DoD Environmental Planning and Conservation Webinar Series

Conducting Species Status Assessments for Priority DoD At-risk Species (Legacy Project 18-848)

May 30, 2023

Please mute your phones

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www.denix.osd.mil/nr/

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Mike's Background

ESA on Fort Hood

Extension: working with landowners on ESA

Watershed Coordinator

USFWS: IPA experience

Research is often disconnected from policy

- It shouldn't
- It doesn't have to be

SSAs represent that Science-Policy nexus

Outline

Quick project overview

What is an SSA?

Deep dive into gopher tortoise SSA

Benefits of project to DoD

Questions

Project Background

Military installations provide habitat for federally listed and at-risk species.

These species can adversely impact training and testing on military installations due to ESA requirements.

Collaboration between partners to develop and promote innovative strategies for proactive conservation of at-risk species and increased flexibility for addressing impacts to both listed species and military missions is critical.

FWS has an ever increasingly workload and diminishing resources/capacity

	R1	R2	R3	R4	R5	R6	R7	R8	R9	Total
Total Actions	24	91	17	334	50	30	1	55	28	630
%	4%	14%	3%	53%	8%	5%	0%	9%	4%	
Allocation	14%	18%	3%	16%	5%	10%	3%	17%	14%	

Legacy Project 18-848

Contract support to help conduct SSAs supports DoD and FWS:

- Increasing integration of DoD conservation and management of at-risk species in SSAs
- Better data/information→better listing and reclassification decisions
- Increased capacity→addressing backlog of 5-year reviews→de/down listings
- IPA in Atlanta FWS RO supported by REPI

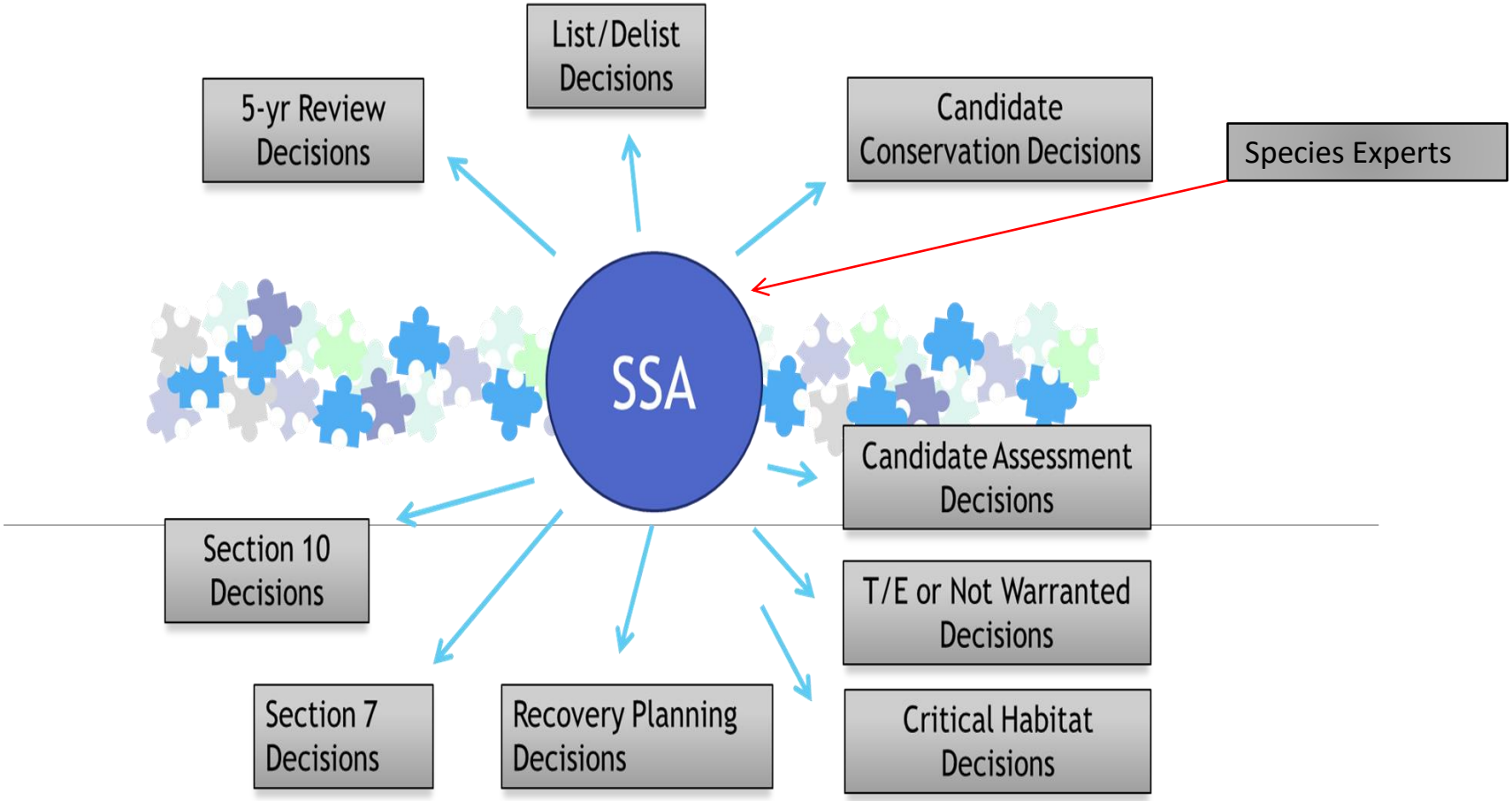
Original project: conduct SSAs for 5 priority reptile/amphibian species in the Southeast Region FWS

- Gopher tortoise; Southern hognose snake; Florida pinesnake; Gopher frog; Striped newt

Shifted to cover other priority DoD species

- Gopher tortoise; Southern hognose snake; Okaloosa darter; Black Creek Crayfish; Alligator snapping turtle; 5 SCI species

THE BIG PICTURE: SSAs will inform all ESA decisions. They form the hub of information to be used across all ESA programs.



What is a Species Status Assessment (SSA)?

An analytical framework used to deliver foundational science for informing all ESA decisions in a focused, repeatable manner

Stage 1 – Species Needs:

- Describe ecological needs at the individual, population, and species level

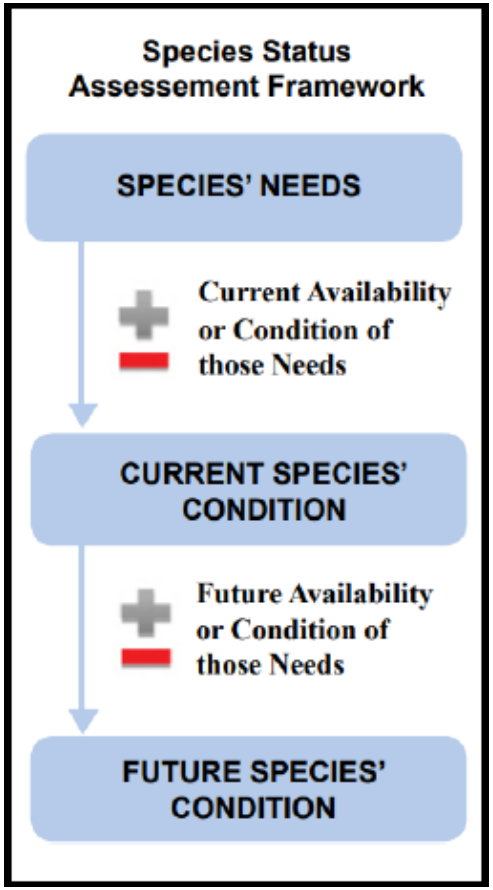
Stage 2 – Current Condition:

- Describe current state of the species' habitat and demographics
- Describe probable explanations for changes in abundance and distribution

Stage 3 – Future Condition:

- Forecast the species' response to plausible future scenarios of changes in environmental conditions, threats, and/or conservation efforts

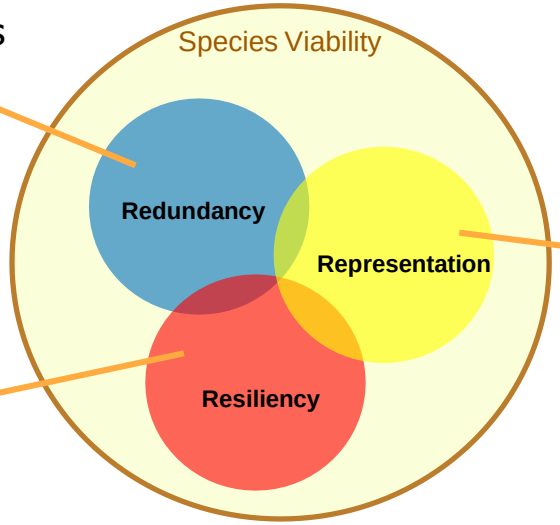
Uses the conservation biology principle of the 3 R's (resiliency, redundancy, and representation) as the lens for assessing viability



What is Viability?

"The ability of a species to withstand catastrophic events"

"The ability of the species to withstand annual environmental variation & stochastic events"

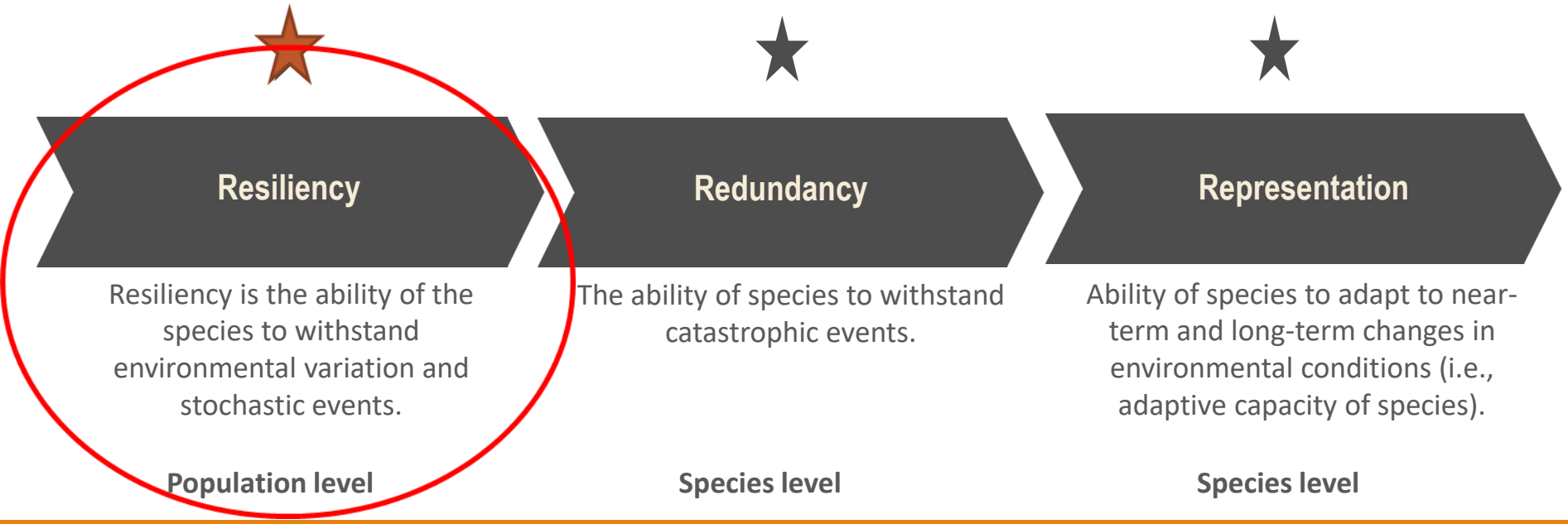


"The ability of a species to adapt to changing environmental conditions"

- Viability is the ability of the species to maintain **multiple** (redundancy), **sustaining populations** (resiliency) across the **full gradient of adaptive diversity** (representation) of the species.
- SSA characterizes a species' degree of viability over time (past, current, and future).

The 3 Rs

- Resiliency by looking at the population (N) over time: historically, currently, and into the future – in each of the defined populations

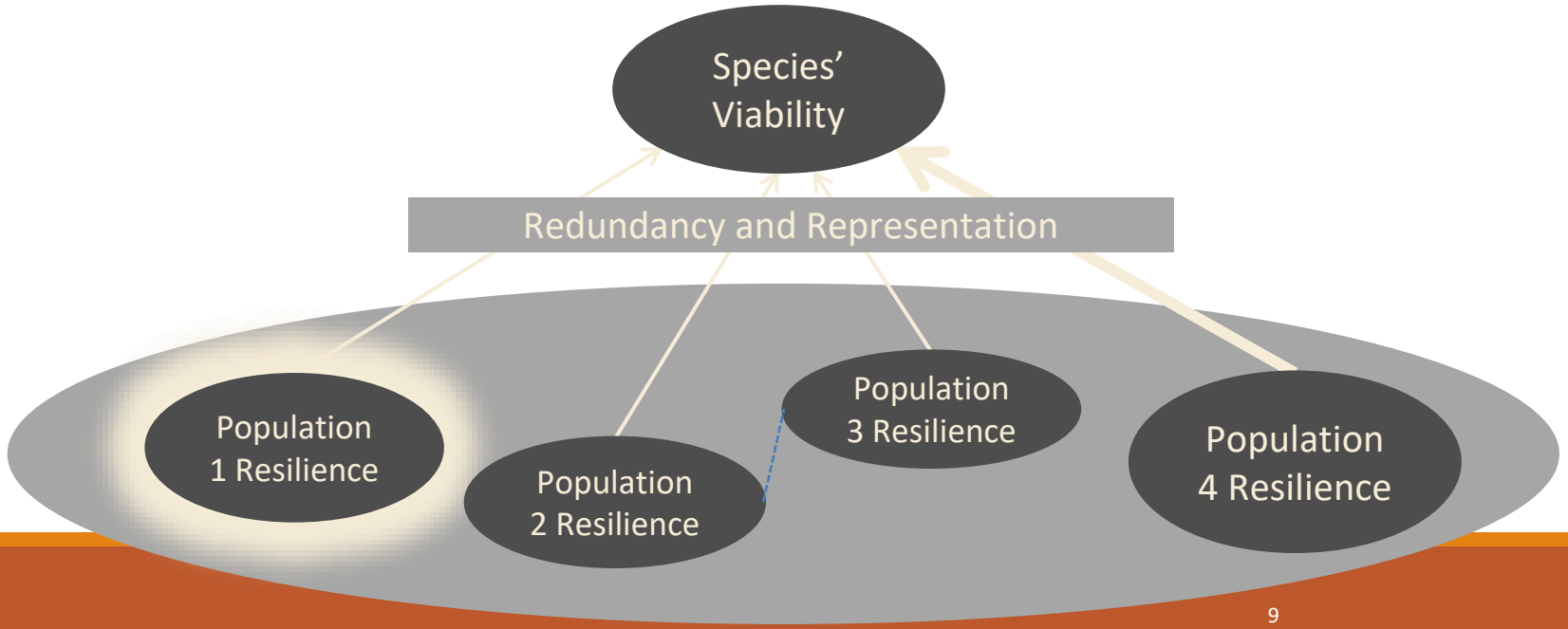


Current Condition: Delineating Populations

Often the most difficult part of the SSA process

Delineations can be based off a number of factors (movement, barriers to dispersal, genetics, pollinators, etc)

Populations = analysis units for resiliency assessments



Assessing Resiliency: defining factors

What factors drive resilience of populations?

