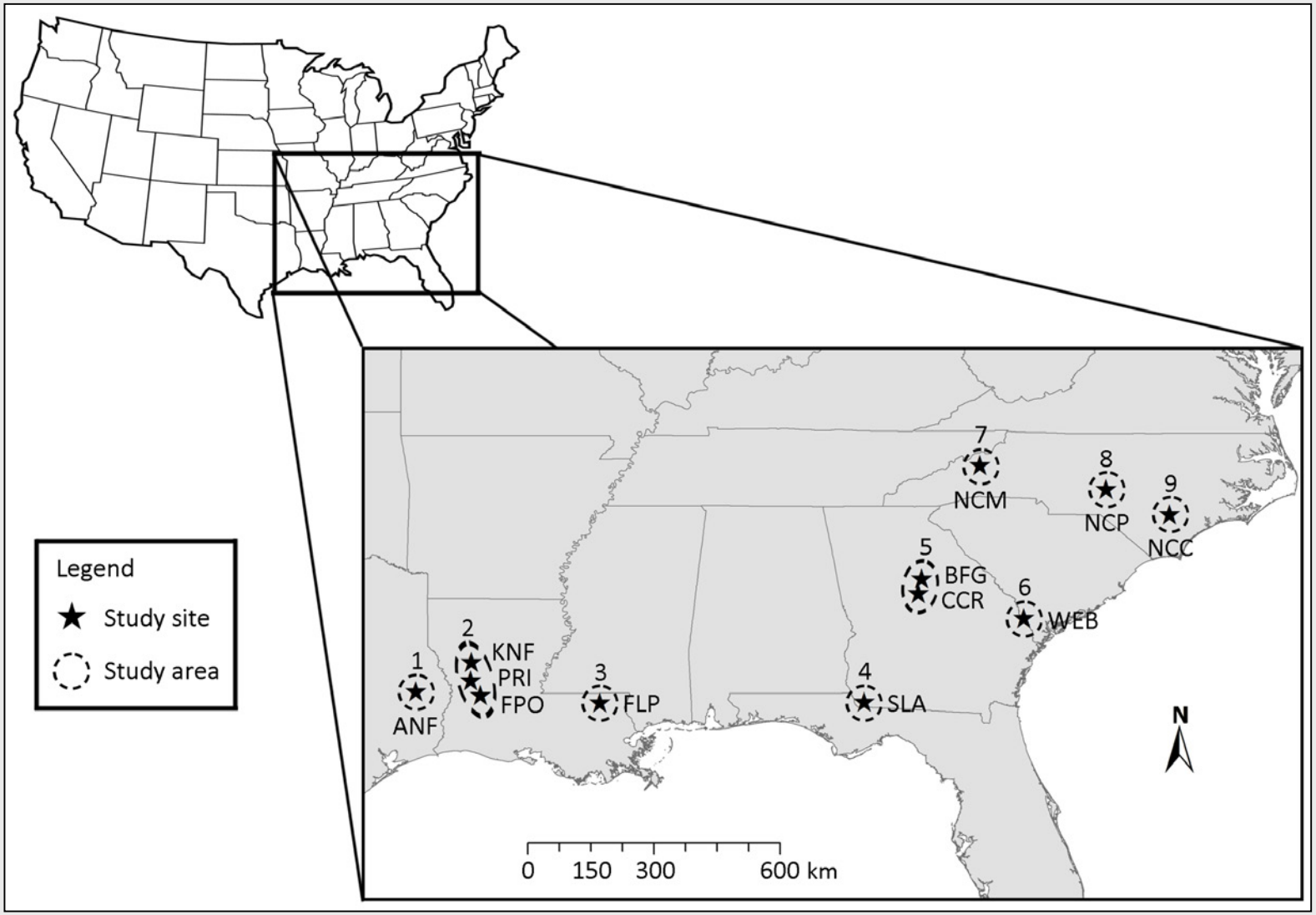
-Run models for the





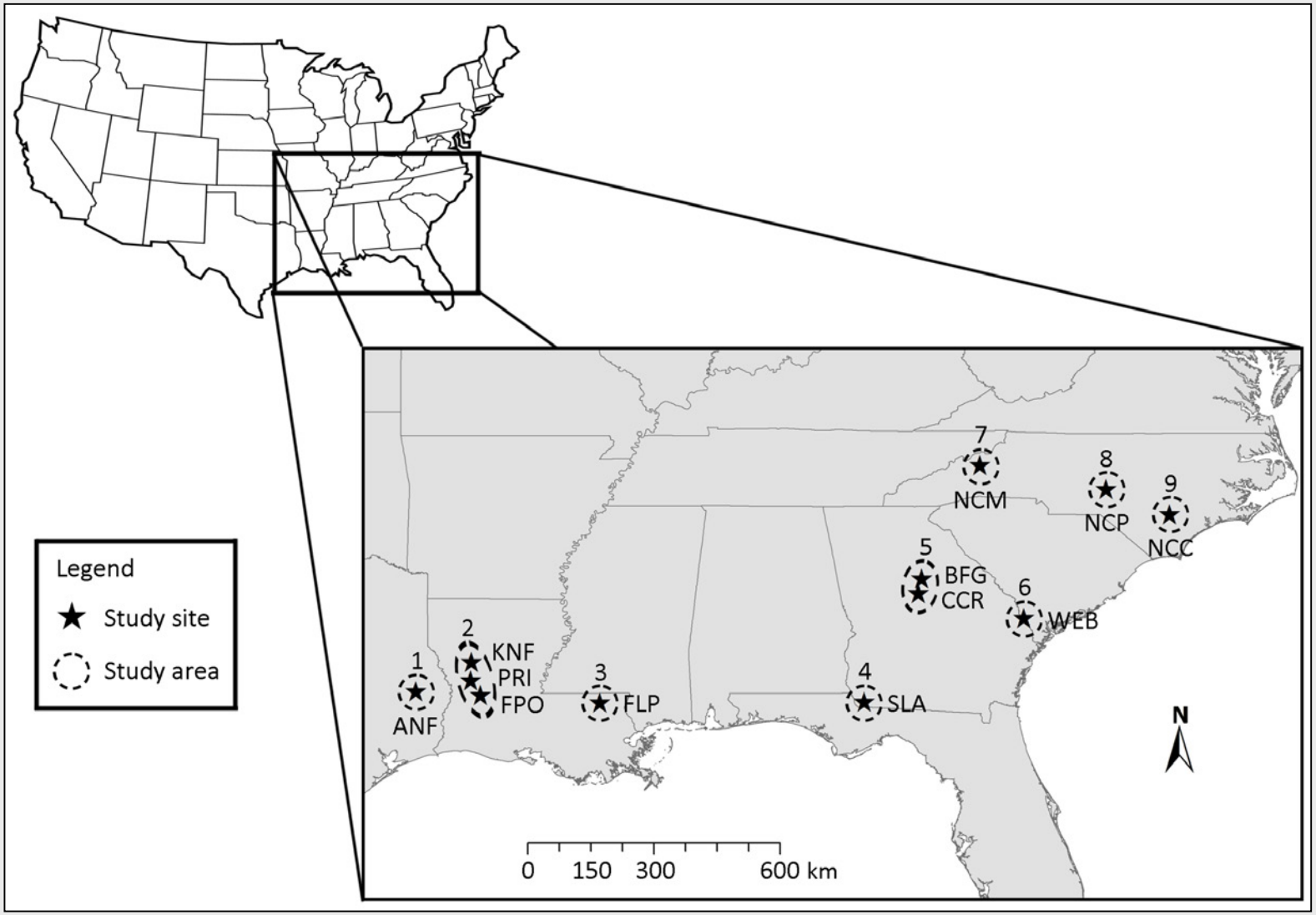
Random effects

Study area Year Individual bird ID



Random effects

