







SOUTHEAST
REGIONAL
GAP ANALYSIS PROJECT

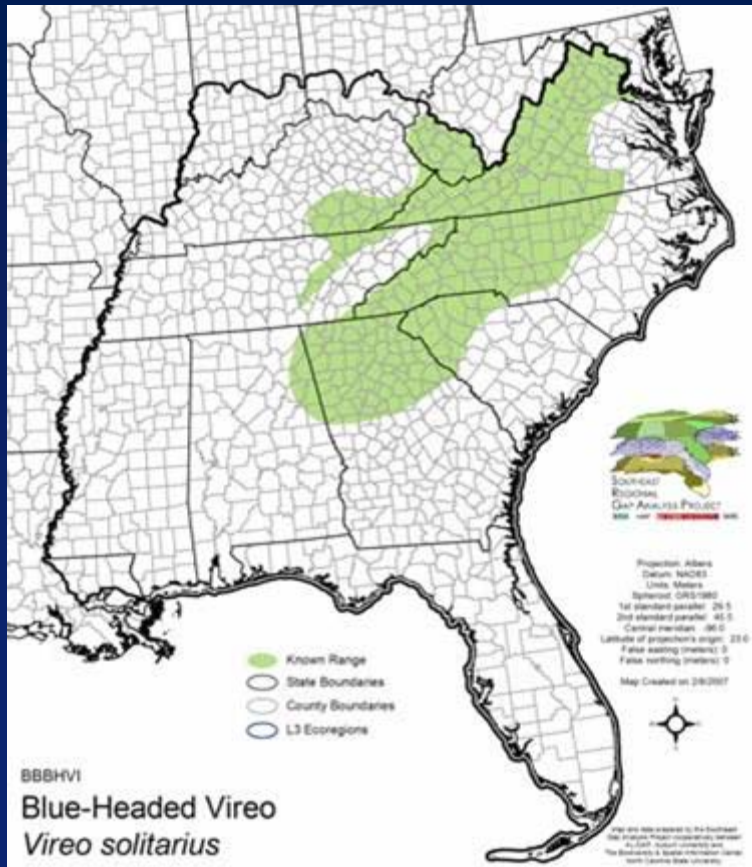
Process & Review: SE-GAP Avian Distribution Models for the Southeast



Vertebrate Data

- ◆ 608 Species (terrestrial)
 - 253 birds
- ◆ Known Range
- ◆ Predicted Habitat Models
- ◆ Presence/Absence Distribution Maps
- ◆ Knowledge Based Information

SE-GAP Known Range Maps



Habitat Text Review Form

Habitat Modeling Information

BaSIC/NC-GAP

AVIAN

BBDCCO

Phalacrocorax auritus

ABNFD01020

Double-crested Cormorant

Find
Record

Place cursor in field
for selection

Existing State Habitat Notes:

STATE: AL
Breeding:
Wintering:
General:
. Abundant in winter & during migration on the Gulf Coast; occasionally summers there as well. Considered rare inland since 1961. . NEAR SHORE . RIVER, BIG, LOW GRADIENT . DEEP WATER . FORESTED WETLAND, RIPARIAN . CLIFF, BARE ROCK/TALUS/SCREE . . STANDING SNAG/HOLLOW TREE

STATE: NC
Breeding:
Time of nesting varies geographically, with local variations, and among different years a particular colony. Nesting begins in winter in Florida, as late as early June in southern Alaska. Clutch size usually 1-7 (average typically 3 or 4). Incubation 24-33 days (average around 28-30), by both sexes in turn. Hatching success was 54-75% in three studies. Survival from hatching to fledging was 72-95% in two studies. First flight to water at about 35-42 days. Independent at about 9-10 weeks. Usually first breeds at 3 years, sometimes at 2 years, rarely at 1 year. Renesting following loss of clutch is fairly common. Nests mostly in colonies. See Johnsgard (1993) for further information.
Wintering:

Compiled Habitat Notes for the Region:

Scattered breeding colonies exist throughout the region but most often in coastal areas along estuaries, bays, inlets, swamps, lagoons, marine islands etc... Also occurs inland along large reservoir and lake shores and slow-moving rivers. Nests within mats of emergent vegetation as well as in trees in standing water of swamps and lake margins. Forages in shallow waters and roosts and loaf in/on trees, pier pilings, high-tension wires, typically within 30km of nesting sites. M. Rubino, 9nov04.