- Habitat factors (e.g., habitat quality/quantity, land use, rx fire, soils, etc)
- Population factors (e.g., presence, abundance, evidence of reproduction, dispersal)

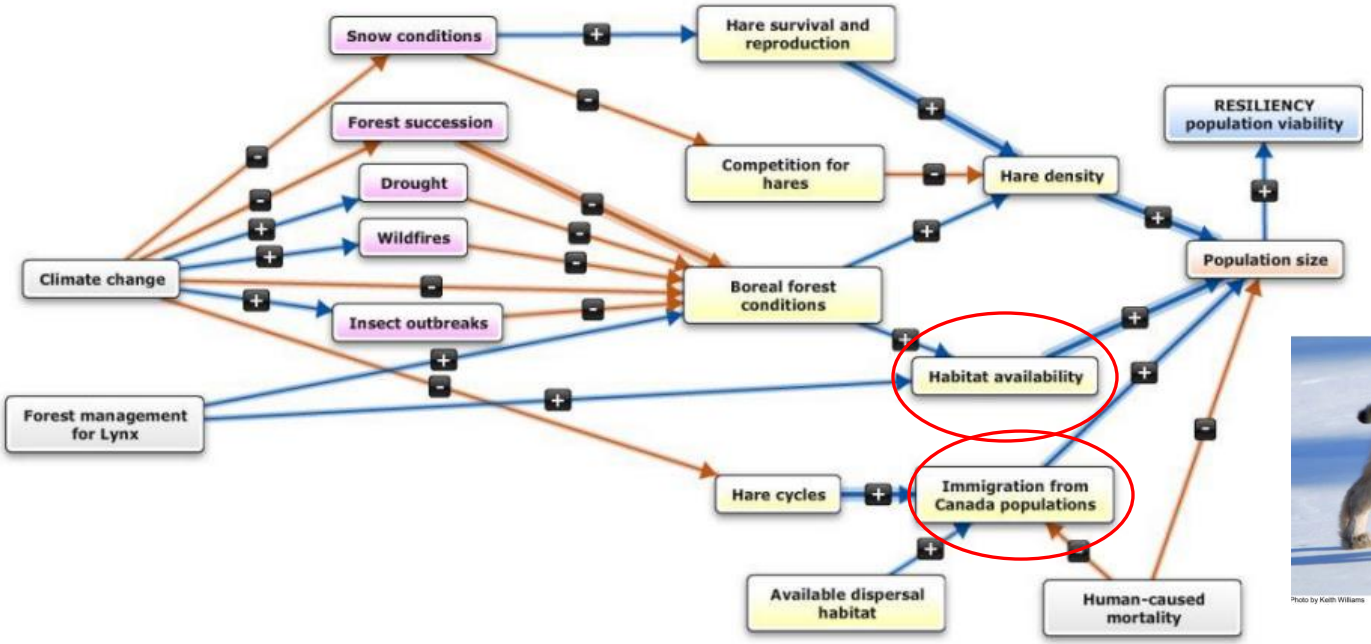
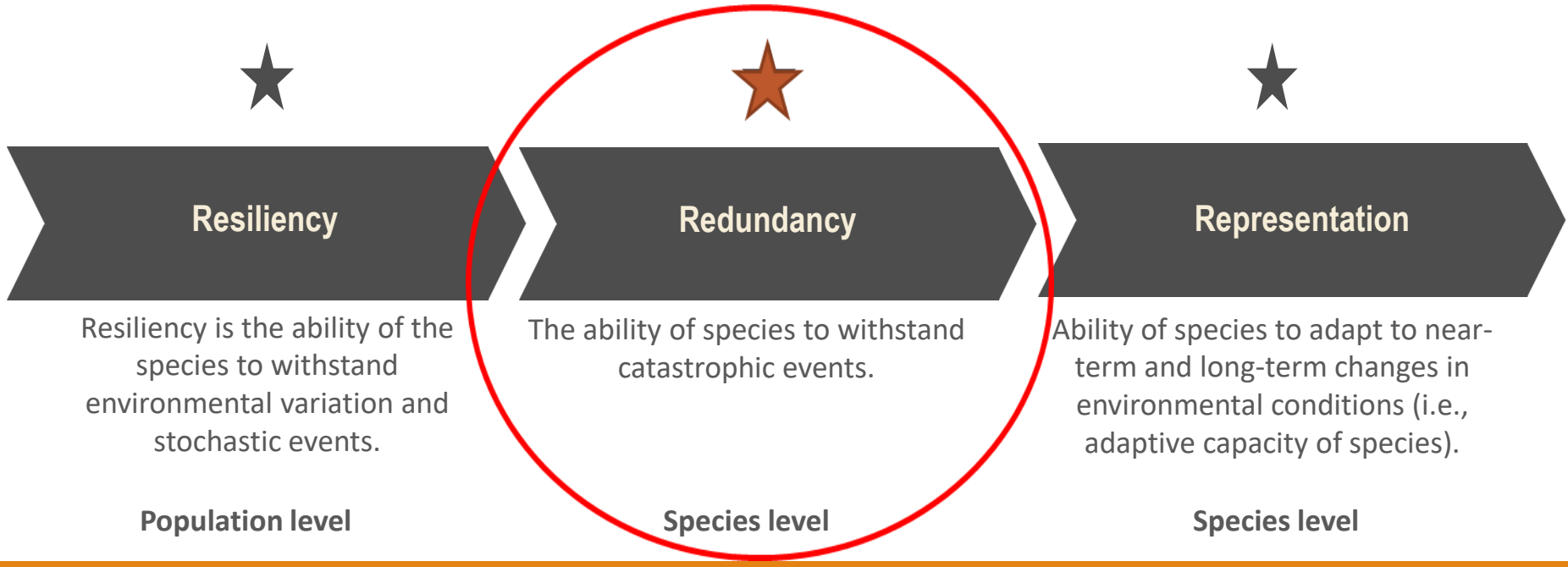


Figure 7. Conceptual model of factors thought to influence the resiliency of lynx populations within the DPS.

The 3 Rs

Measured by the number of populations and their distribution:

- Across the range (tally)
- Within representative units



Representation

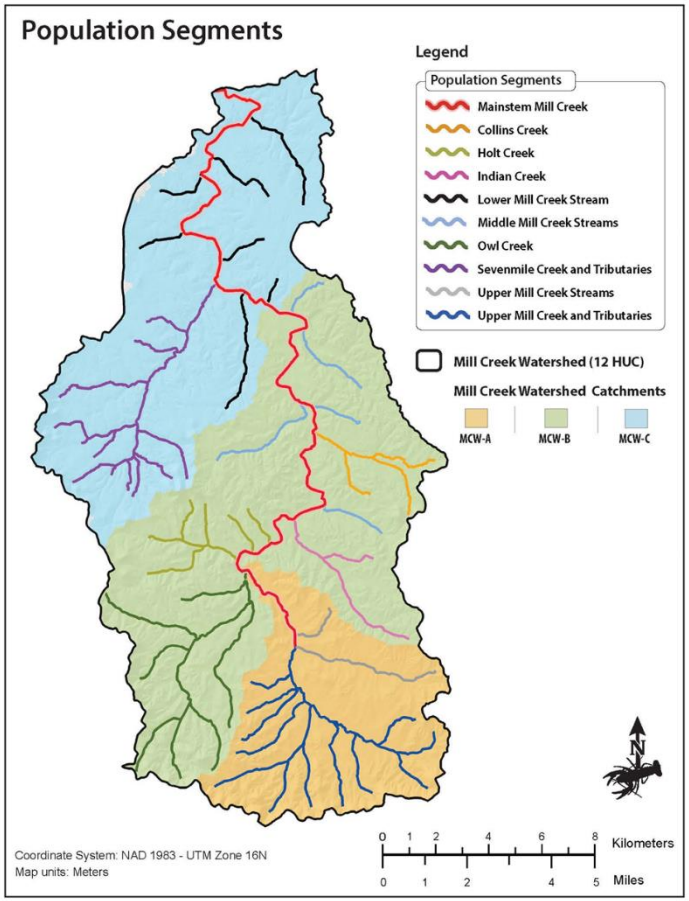
Representative Units: can be thought of as different “types” of the species

- Genetic groupings
- Ecoregions
- Habitat type
- Different life history strategies
- Could be single unit

Typical representative units include genetic populations, ecoregions, and watersheds.

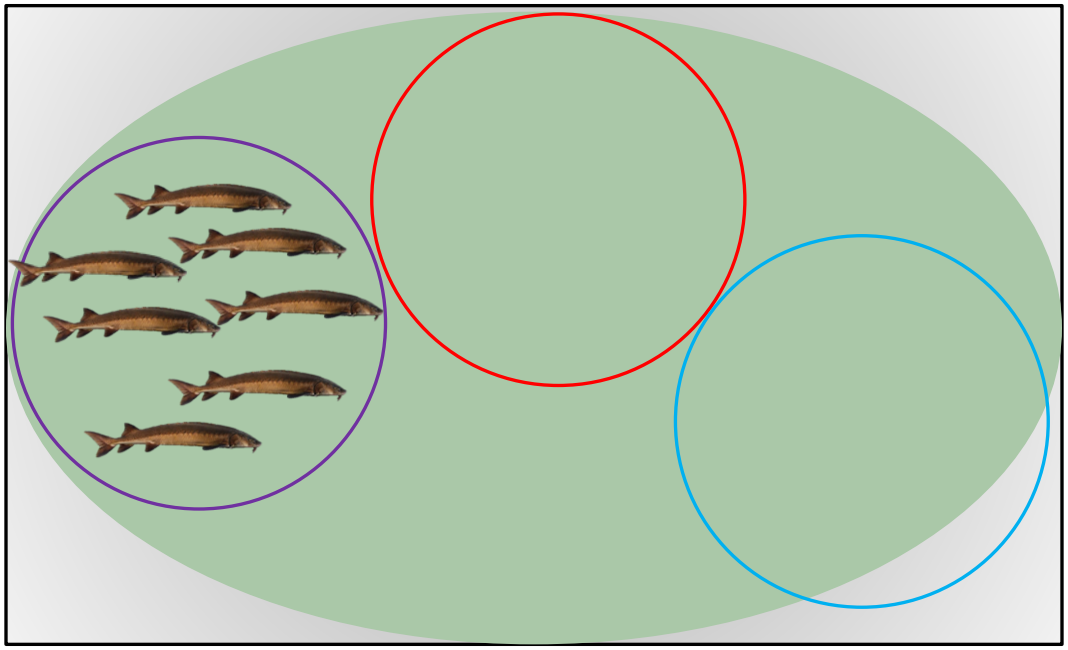
May not be possible to evaluate directly

- In the absence of species specific ecological and genetic data, representation evaluated based on the extent and variability of habitat characteristics across the range of the species.