Study area Year ~~Individual bird ID~~



Random effects

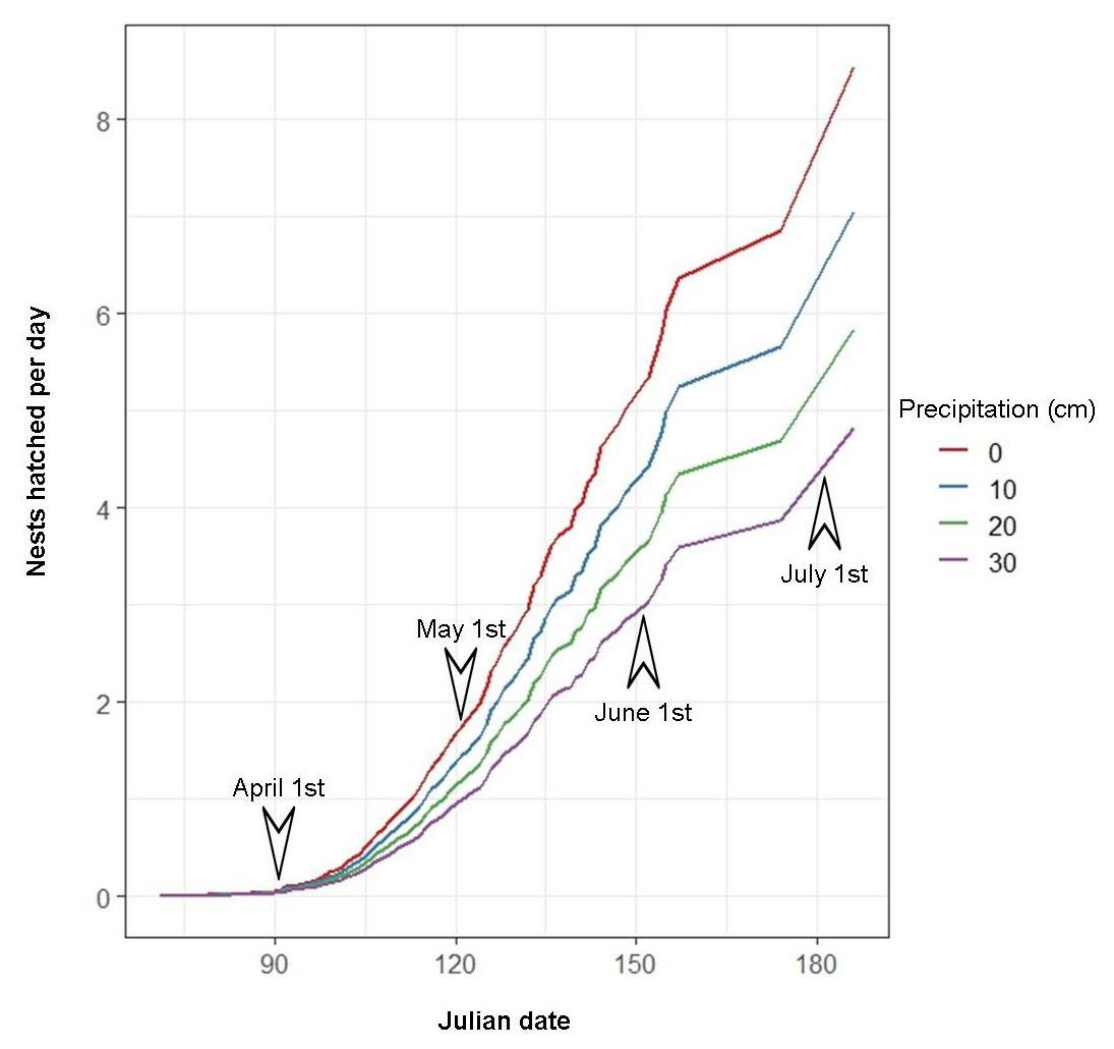
Study area ~~Year~~ ~~Individual bird ID~~

Green wave?

Green wave?