Redundancy and Representation

Interplay between redundancy and representation



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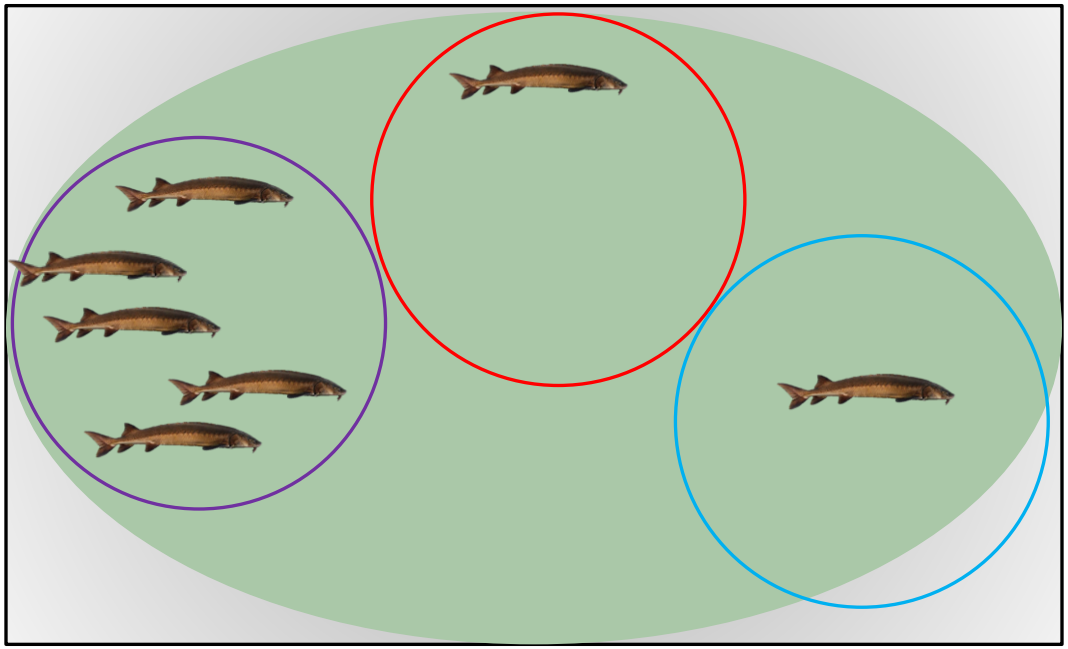
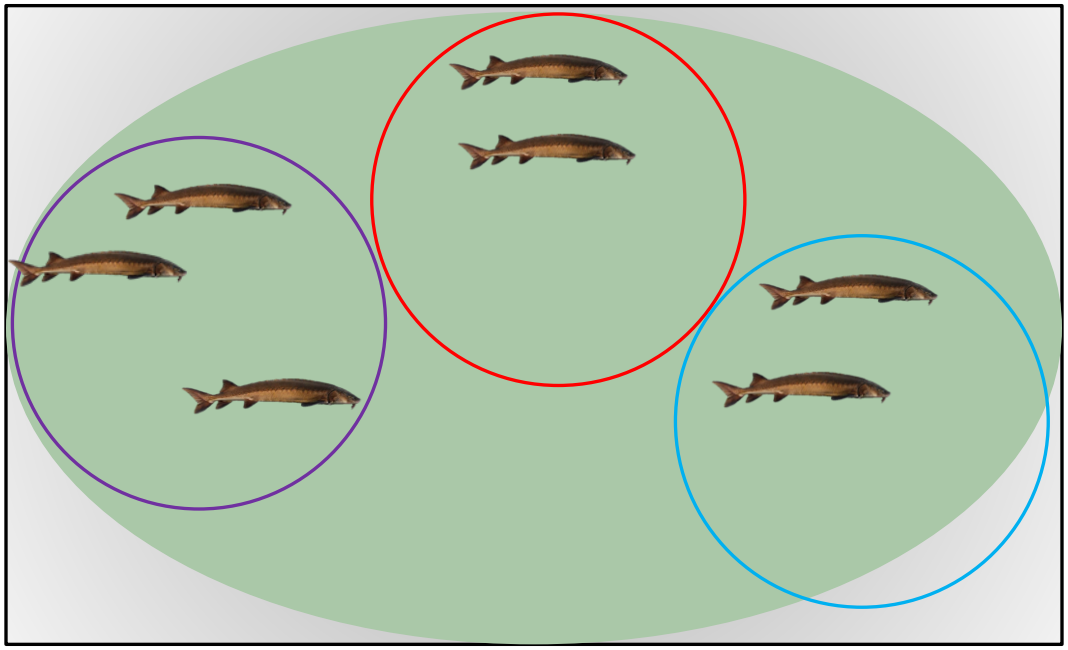


Redundancy and Representation

Interplay between redundancy and representation



Influences on Viability

Identify all potential threats/stressors/influences and their sources (e.g., development, climate change, water management)

- Influences can be positive
- Influences help define scenarios
- Identify key influences to project forward

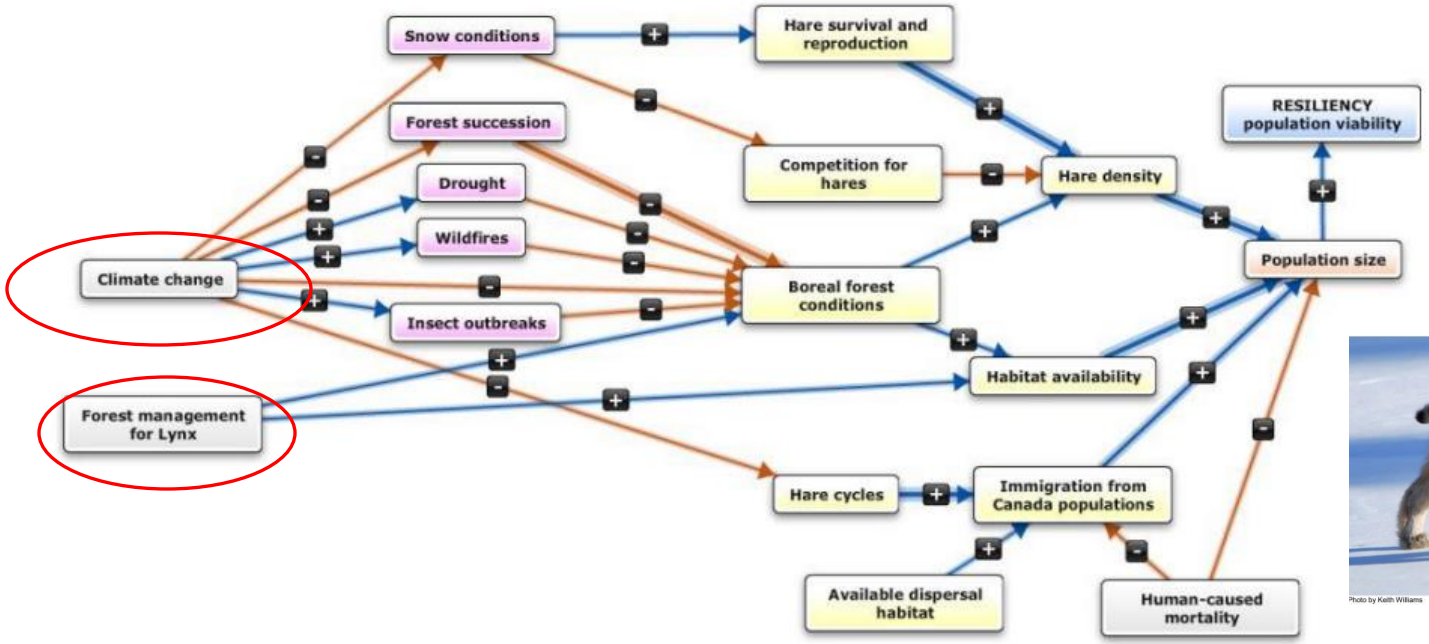


Figure 7. Conceptual model of factors thought to influence the resiliency of lynx populations within the DPS.

Future Scenarios

Primary goal: compare current condition (3 Rs) to future condition (3 Rs) under several plausible scenarios to assess viability

Carry forward important influences on viability

- Negative: Urbanization, climate change, habitat degradation, etc.
- Positive: Habitat protection, reintroductions, reduced take, etc.

Multiple scenarios to capture uncertainty:

- Uncertainty in risk factors (e.g., multiple climate models)
- Uncertainty in species' response

Appropriate time frame

- Life span of species, time scale of influences (positive and negative), uncertainty in future environmental conditions and species' response

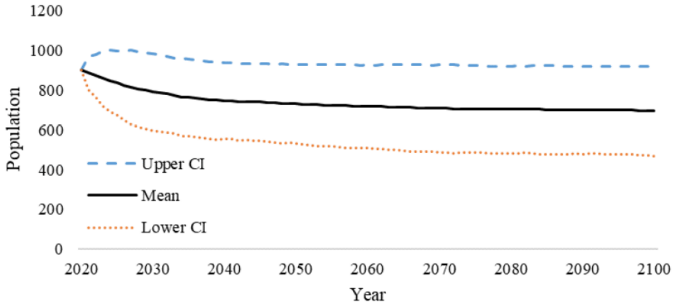


Figure 37 - Tier I Key deer abundance under baseline (no sea-level rise; C0) as derived from a compartment model running from 2020 to 2100. Abundance estimate is mean of 1,000 simulations.

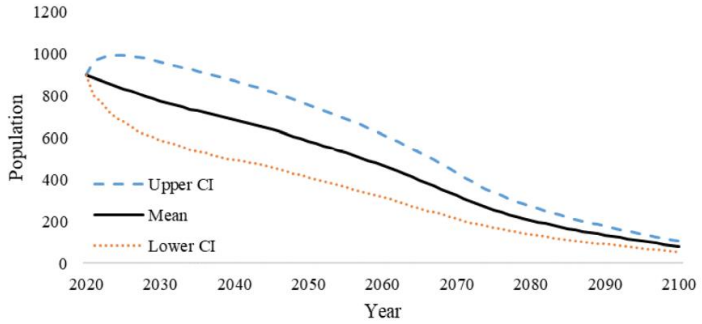


Figure 46 - Tier I Key deer abundance under C5 (high sea-level rise) scenario as derived from a compartment model running from 2020 to 2100. Abundance estimate is mean of 1,000 simulations.

Future Scenarios

Analysis:

- Complexity of the SSA and the associated analysis should match that of the species and the associated data
  - Statistical analysis; GIS models; qualitative projections from expert input
- Which scenario(s) is(are) most likely?
  - What do the 3 Rs look like under each scenario?

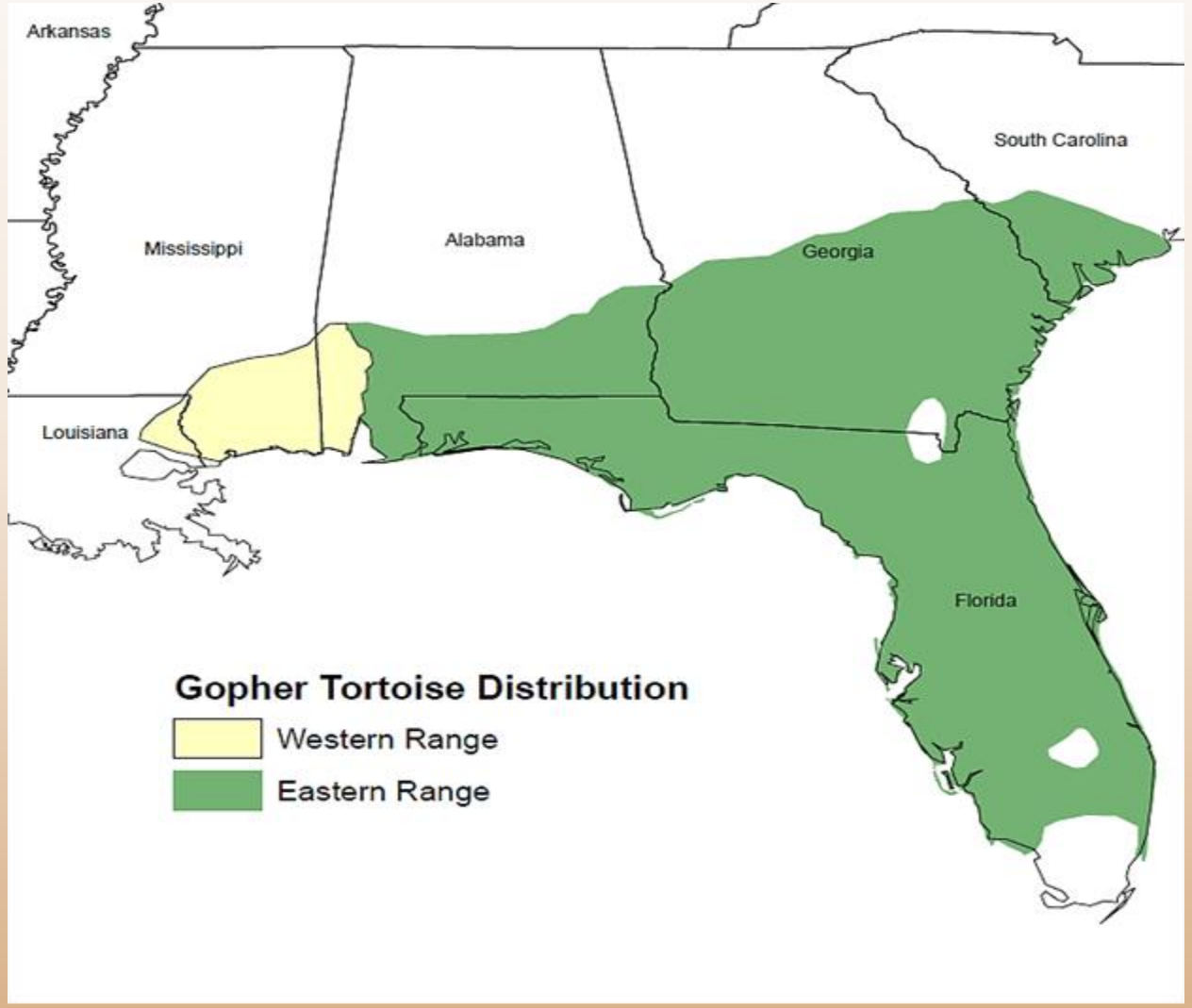
Joel Sartore

Black Warrior waterdog population	Current Condition	Future – Optimistic Status Quo	Future – Pessimistic Status Quo	Future – Conservation
Blackburn Fork	Moderate	Moderate	Presumed Extirpated	High
Blackwater Creek/Browns Creek	Moderate	Moderate	Presumed Extirpated	High
Brushy Creek/Capsey Creek	High	High	Moderate	High
Carroll Creek	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated
Locust Fork	Moderate	Moderate	Presumed Extirpated	High
Lost Creek	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated
Mulberry Fork	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated
North River	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated	High
Sipsey Fork	High	High	High	High
Slab Creek	Presumed Extirpated	Presumed Extirpated	Presumed Extirpated	Moderate
Yellow Creek	Moderate	Moderate	Presumed Extirpated	High
Reintroduction Non-Critical Habitat	NA	NA	NA	Presumed High

Gopher Tortoise

Range and Distribution

Southeastern Atlantic and Gulf Coastal Plains



Listing and Petition History

July 1987: listed the population of the gopher tortoise as a threatened species in the western portion of its range (west of the Mobile and Tombigbee Rivers in Alabama, Louisiana, and Mississippi)

- Populations too sparsely distributed for viability
- Habitat Loss and Modification
- Harvest for Consumption
- Road Mortality

January 2006: Petitioned to list the population of the gopher tortoise in the eastern range (east of the Mobile and Tombigbee Rivers in Alabama, Florida, Georgia, and South Carolina)

September 2009: 90-Day Finding – substantial information

July 2011: Eastern populations 12-month finding: Warranted as Threatened; precluded by higher priority actions

- Difficult to determine status due to lack and inconsistency of data
- At the moment, the data showed very few populations met viability criteria
- Future range-wide analysis of the species

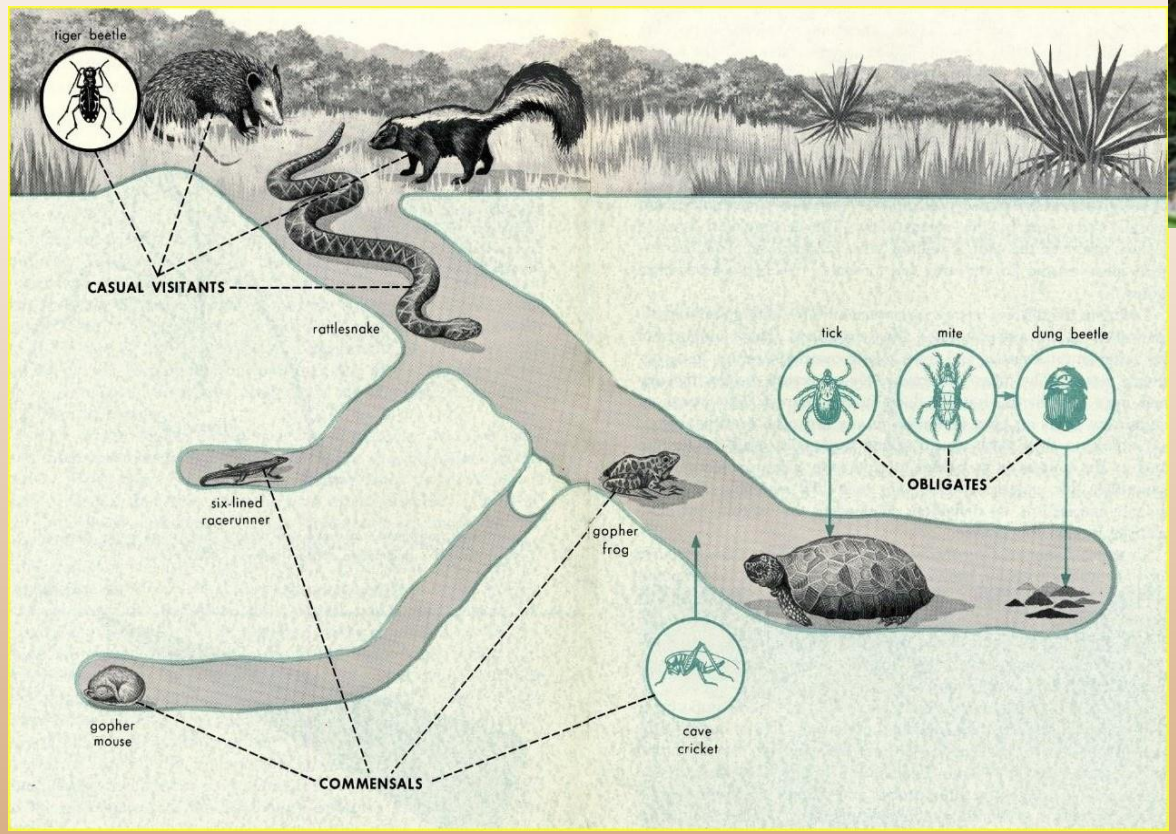
2019: Species Status Assessment

Life History: Diet and Burrows

Feeding/Forage

- Herbaceous Vegetation
- Seeds
- Fruits

Photo: Charles Warren



Burrows

- Sheltering
- Central to:
  - Feeding
  - Breeding
- Commensals

Habitat

Sandhill

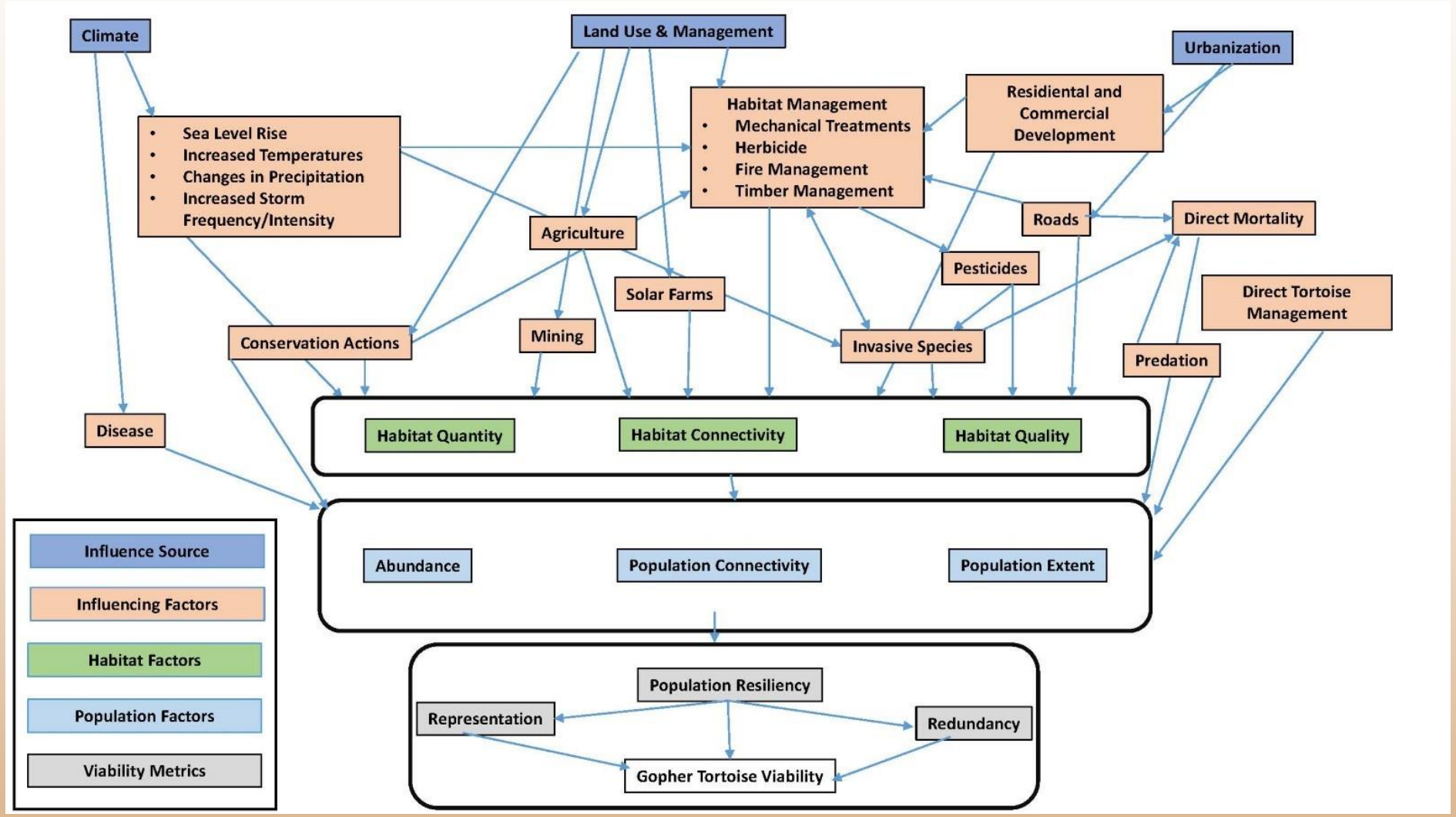
Pine Flatwoods

✓ **Open Canopy** ✓ **Little/No Midstory** ✓ **Herbaceous Vegetation** ✓ **Sandy Soil**

Pine uplands

Scrub

Chapter 3: Factors Influencing Viability



Relocations, Translocations, and Headstarting

Relocations

- Occur on sites where habitat will remain
- Retains regional populations

Translocations

- Conservation strategy to mitigate loss, restore or supplement populations
- High site fidelity and survival required
- Methods to increase success

Headstarting

- Raise in captivity prior to release
- **Camp Shelby**
  - 70-80% survival post-release
  - Plans to continue release at Camp Shelby and adjacent DeSoto National Forest

Image credits: FWC

Habitat Management

- Variety of management techniques:
  - Fire
  - Mechanical
  - Herbicide
  - Timber management
- Gradient of ownerships and management conditions and techniques

Image credit: Heather Venter

Prescribed Fire --- Mechanical Treatments --- Herbicide Treatments --- Timber Management

Agreements, BMPs, Strategies and Initiatives

Image credit: Jeffrey Goessling

Agreements

- Memorandum of Agreements
- Gopher Tortoise Conservation Crediting Strategy
- Candidate Conservation Agreement with Assurances
- Candidate Conservation Agreement

BMPs, Strategies, Initiatives

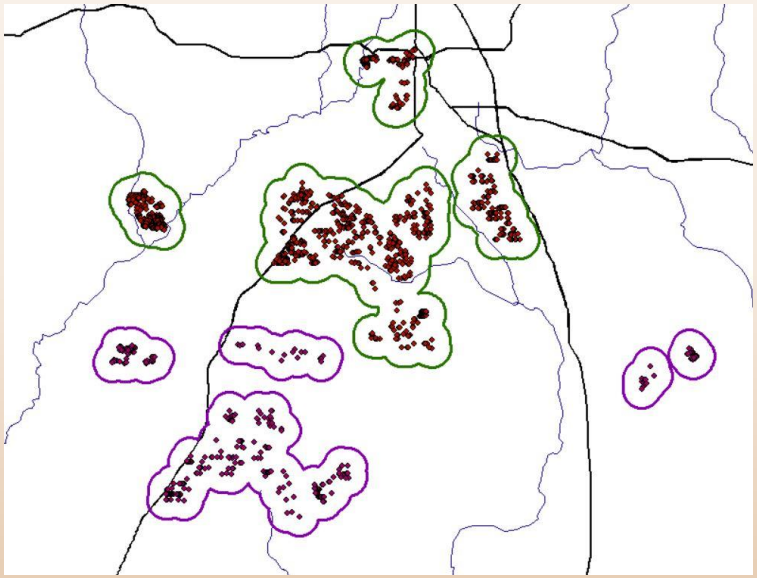
- Range-wide Conservation Strategy
- BMPs
- The Gopher Tortoise Initiative

Current Condition: Data Availability

- Spatially explicit
  - More reliable estimates of population size
  - Delineation of populations with buffers
  - Ability to tie site specific factors to GT locations
  - Can project populations under a PVA framework
- County centroids
  - Tenuous population estimates
  - Inability to delineate populations with buffers
  - Cannot tie site specific factors to GT locations
  - Cannot project populations under a PVA framework
  - **However: almost all private lands data is this type**

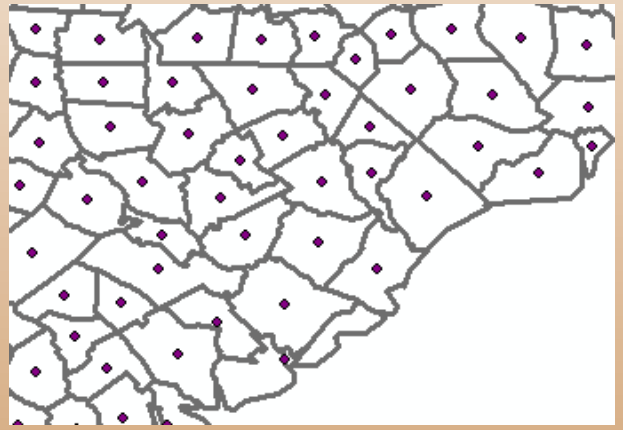
Spatial Data

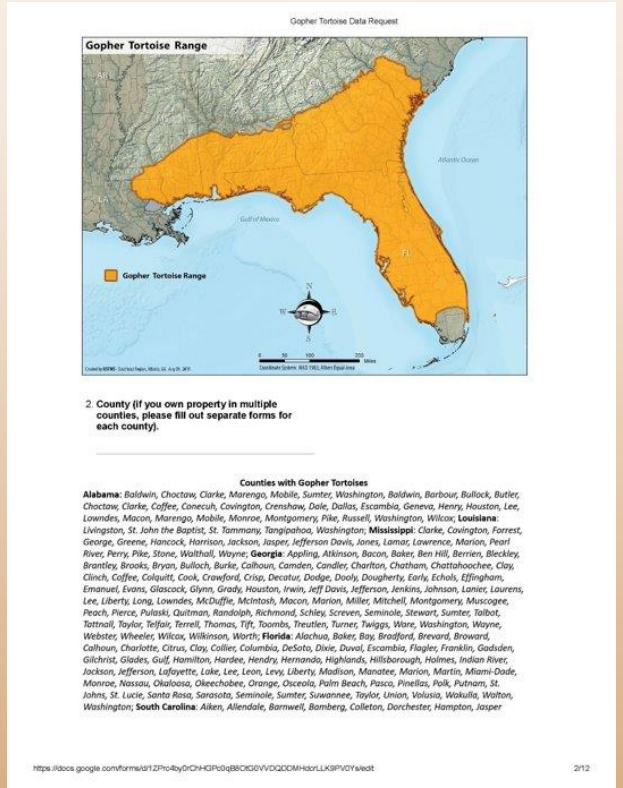
- From a variety of partners
- Mostly protected lands
- Various survey methodologies
- Burrow locations after the year 2000
- Abundance estimates



County Centroids

- Vast majority of county scale data are from private lands
- Various survey methods; not many rigorous
- Estimates of abundance, habitat and management from questionnaire
- Data are not spatially explicit
  - Issues associated with privacy
  - Cannot model these data