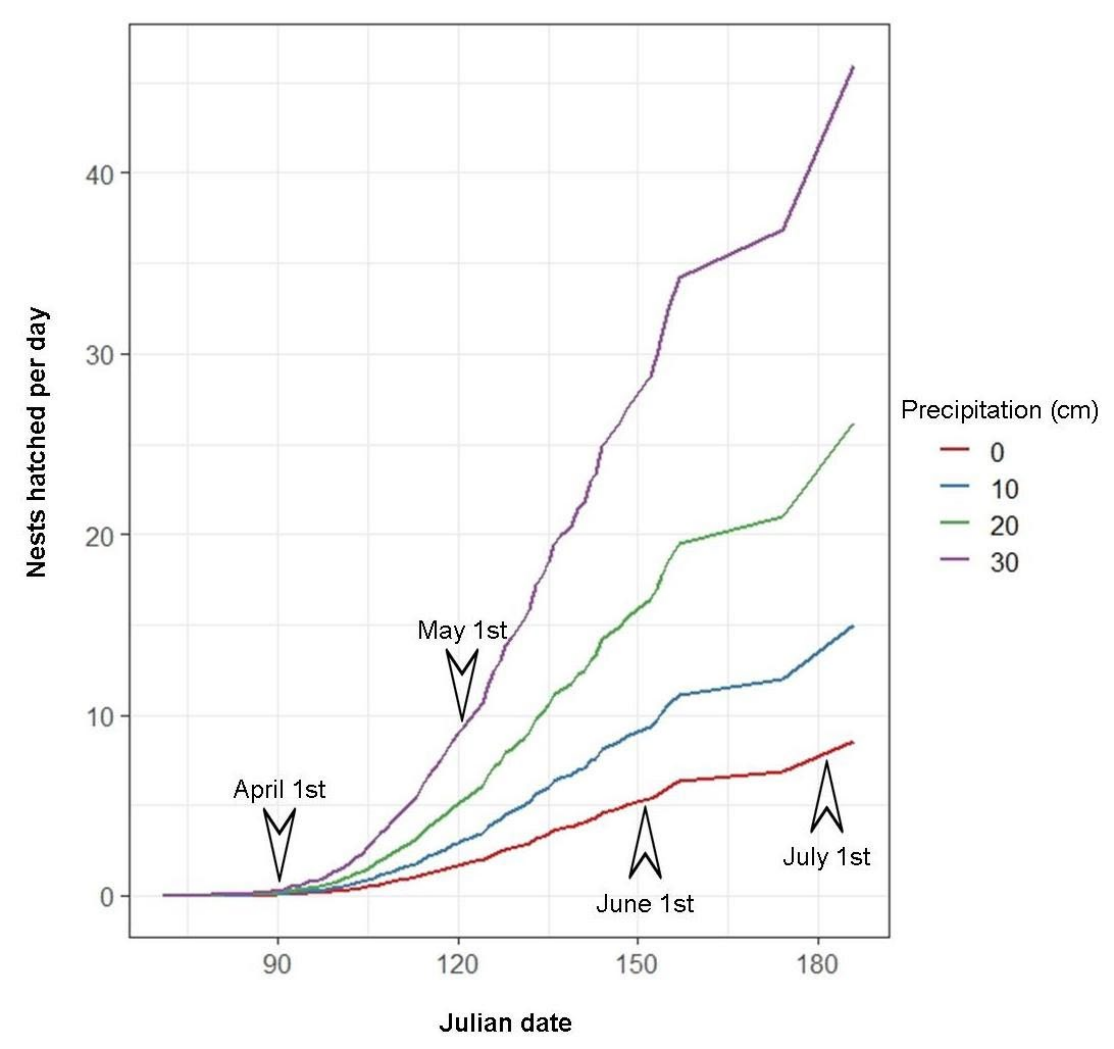
Full dataset

Total precipitation in 30 days prior to incubation



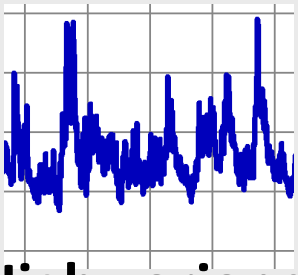
Full dataset

Total January precipitation



70% dataset

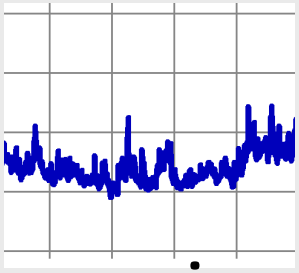
February minimum temperature variance



High variance

=

Later nesting



Low variance

=

Earlier nesting

70% dataset

February maximum average temperature

Higher = Earlier nesting

Lower = Later nesting

Nest survival (did eggs hatch?)

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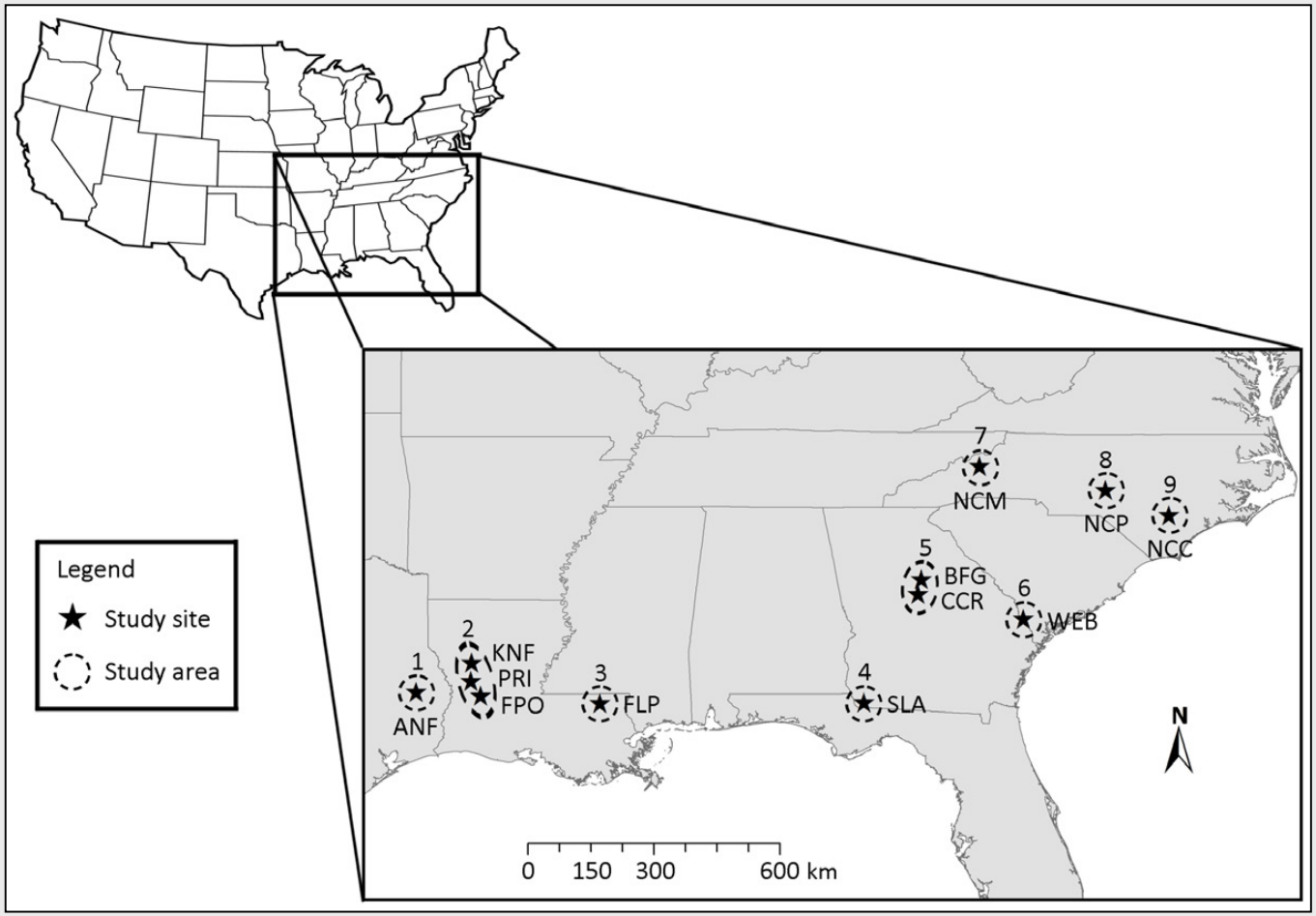
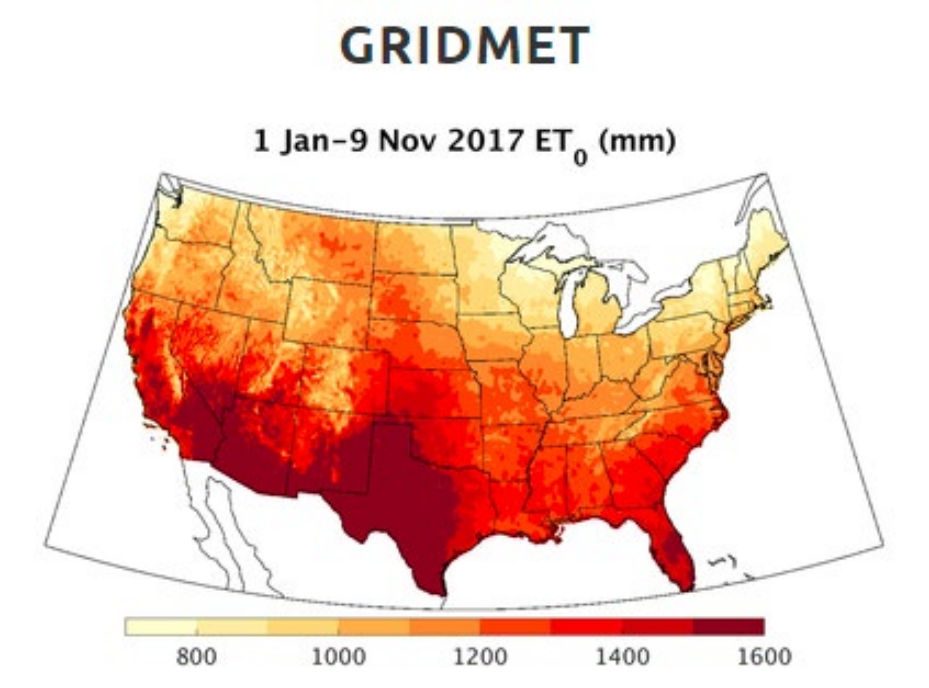


2014 – 2021

715 first nests (186 [26%] hatch)

Minimum average temperature.
Minimum temperature variance.
Precipitation total.
Avg min temp X Precipitation total.
48 hour precipitation total.
Absolute minimum temperature.



4 km spatial resolution.
Daily temporal resolution.
Available through yesterday.

January February March 30-days prior During

Visual obstruction.
Year.
Start date (Julian date).

January February March 30-days prior During

Generalized Linear Mixed Model

January February March 30-days prior During

Generalized Linear Mixed Model

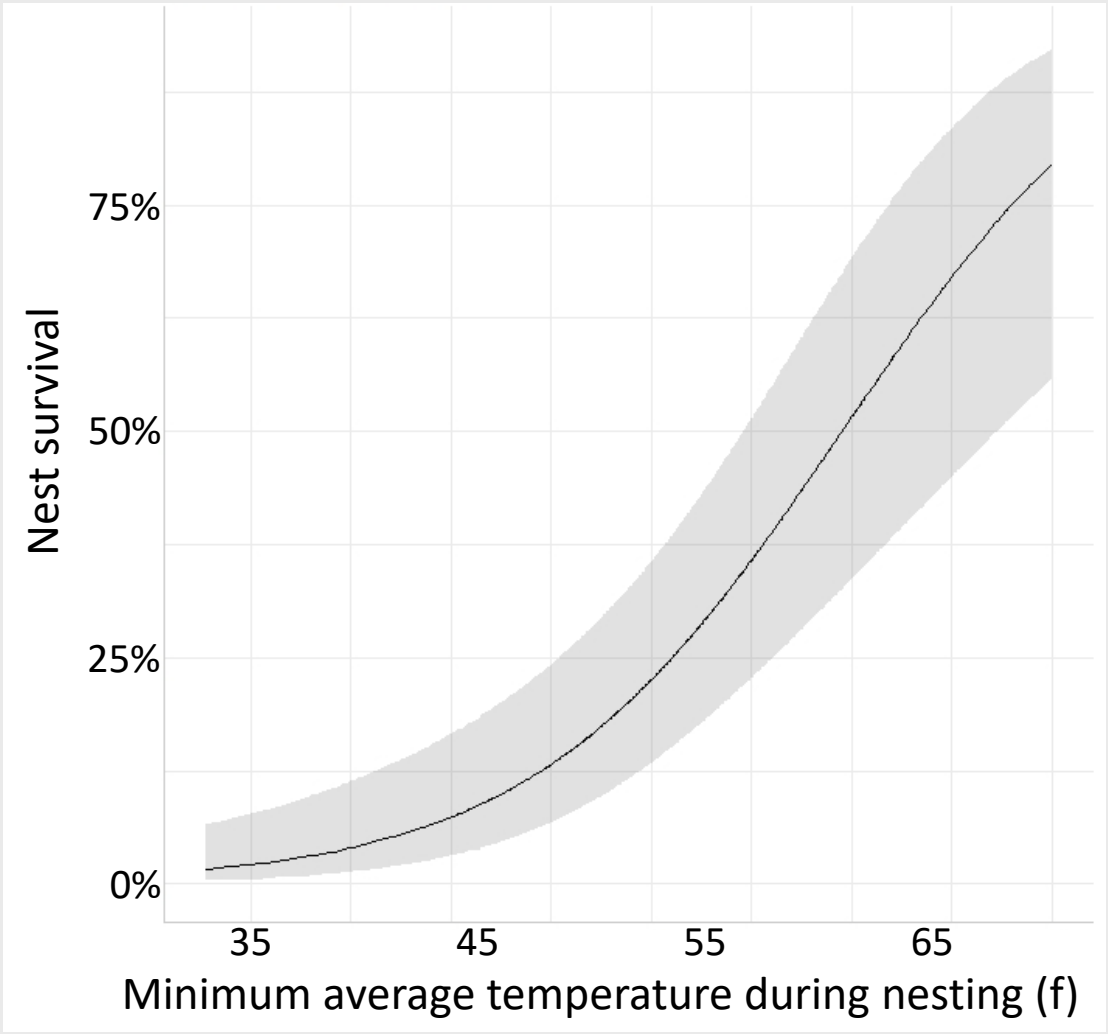
Ran 5 semi-global models.

Excluded pairs of excessively correlated variables.

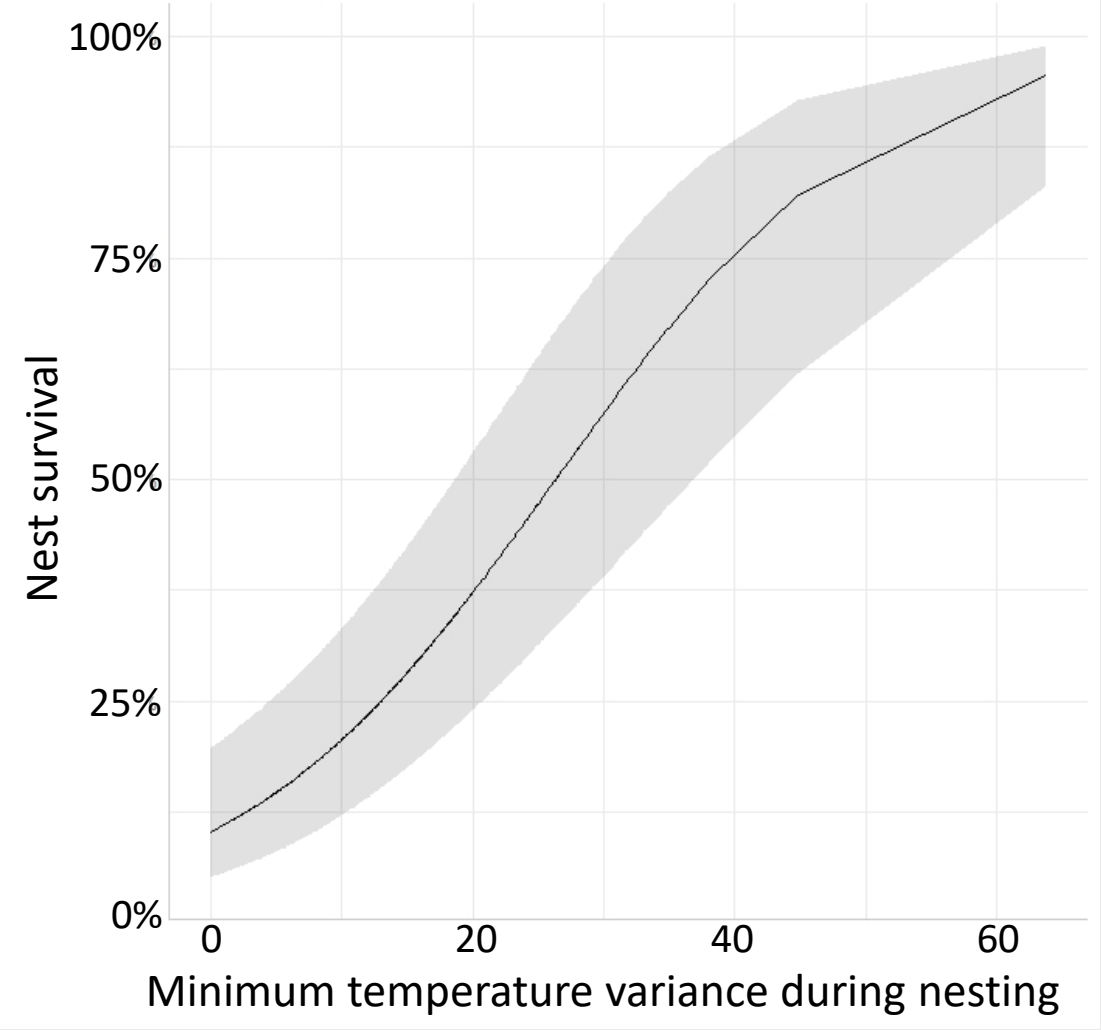
Ranked models by AICc.