Gopher Tortoise Data Request

Gopher Tortoise Range

Gopher Tortoise Range

2. County (if you own property in multiple counties, please fill out separate forms for each county).

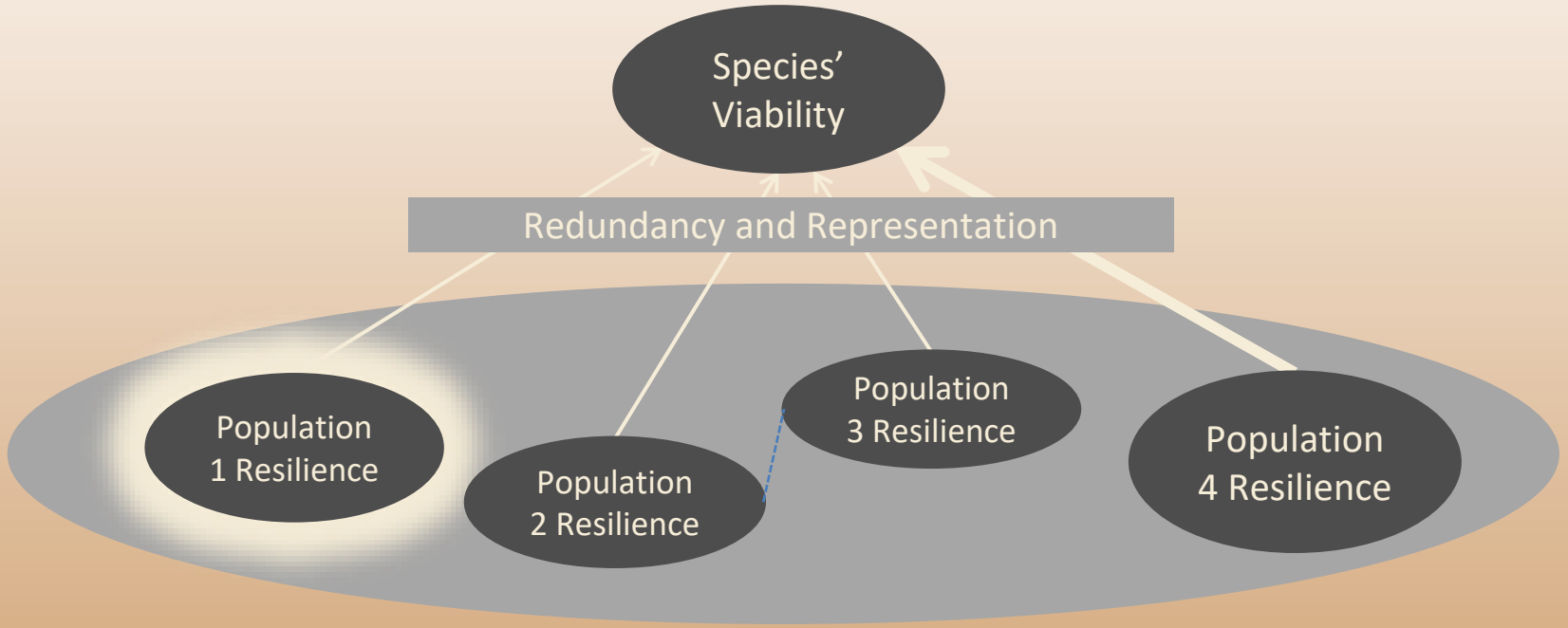
Counties with Gopher Tortoises

Alabama: *Baldwin, Choctaw, Clarke, Marengo, Mobile, Sumter, Washington, Baldwin, Barbour, Bullock, Butler, Choctaw, Clarke, Coffee, Conecuh, Covington, Crenshaw, Dale, Dallas, Escambia, Geneva, Henry, Houston, Lee, Lowndes, Macon, Marengo, Mobile, Monroe, Montgomery, Pike, Russell, Washington, Wilcox*; **Louisiana**: *Livingston, St. John the Baptist, St. Tammany, Tangipahoa, Washington*; **Mississippi**: *Clarke, Covington, Forrest, George, Greene, Hancock, Harrison, Jackson, Jasper, Jefferson Davis, Jones, Lamar, Lawrence, Marion, Pearl River, Perry, Pike, Stone, Walthall, Wayne*; **Georgia**: *Appling, Atkinson, Bacon, Baker, Ben Hill, Berrien, Bleckley, Brantley, Brooks, Bryan, Bulloch, Burke, Calhoun, Camden, Candler, Charlton, Chatham, Chattahoochee, Clay, Clinch, Coffee, Colquitt, Cook, Crawford, Crisp, Decatur, Dodge, Dooly, Dougherty, Early, Echols, Effingham, Emanuel, Evans, Glascock, Glynn, Grady, Houston, Irwin, Jeff Davis, Jefferson, Jenkins, Johnson, Lanier, Laurens, Lee, Liberty, Long, Lowndes, McDuffie, McIntosh, Macon, Marion, Miller, Mitchell, Montgomery, Muscogee, Peach, Pierce, Pulaski, Quitman, Randolph, Richmond, Schley, Screven, Seminole, Stewart, Sumter, Talbot, Tattnall, Taylor, Telfair, Terrell, Thomas, Tift, Toombs, Treutlen, Turner, Twiggs, Ware, Washington, Wayne, Webster, Wheeler, Wilcox, Wilkinson, Worth*; **Florida**: *Alachua, Baker, Bay, Bradford, Brevard, Broward, Calhoun, Charlotte, Citrus, Clay, Collier, Columbia, DeSoto, Dixie, Duval, Escambia, Flagler, Franklin, Gadsden, Gilchrist, Glades, Gulf, Hamilton, Hardee, Hendry, Hernando, Highlands, Hillsborough, Holmes, Indian River, Jackson, Jefferson, Lafayette, Lake, Lee, Leon, Levy, Liberty, Madison, Manatee, Marion, Martin, Miami-Dade, Monroe, Nassau, Okaloosa, Okeechobee, Orange, Osceola, Palm Beach, Pasco, Pinellas, Polk, Putnam, St. Johns, St. Lucie, Santa Rosa, Sarasota, Seminole, Sumter, Suwannee, Taylor, Union, Volusia, Wakulla, Walton, Washington*; **South Carolina**: *Aiken, Allendale, Barnwell, Bamberg, Colleton, Dorchester, Hampton, Jasper*

https://docs.google.com/forms/d/1ZPrc4by0rChH3Pc0qB8OlG6VVDQDDMHdorLLK9PV0Ys/edit 2/12

Delineating Populations

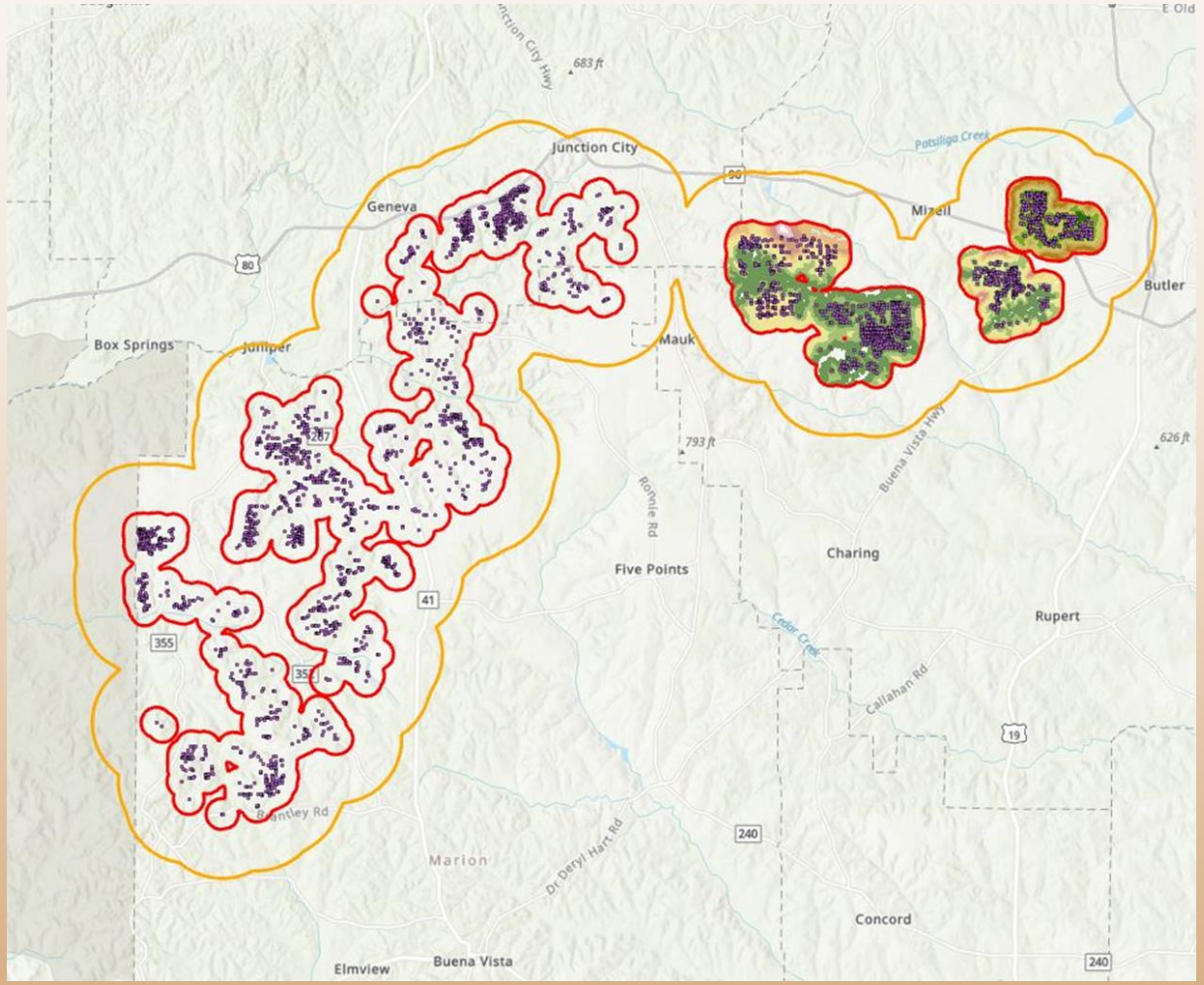
- Delineations based off of tortoise movements and barriers to movement (e.g. major roads and waterbodies, urban areas)
- Local Populations (individuals likely to interbreed)
- Landscape Populations (immigration/emigration)



Current Conditions: Delineating Populations

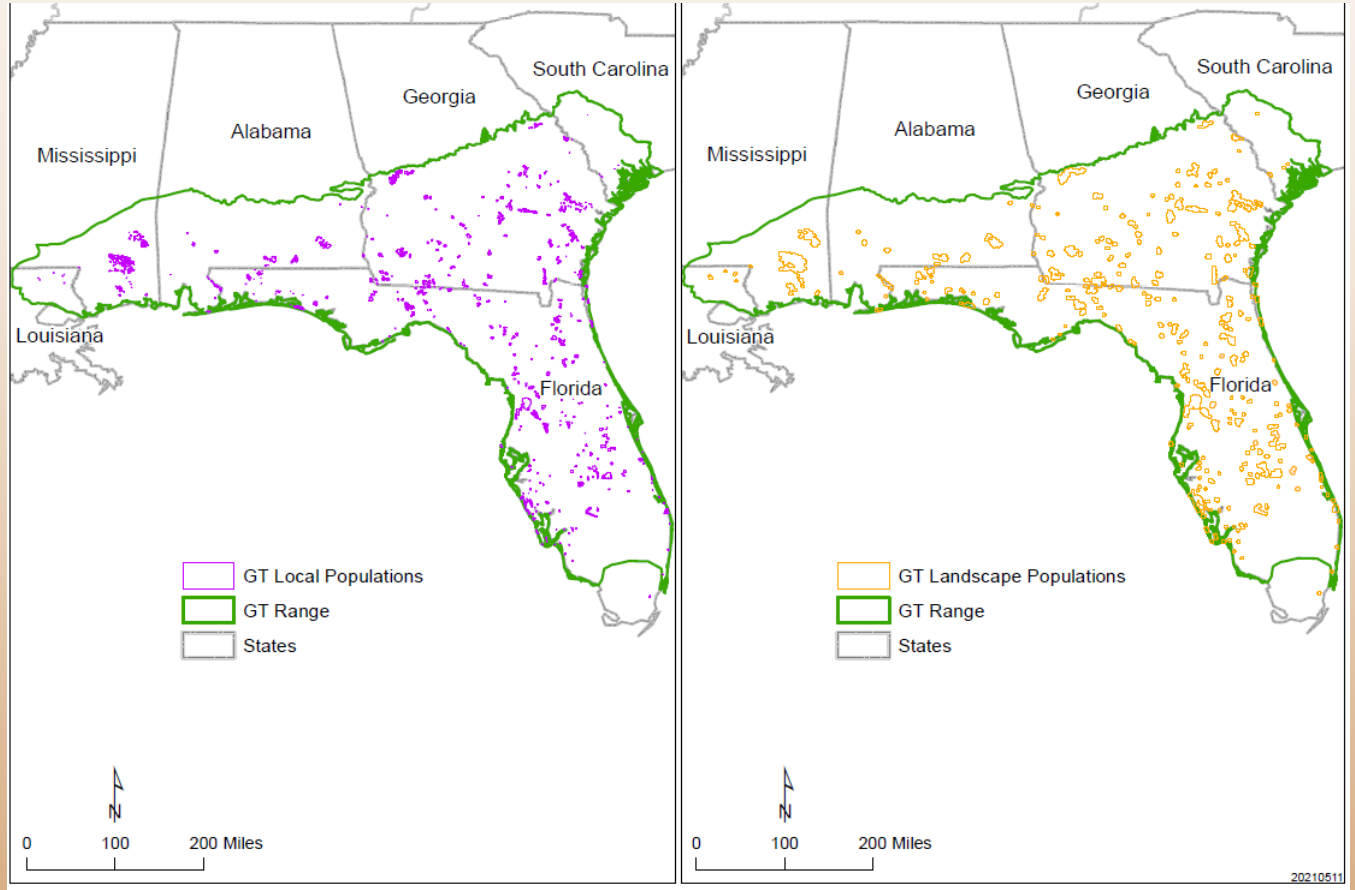
Local Populations: 600 meter buffer around burrows