January February March 30-days prior During

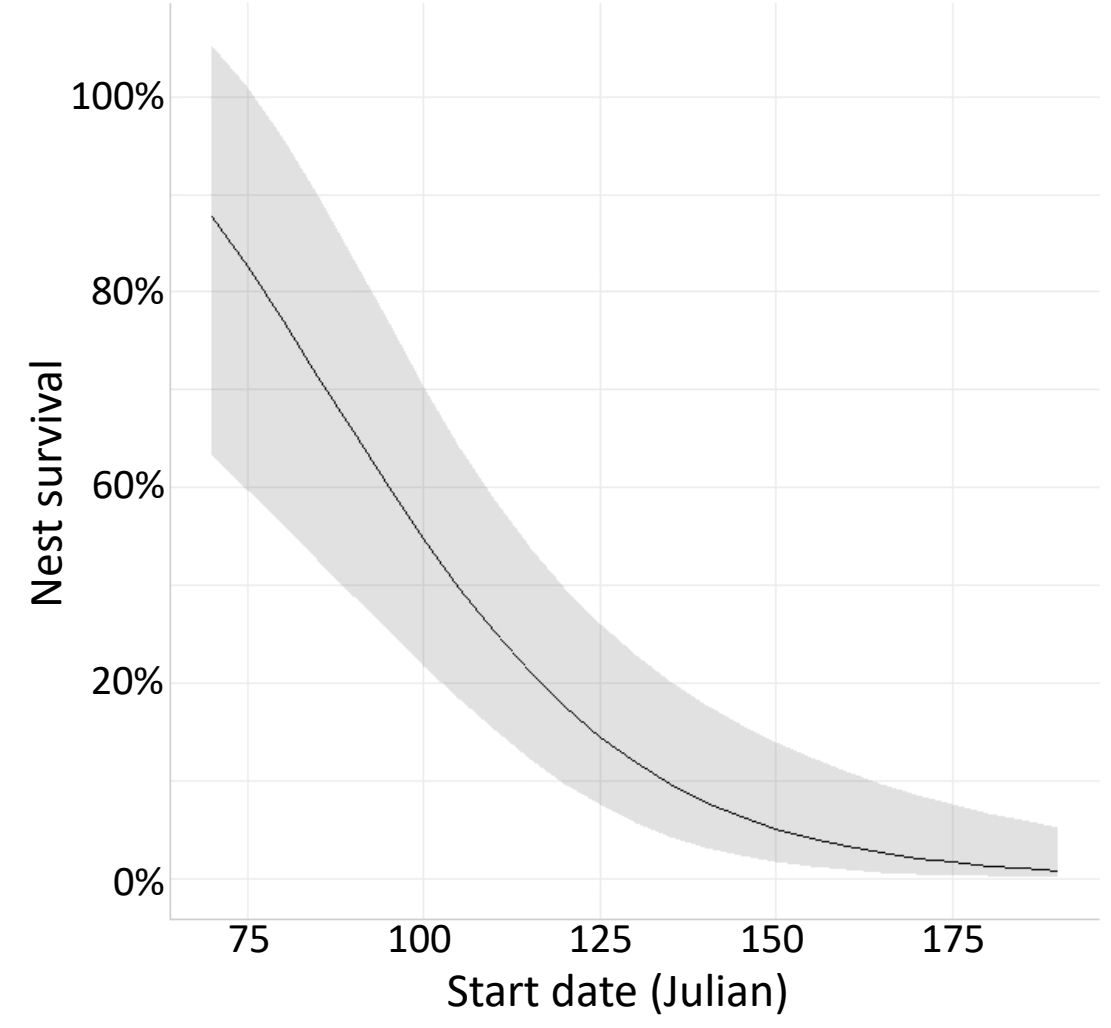
January February March 30-days prior During



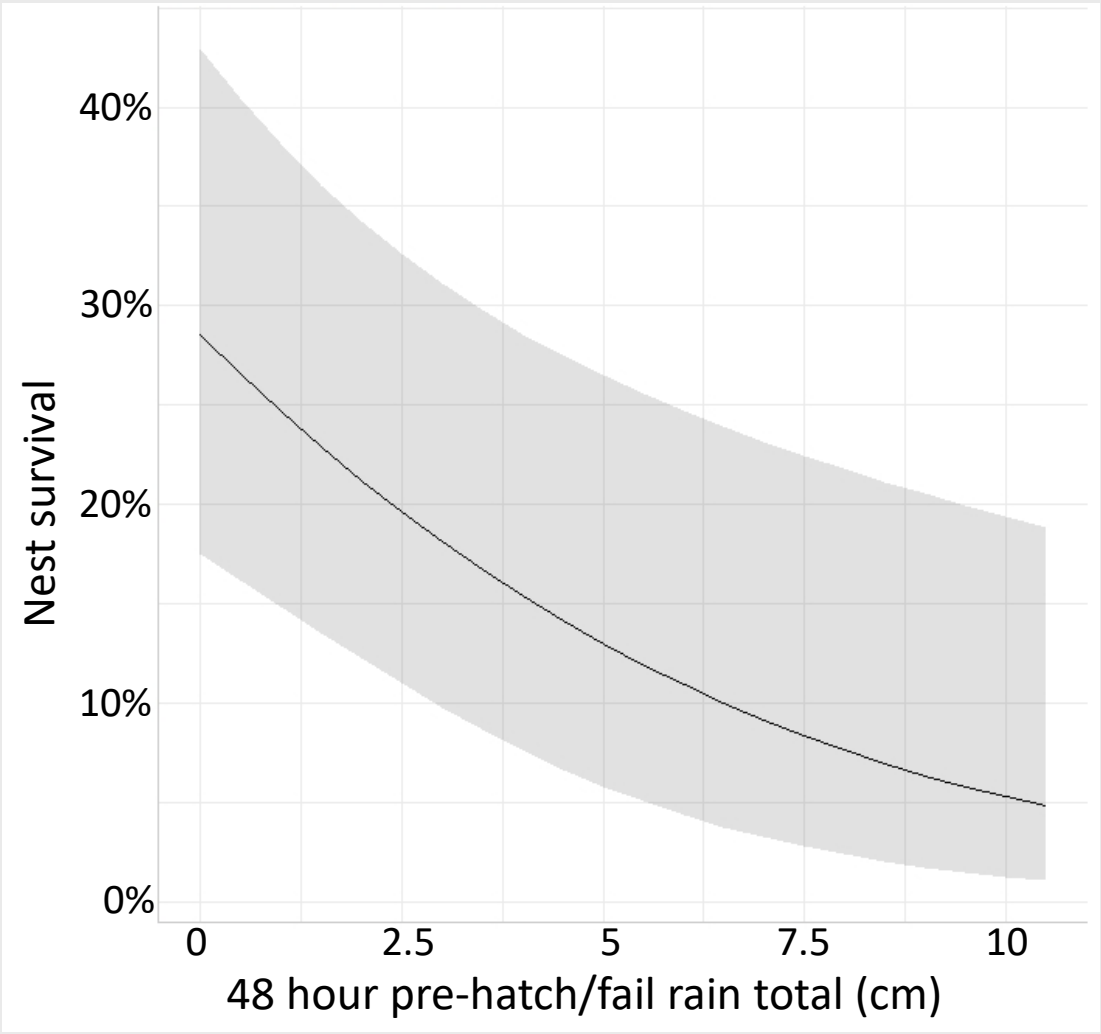
January February March 30-days prior During