Landscape Populations: 2500 meter buffer around burrows



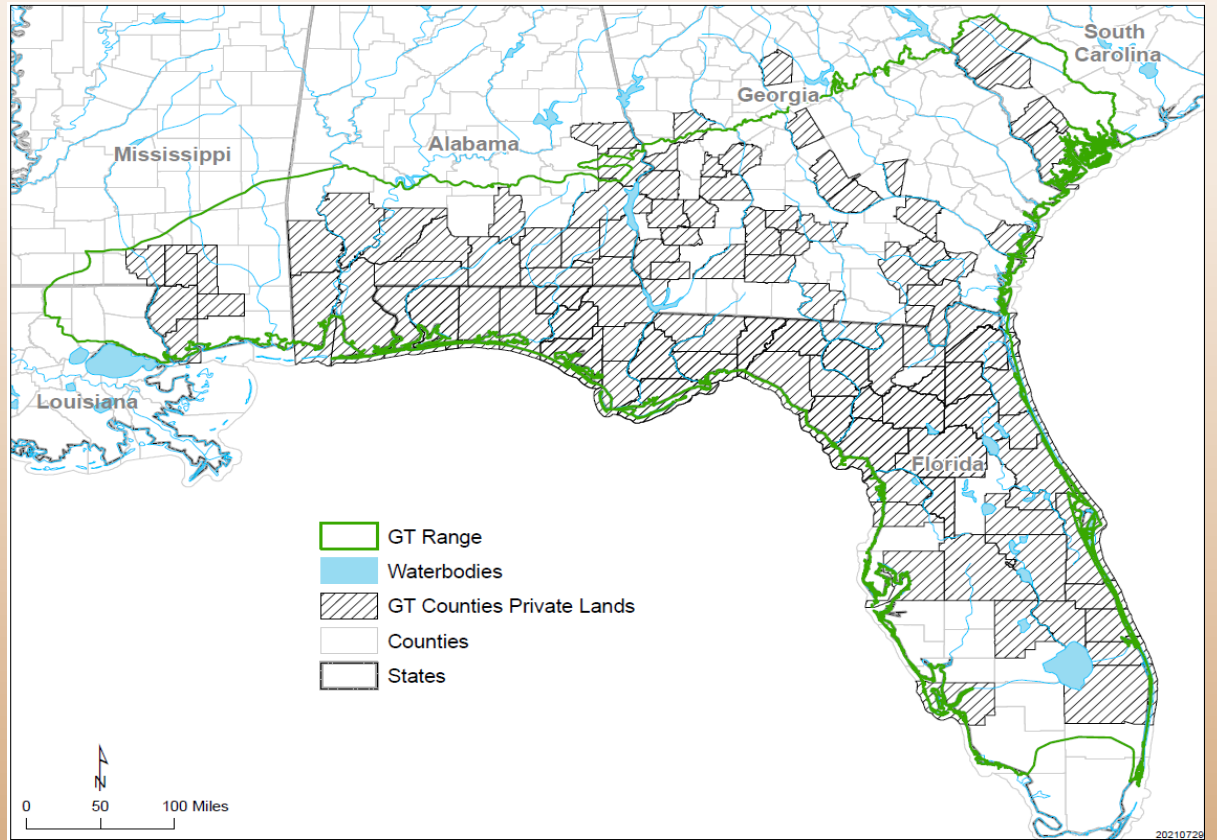
Population Summary: spatial data

- 656 local populations from 253 landscape populations
- Florida had the greatest number of local (316) and landscape populations (161), followed by Georgia (151, 63, respectively), Mississippi (99, 7), Alabama (77, 14), Louisiana (7, 5), and South Carolina (6, 4).



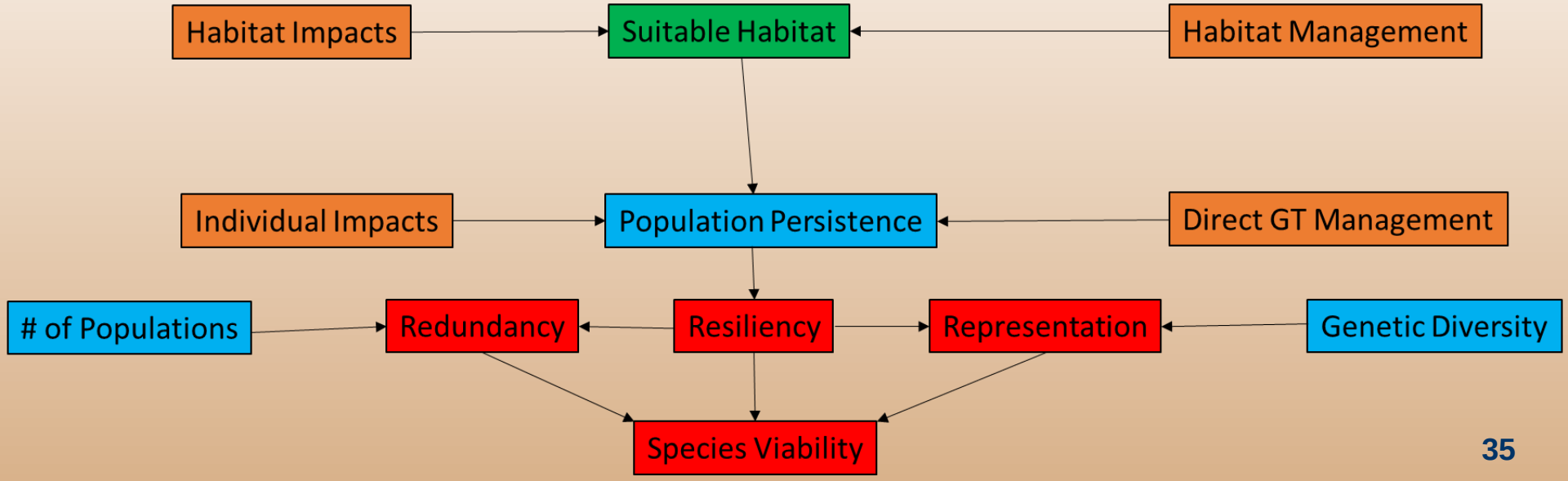
Population Summary: private lands

- 167 responses to the GT questionnaire
- 34 additional responses to FFA questionnaire



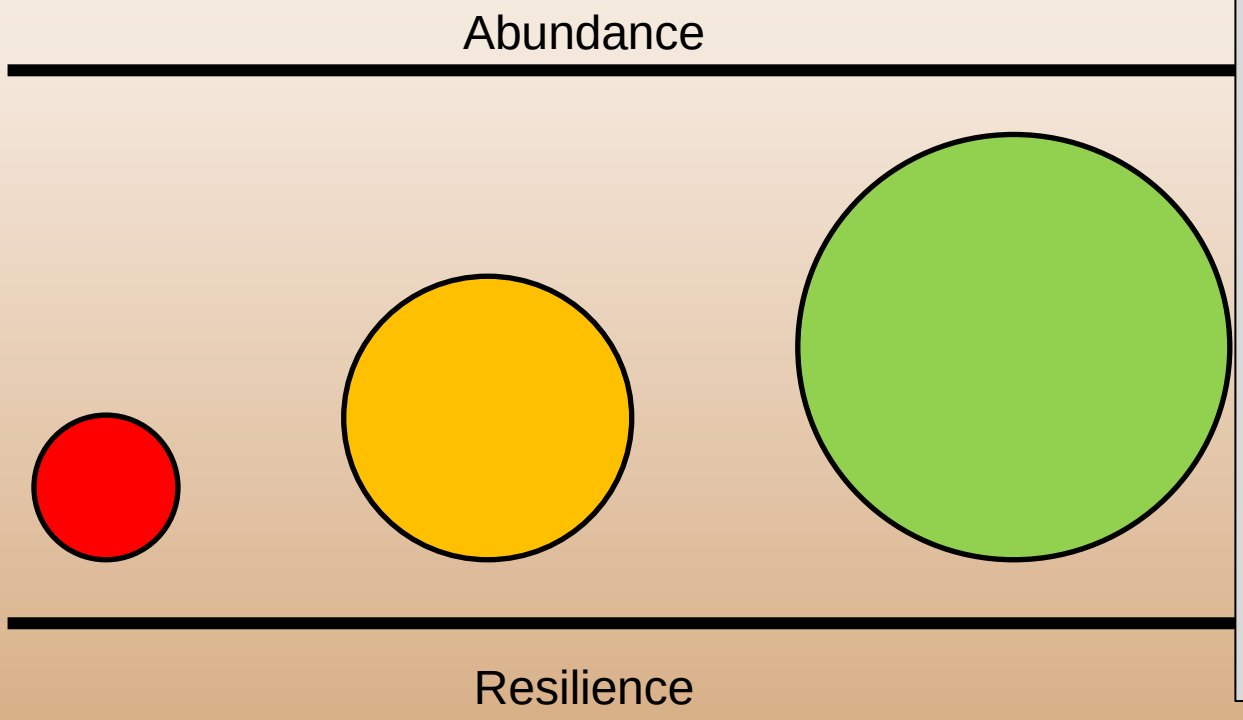
Current Resilience

- We summarize population, habitat, and management factors
- We assess current resilience based solely on abundance
- Current resilience results encompass spatial and county scale data (future analysis only uses spatial data)



Current Conditions: Population Factors

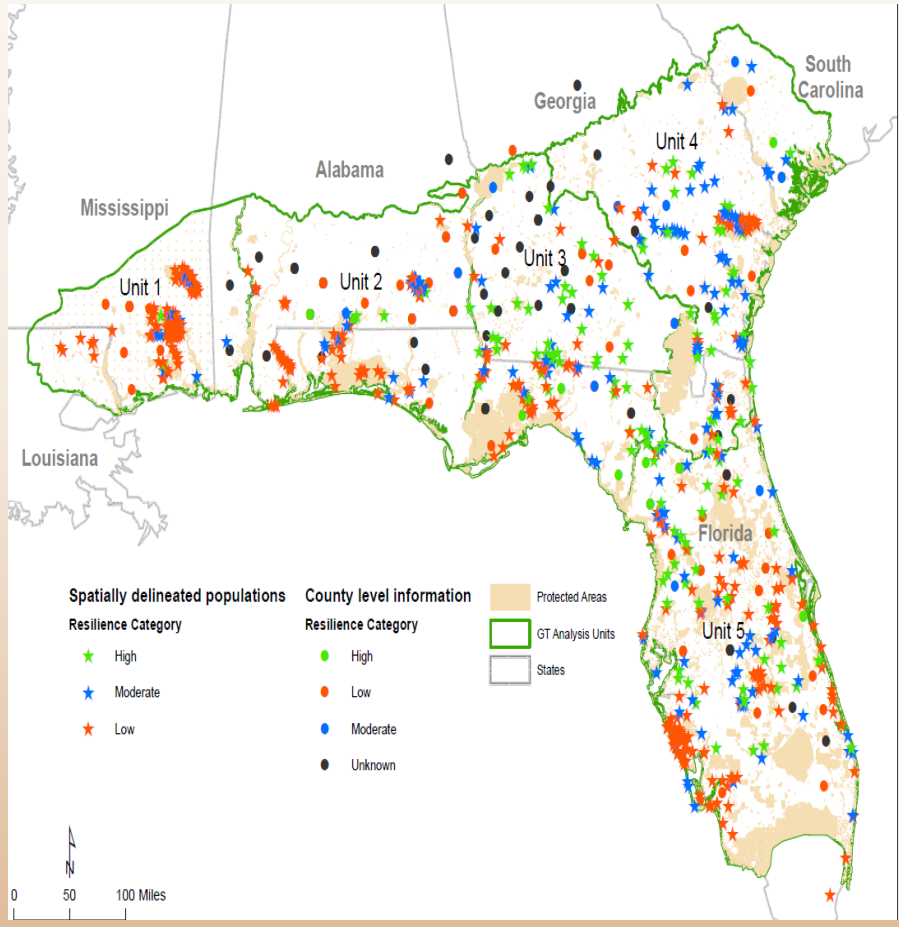
- Use of MVP to guide resilience categories
  - Low (<50 adults)
  - Moderate (50-249 adults)
  - High (250+ adults)



- **High**-local population **highly likely to persist** through a biologically appropriate time frame.
- **Moderate**-local population **likely to persist** for a long period of time under high-quality habitat conditions, although more vulnerable to stochastic disturbances compared to highly resilient populations.
- **Low**-local population **may persist** for a long period of time under high quality habitat conditions and **high levels of management**, but highly vulnerable to stochastic disturbance.

Current Resilience: results

- Spatially delineated populations
  - Total local populations—656
  - High resilience—127
  - Moderate resilience—169
  - Low resilience—360
- County scale (private lands)
  - Total local populations—167
  - High resilience—11
  - Moderate resilience—11
  - Low resilience—63
  - Unknown—82
  - 55% of properties report evidence of reproduction

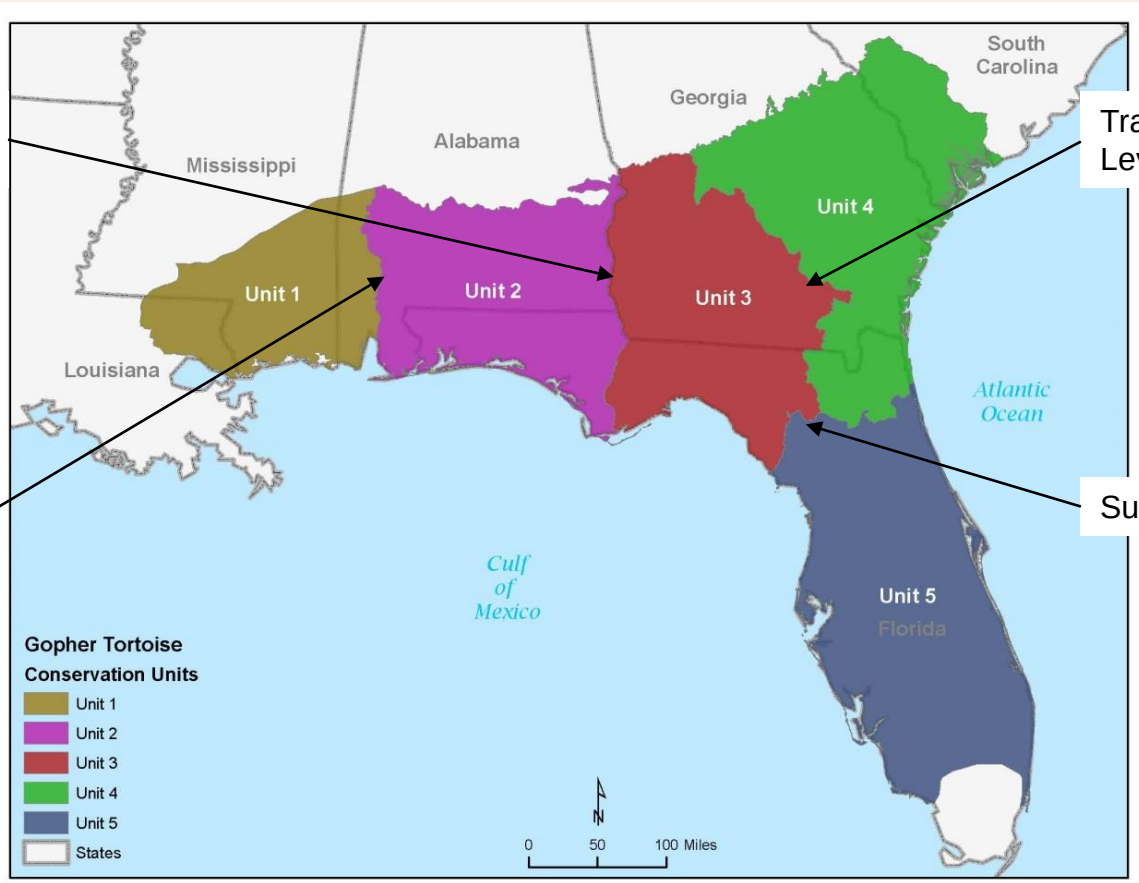


Delineating Representative Units

- Analysis Units: based on genetics, GT conservation units, and expert input

Apalachicola-Chattahoochee Rivers

Tombigbee-Mobile Rivers



Transitional zone between Level 4 ecoregions

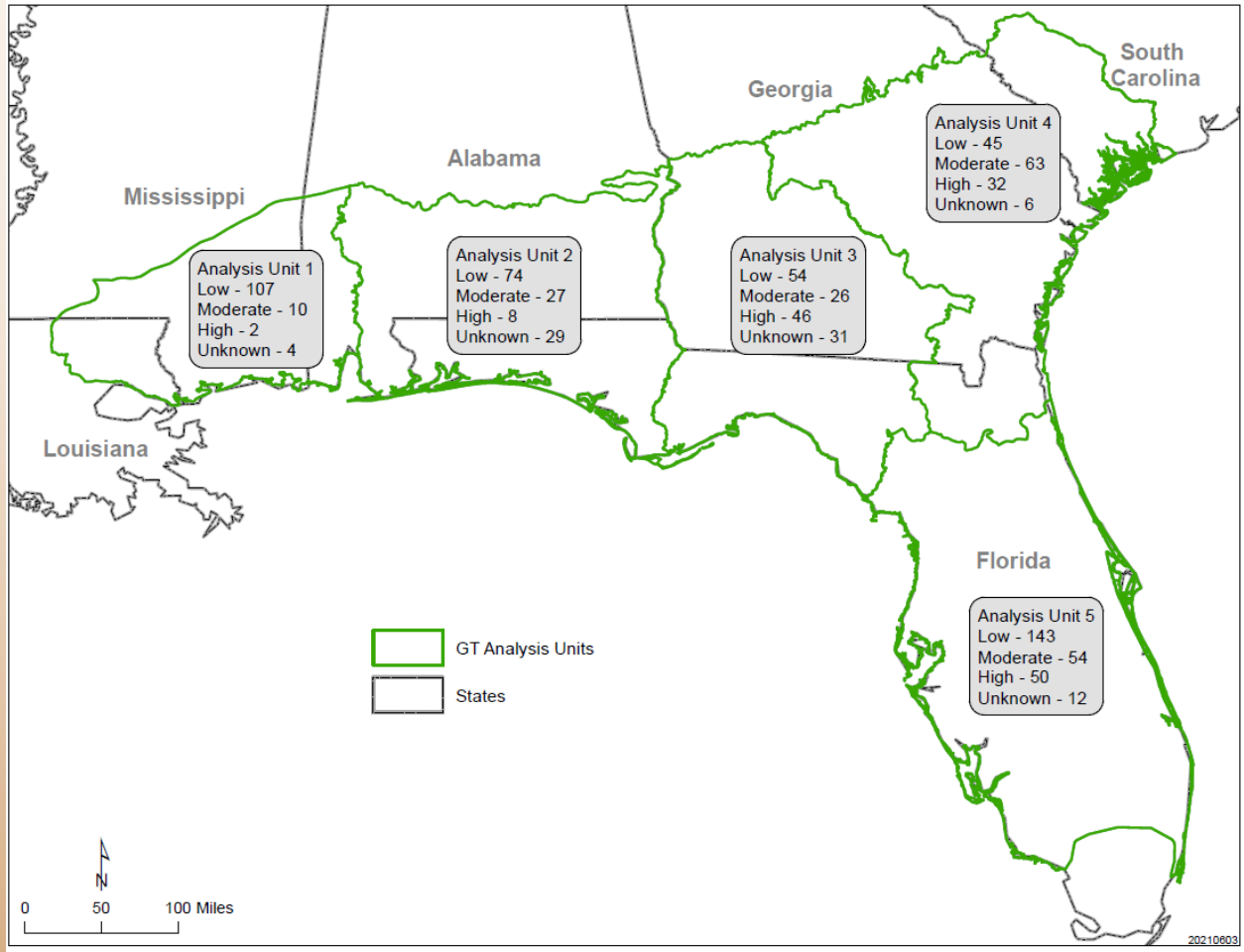
Suwanee River

Current Conditions: Representation & Redundancy

Distribution and resilience of populations across the range and within analysis units

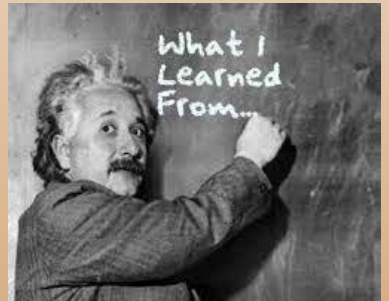
Resilience Moderate or High:

- Unit 1 = 11% (n = 123)
- Unit 2 = 33% (n = 138)
- Unit 3 = 42% (n = 157)
- Unit 4 = 26% (n = 146)
- Unit 5 = 22% (n = 259)



Take Home Messages

- Approx. 150,000 tortoises (range-wide) from 656 spatially delineated populations
- Data represent a subset of tortoises; lack of private lands
- There is a lot of potential GT habitat on the landscape
- Eastern and Core portions of the range are strongholds
- Western portion composed of small-isolated populations
  - Edge of range
  - Uncertainty in intervening habitat



Chapter 5: Future Conditions and Viability

Future Conditions

Predicting future population conditions across the species' range

- **Model demography** as specific to each population (geographic variation)
- Account for uncertainty by modeling **threats** with **scenarios**
- **Project population** forward in time and account for the **three Rs**:

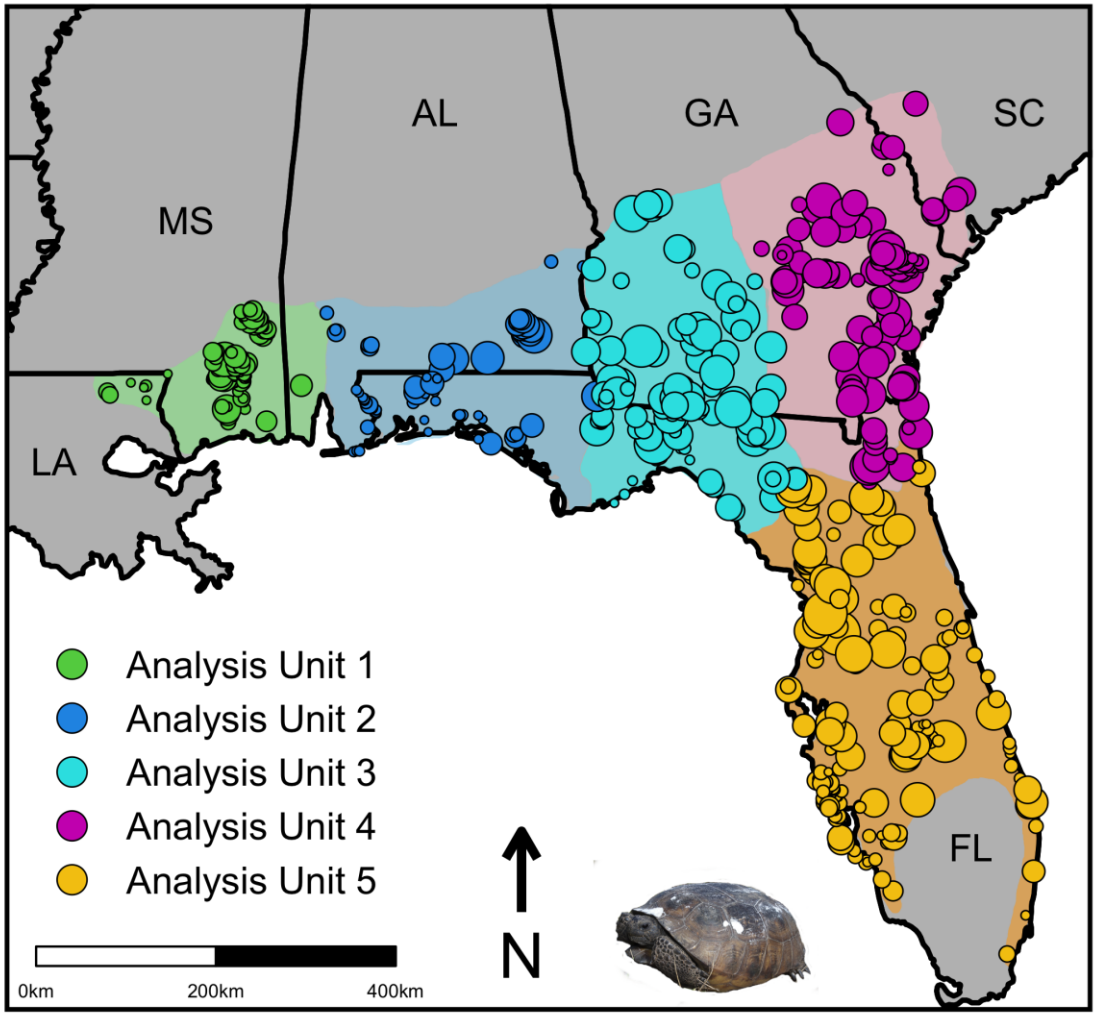
  - Estimate future **resiliency** (persistence) and **redundancy** (number of populations)

  - Account for **representation** by summarizing among the five genetic populations

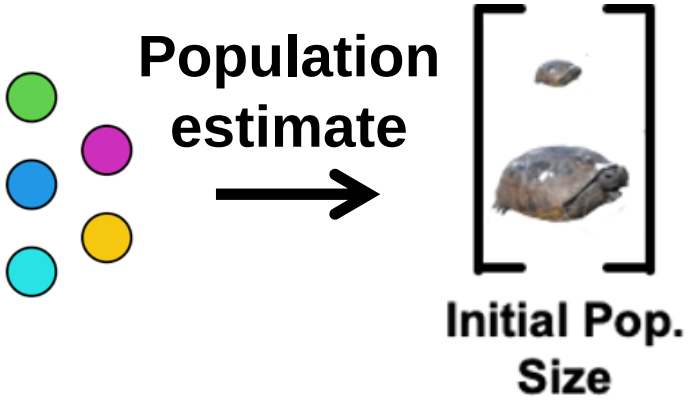
For each population, estimate local patterns of growth, reproduction, and survival.

Only spatially explicit data

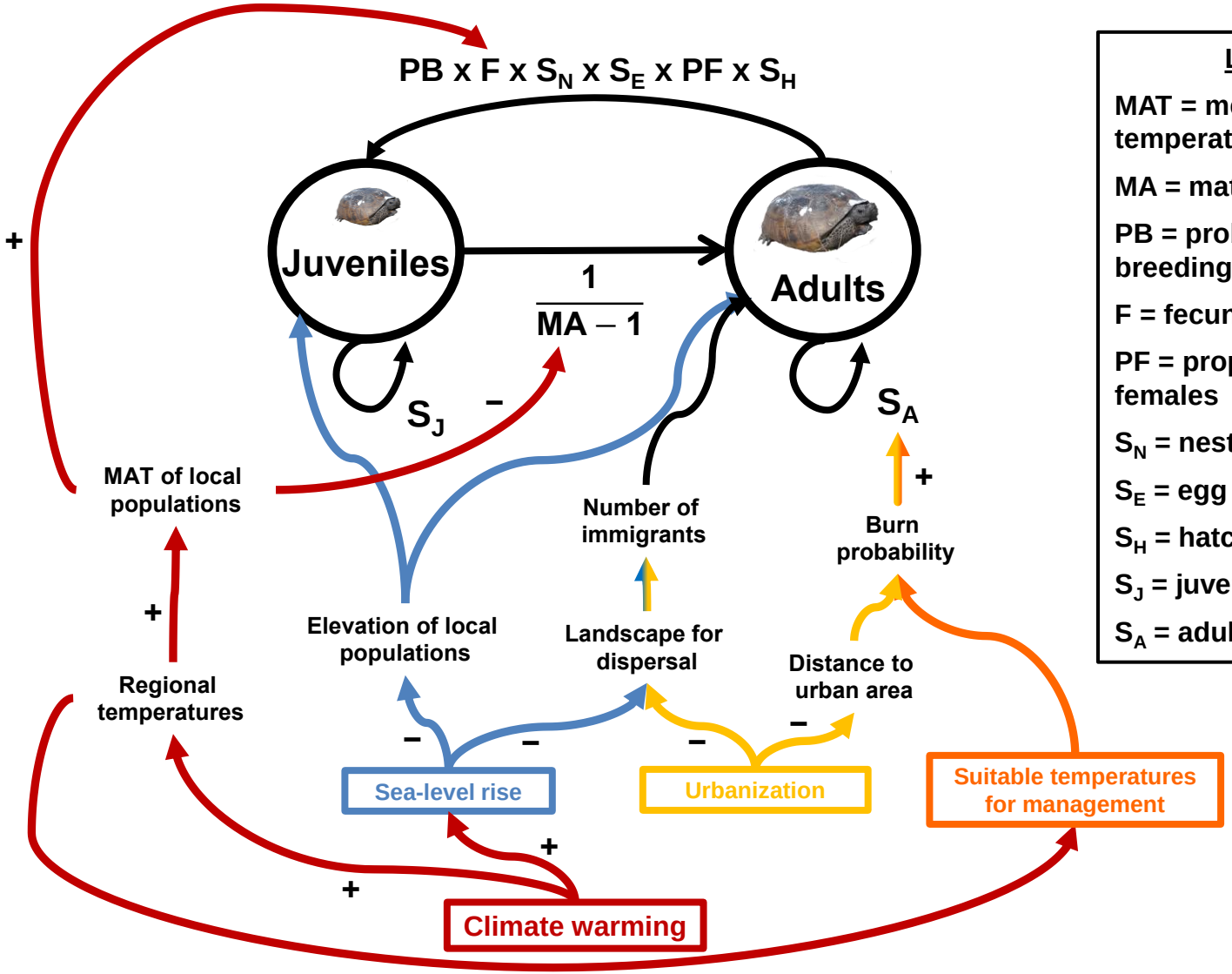
Initial Pop. Size



Demographic estimates by analysis unit



Scenarios



Legend

MAT = mean annual temperature (°C)