January February March 30-days prior During



January February March 30-days prior During



January February March 30-days prior During

Conclusions

(1) Warmer springs -> earlier nesting/increased nest survival.

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(2) Increased temperature variance -> delay nesting but also increase nest survival (it's complicated!).

Conclusions

(1) Warmer springs -> earlier nesting/increased nest survival.

(2) Increased temperature variance -> delay nesting but also increase nest survival (it's complicated!).

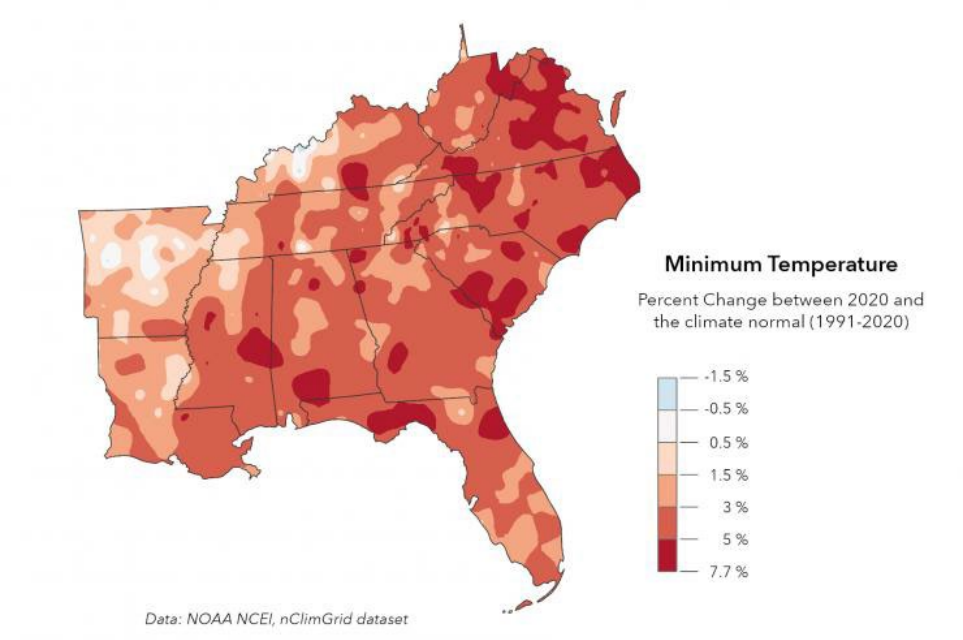
(3) Extreme rain events -> decrease survival.

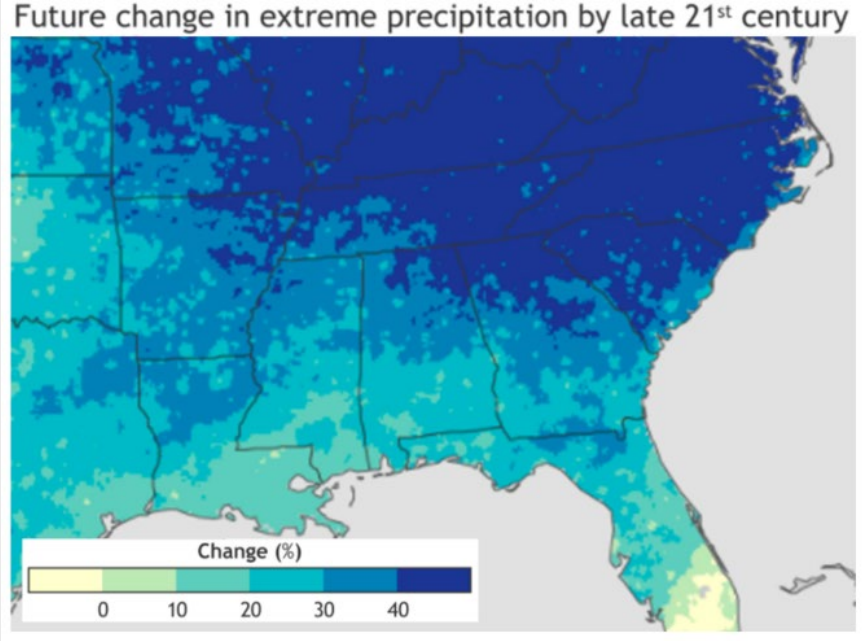
Next steps

Thank you!