MA = maturity age

PB = probability of breeding

F = fecundity

PF = proportion of females

S_N = nest survival

S_E = egg survival

S_H = hatchling survival

S_J = juvenile survival

S_A = adult survival

Scenarios

Scenarios	Climate warming (°C)	Sea-level rise (m)	Urbanizat-ion	Habitat management	Immigration

IPCC 2013

NOAA sea-level rise model

SLEUTH urbanization model

Kupfer et al. (2020) predictions

Metrics

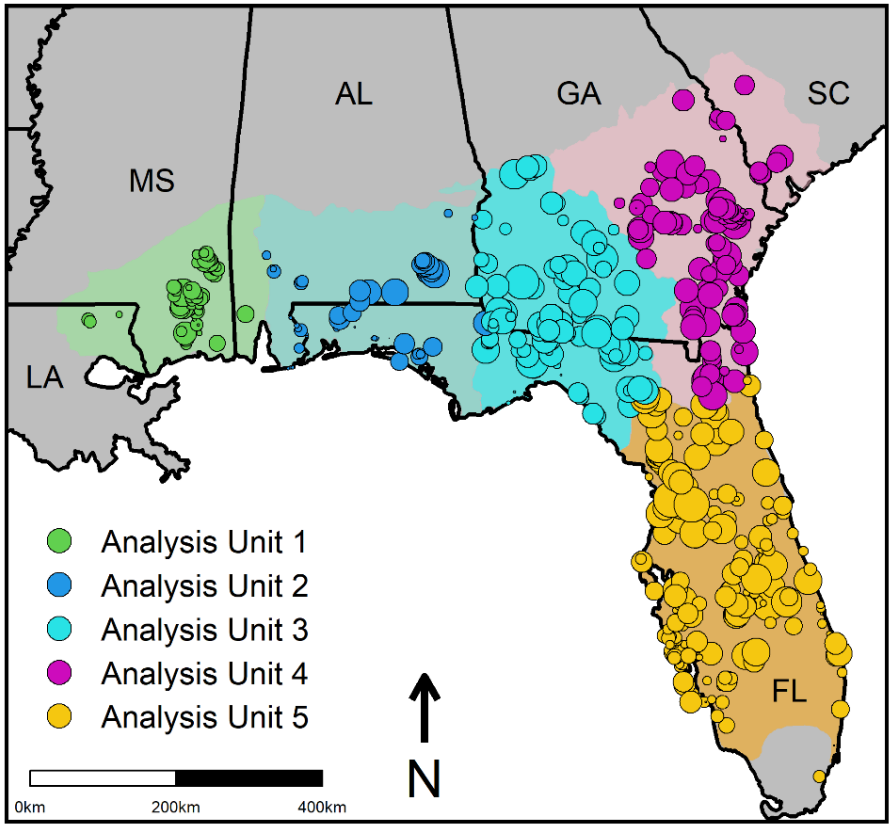
For each scenario, we estimated:

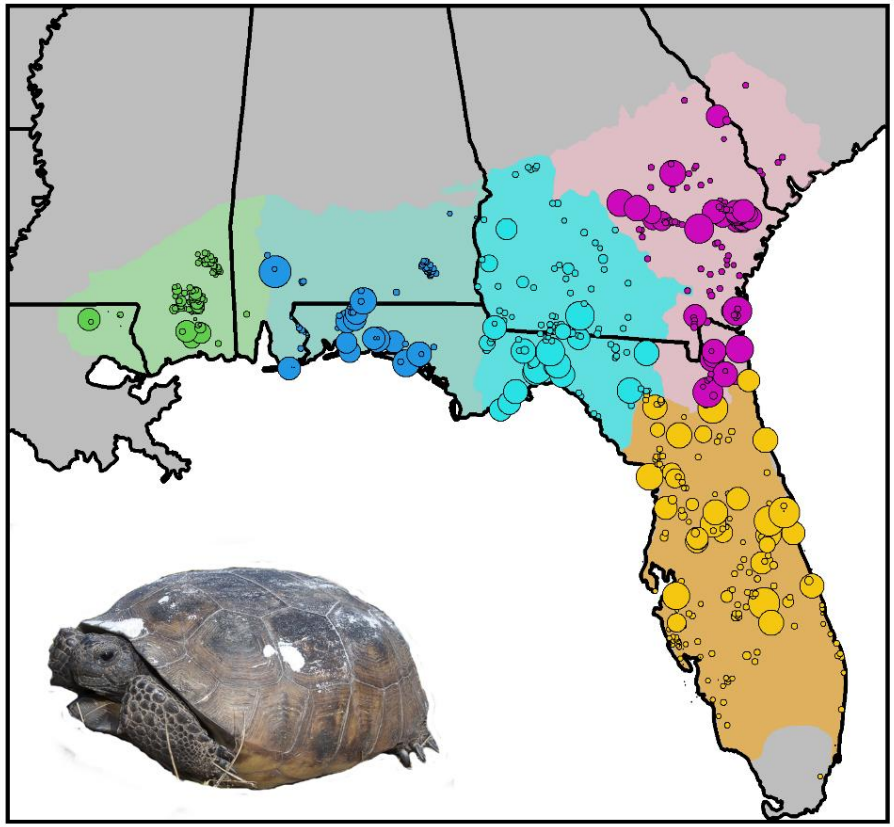
- The projected future number of **individuals**, **local populations**, and **landscape populations** 80 years in the future
- **Population growth (λ)**: whether the projected populations grew ($\lambda > 1.00$) or declined ($\lambda < 1.00$) over the 80-year projection interval
  - $\lambda = \frac{\textbf{Predicted population size 80 years in the future}}{\textbf{Current population size}}$
- **Persistence probability (P_p)**: the likelihood that local and landscape populations persist in the future
  - Extremely likely to persist ($P_p \geq 95\%$)
  - More likely than not to persist ($50\% < P_p \leq 75\%$)
  - Very likely to persist ($75\% < P_p \leq 95\%$)
  - Unlikely to persist ($P_p < 50\%$)

Results

Total number of individuals in local populations (log-scaled)

‘Less Management’ Scenario





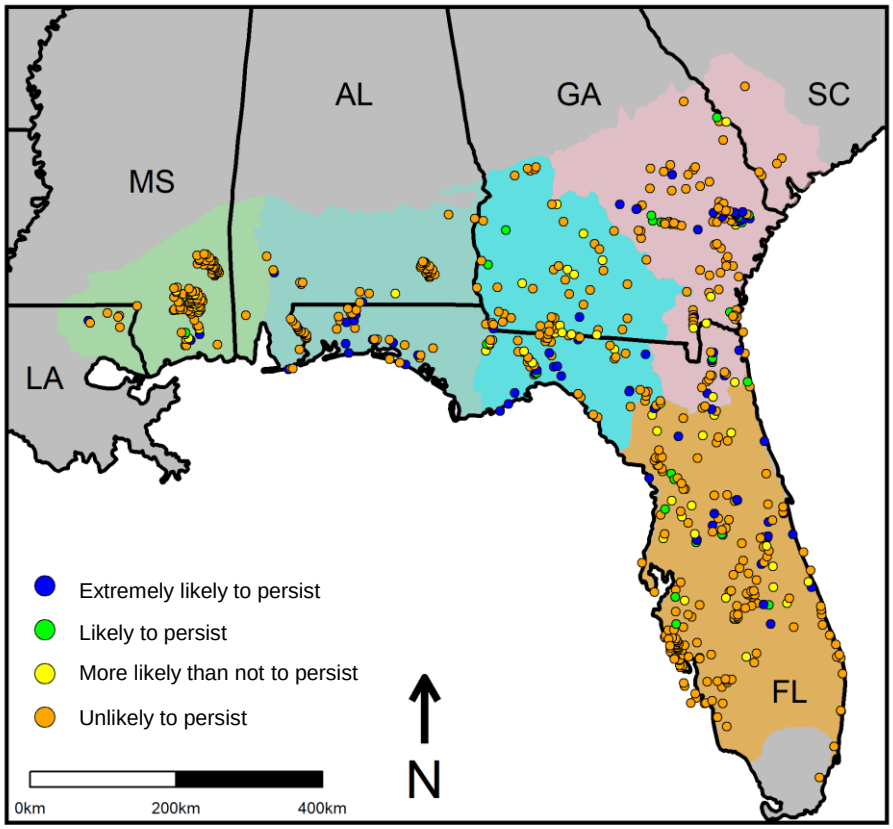
Current (2020)

Future (2100)

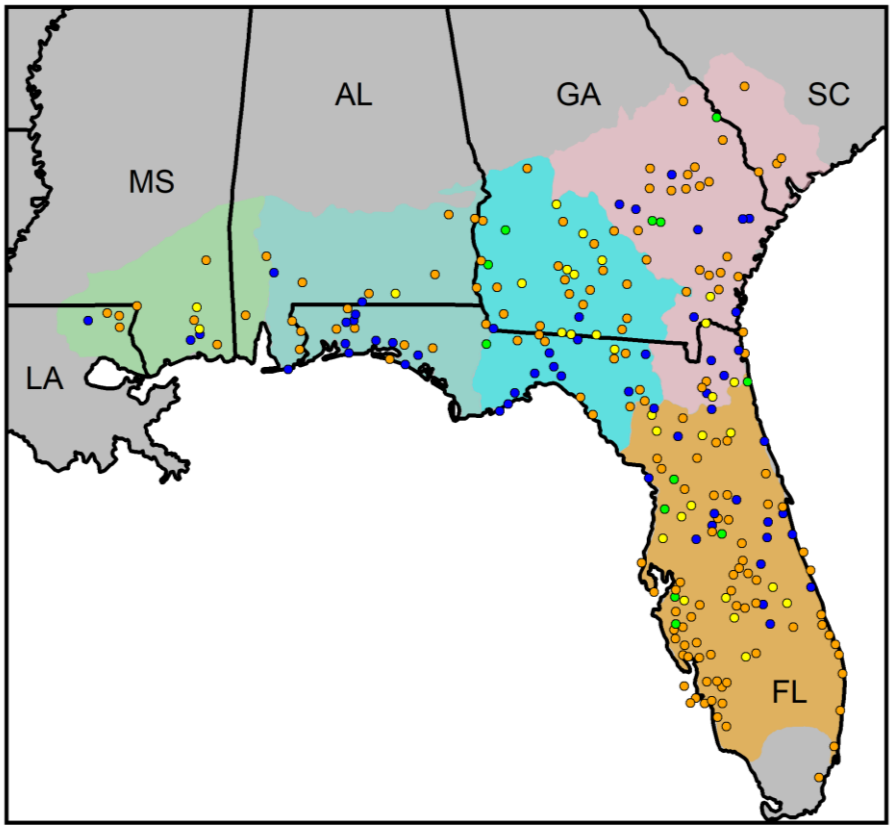
Results

Persistence probabilities (P_p) of local and landscape populations 80 years in the future

‘Less Management’ Scenario



Local populations (2100)



Landscape populations (2100)

Results

Regression analysis of how abiotic, biotic, and anthropogenic factors influenced persistence probability of local populations

- **Initial population size**: for each 50-individual increase, populations were 1.029 times as likely to persist
- **Habitat management**: with each categorical increase in management, populations were 1.021 times as likely to persist
- **Area**: for each 500-ha increase, populations were 1.002 times as likely to persist
- **Urbanization**: for each 0.1 proportion loss in landscape due to urbanization, populations were 0.96 times as likely to persist
- **Sea-level rise**: for each 0.01 proportion loss in landscape due to sea-level rise, populations were **0.57** times as likely to persist

Big Picture

- Most populations that were simulated had very small population sizes to begin with
- Larger populations persisted; some grew
- Resilience (overall decrease)
- Redundancy (significant decreases)
  - Lots of small “isolated” pops
- Representation (all units represented in future scenarios)

Other SSAs Conducted

Species	Complete	Reason for SSA
Southern Hognose Snake	2019	Not Warranted
Okaloosa Darter	2019	Proposed Delisting
Black Creek Crayfish	2020	Not Warranted
Gopher Tortoise	2021	Threatened/Not Warranted*
SCI paintbrush	2019	Reclassification
SCI lotus	2019	Reclassification
SCI Bell's sparrow	2019	Reclassification
SCI larkspur	2019	Reclassification
SCI bushmallow	2019	Reclassification

Benefits to DoD

- Increasing integration of DoD conservation and management of at-risk species in SSAs
  - TAMU facilitated the direct involvement of DoD staff into SSAs through inclusion on expert and core teams
- Better data/information→better listing and reclassification decisions
  - TAMU 100% focused on SSA product→more time invested in the science on the front end→more informed and defensible decisions
- Increased capacity→addressing backlog of 5-year reviews→de/down listings
  - Multiple delistings and not warranted decisions from contracted SSAs

Thank you!

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