wwboone@ncsu.edu

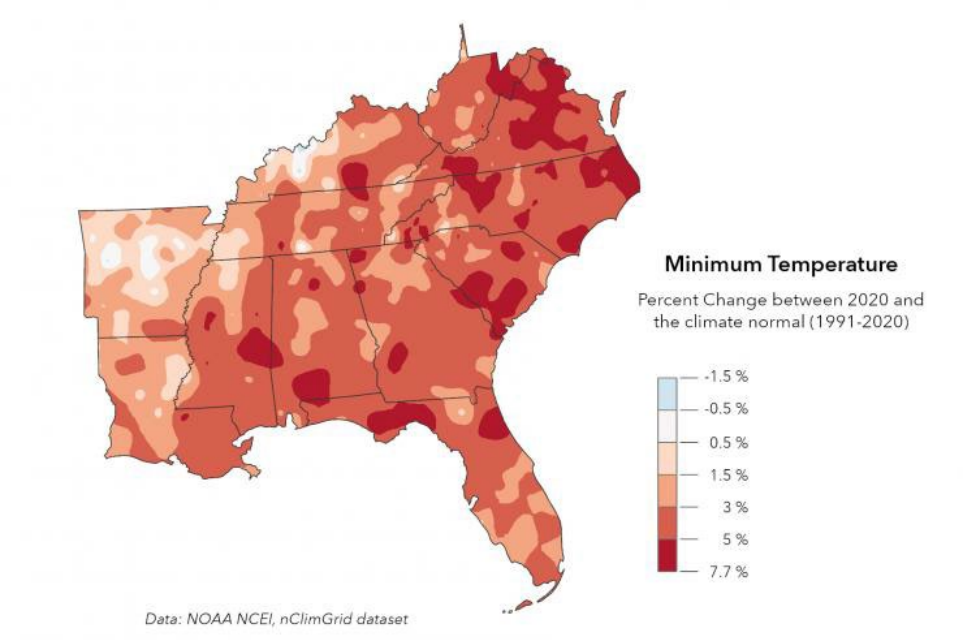
Discussion

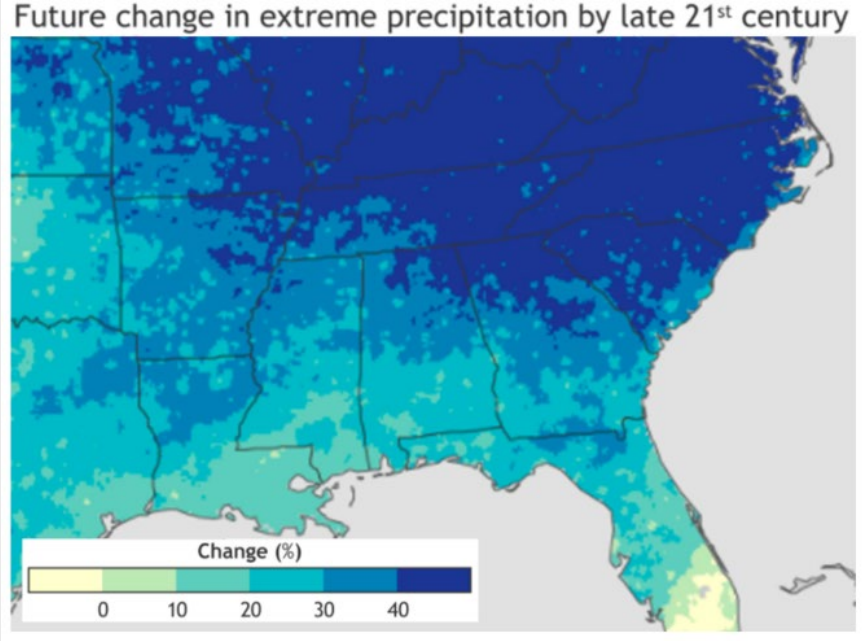




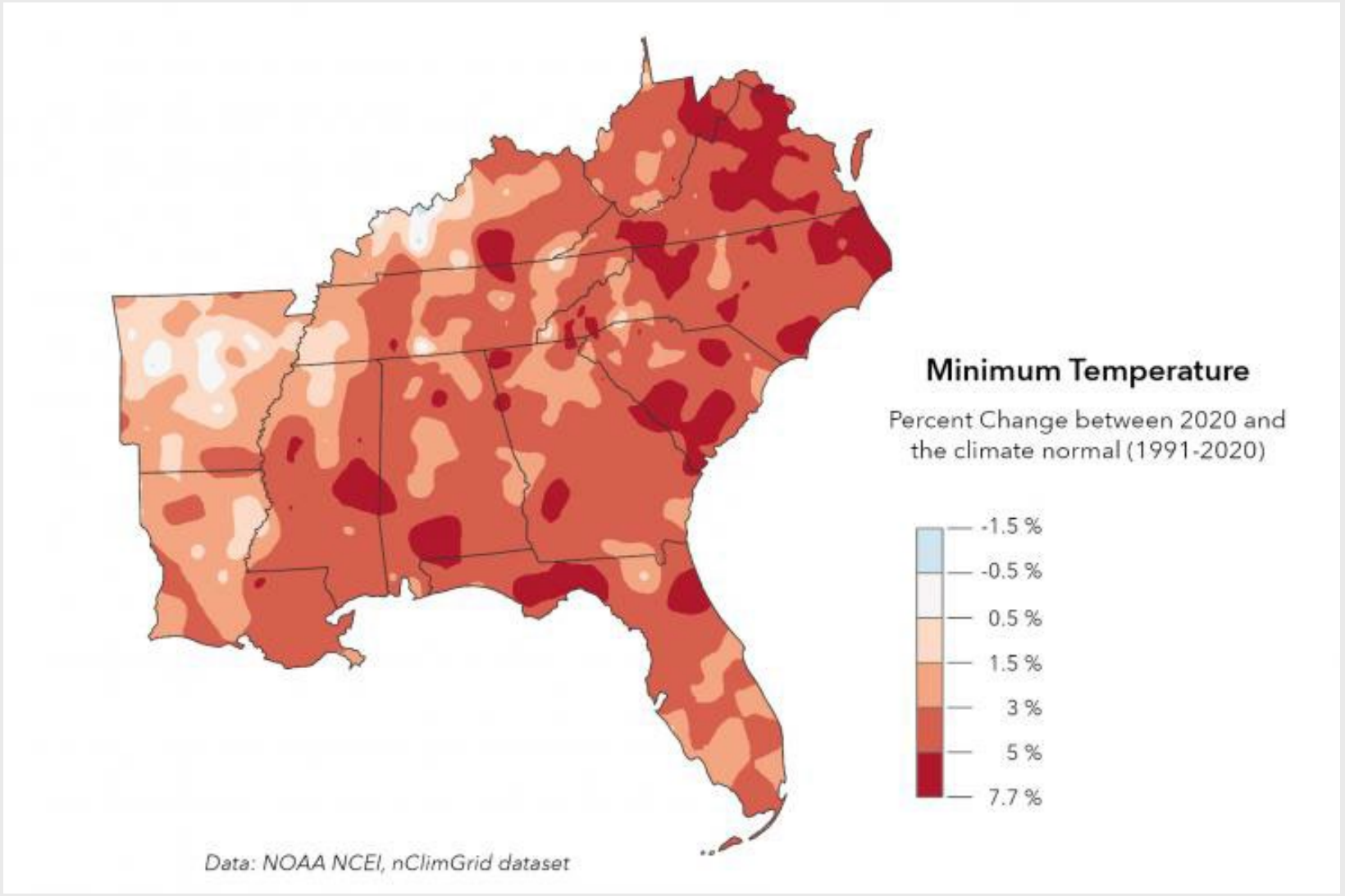
Wikipedia

Discussion

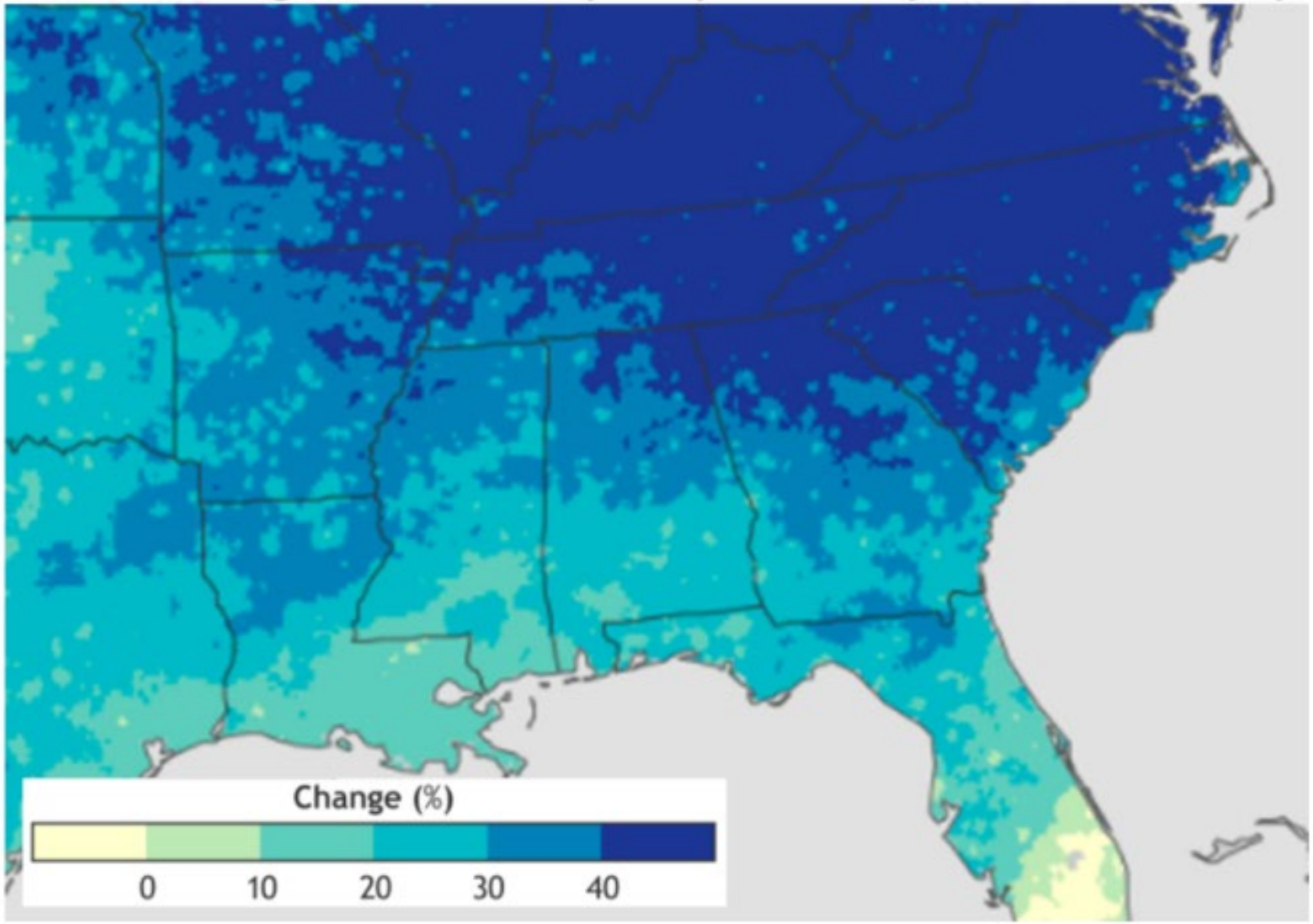




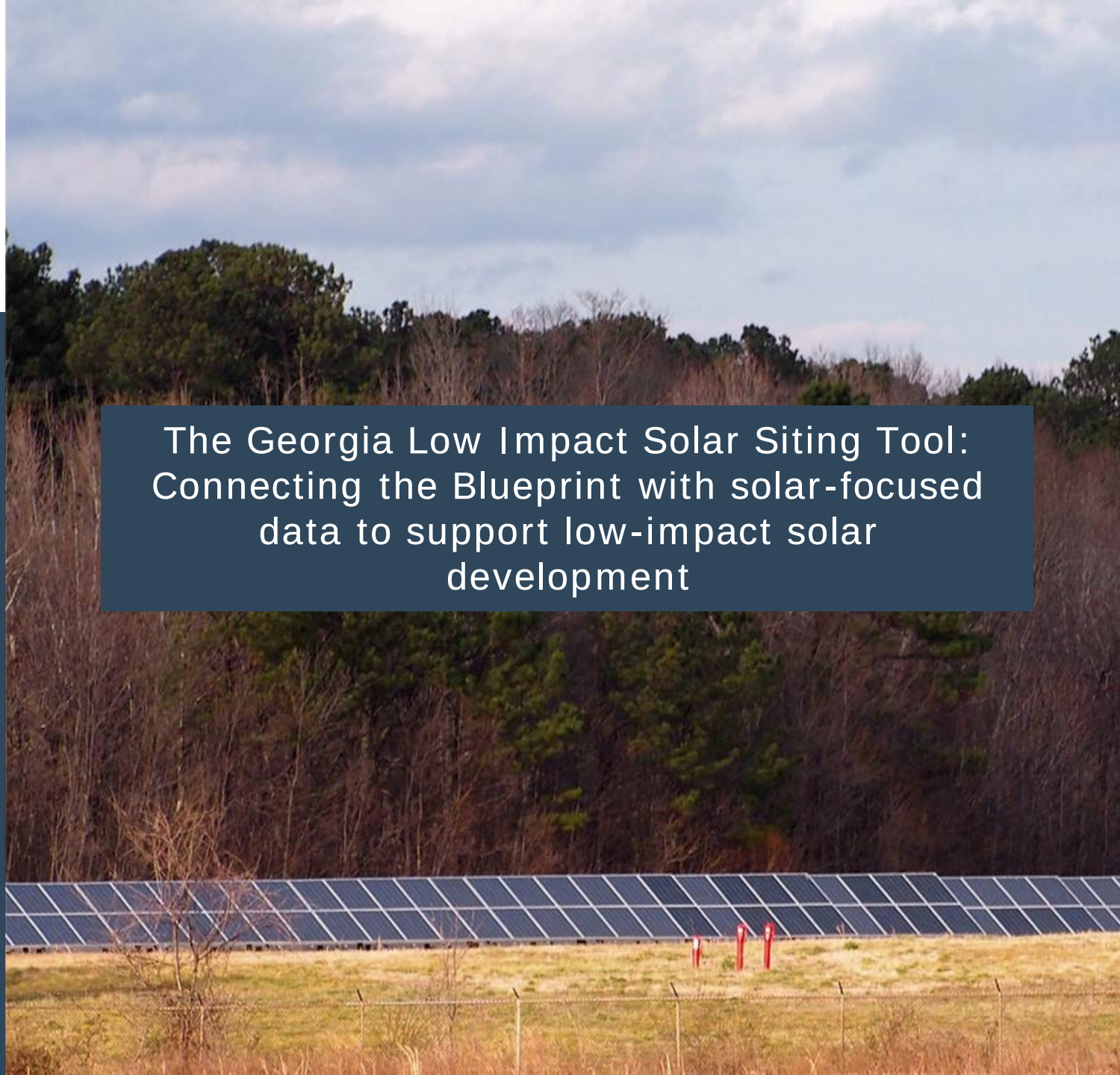
Wikipedia


Minimum Temperature
Percent Change between 2020 and the climate normal (1991-2020)
-1.5 %
-0.5 %
0.5 %
1.5 %
3 %
5 %
7.7 %
Data: NOAA NCEI, nClimGrid dataset

Future change in extreme precipitation by late 21st century



The Georgia Low Impact Solar Siting Tool: Connecting the Blueprint with solar-focused data to support low-impact solar development



Next Third Thursday Web Forum

8-18-2022

10:00 am

Amy Gutierrez, The Nature Conservancy

Alex Lamle, Southeast Conservation Blueprint


2022 SOUTHEAST
CLIMATE ADAPTATION
SCIENCE SYMPOSIUM
Southeast Climate Adaptation Science Center
September 19-21, 2022
Registration for the Symposium & Poster/Tools Session are now open for the Southeast Climate Adaptation Science Symposium
Visit our symposium webpage for more information and to register!
Sept.19-21, 2022
https://secasc.ncsu.edu/2022-secasc-science-symposium/


Questions?