Edit Species by
Map Units

Edit Ancillary
Spatial

Open Range
Notes

Please Document Reviewer Name and Date (i.e. Steve Williams, 25feb03)

Record: 4 of 106

Select Species Above

Select Lab Below

Close Form

Record: 2 of 3

SE-GAP Land Cover Map Units

❖ Ecological Systems - NatureServe

- Matrix, Large Patch, and Linear Types
- Small patch on a case by case basis
- Includes “modifiers” to systems
- ~174 systems mapped

❖ Anthropogenic Classes

- Plantations, Clearcuts, Mines/Quarries
- Pasture/Hay, Row Crops
- Development, Open Space, Utility Swaths

Map Unit Selection (245 types)

Map Unit Selection

Filter Map Units By:

CLASS only:	SUB CLASS only:	MOISTURE:	LANDFORM:	ELEVATION:	PHYSIOGRAPHY only:	SPECIES COMP only:
BARE ROCK/SAND DECIDUOUS FOREST/WOODLAND DEVELOPED OPEN SPACE ESTUARINE EMERGENT WETLAND ESTUARINE FORESTED WETLAND ESTUARINE SHRUB/SCRUB WETLAND	Anthropogenic Bald Beach Bradish/Salt Bradish/Salt Tidal Coastal Dune	Dry to Dry Mesic Hydic Mesic Mesic to Xeric n/a Xeric	Bald Beach Bottomland Cliff Cove Flatrock	High Elevation Low Elevation Mid Elevation n/a	Appalachian Atlantic Coastal Plain Bluegrass Basin Central Florida Central Int. Highlands Cumberland	Alder-Willow Ash-Hickory Bayberry-Mountain Laurel Beach Grass Beech Birch-Maple

Empidonax virescens

Auxiliary Buffer: Distance:

Sub Functional Group:

MU:	Aux:	Map Unit Name:
<input type="checkbox"/>	<input type="checkbox"/>	Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Pasture/Hay
<input type="checkbox"/>	<input type="checkbox"/>	Successional Grassland/Herbaceous (Utility Swath)
<input type="checkbox"/>	<input type="checkbox"/>	Successional Grassland/Herbaceous (Other)
<input type="checkbox"/>	<input type="checkbox"/>	Successional Grassland/Herbaceous
<input type="checkbox"/>	<input type="checkbox"/>	Successional Shrub/Scrub (Other)
<input type="checkbox"/>	<input type="checkbox"/>	Successional Shrub/Scrub (Utility Swath)
<input type="checkbox"/>	<input type="checkbox"/>	Successional Shrub/Scrub (Clear Cut)
<input type="checkbox"/>	<input type="checkbox"/>	Developed Open Space
<input type="checkbox"/>	<input type="checkbox"/>	Bare Sand
<input type="checkbox"/>	<input type="checkbox"/>	Bare Soil
<input type="checkbox"/>	<input type="checkbox"/>	Quarry/Strip Mine/Gravel Pit
<input type="checkbox"/>	<input type="checkbox"/>	Evergreen Plantations
<input type="checkbox"/>	<input type="checkbox"/>	Deciduous Plantations
<input type="checkbox"/>	<input type="checkbox"/>	High Intensity Developed
<input type="checkbox"/>	<input type="checkbox"/>	Medium Intensity Developed
<input type="checkbox"/>	<input type="checkbox"/>	Low Intensity Developed
<input type="checkbox"/>	<input type="checkbox"/>	Central Appalachian Montane Rocky Bald - Herbaceous Modifier
<input type="checkbox"/>	<input type="checkbox"/>	Southern Appalachian Grass and Shrub Bald - Herbaceous Modifier
<input type="checkbox"/>	<input type="checkbox"/>	Southern Appalachian Grass and Shrub Bald - Shrub Modifier
<input type="checkbox"/>	<input type="checkbox"/>	Central Appalachian Montane Rocky Bald - Shrub Modifier
<input type="checkbox"/>	<input type="checkbox"/>	Atlantic Coastal Plain Northern Sandy Beach
<input type="checkbox"/>	<input type="checkbox"/>	Southwest Florida Beach
<input type="checkbox"/>	<input type="checkbox"/>	Southeast Florida Beach
<input type="checkbox"/>	<input type="checkbox"/>	South Florida Shell Hash Beach
<input type="checkbox"/>	<input type="checkbox"/>	Atlantic Coastal Plain Southern Beach

Map Unit Descriptions: FL GA KY MS NC SC TN VA WV

Records: 1 of 243 (Filtered)

Close Form

Map Unit Selection (245 types)

The screenshot displays the 'Map Unit Selection' window with the following components:

- Filter Map Units By:**
 - CLASS only:** BARE ROCK/SAND, DECIDUOUS FOREST/WOODLAND, DEVELOPED OPEN SPACE, ESTUARINE EMERGENT WETLAND, ESTUARINE FORESTED WETLAND, ESTUARINE SHRUB/SCRUB WETLAND
 - SUB CLASS only:** Anthropogenic, Bald, Beach, Brackish/Salt, Brackish/Salt Tidal, Coastal Dune
 - MOISTURE:** Dry to Dry Mesic, Hydric, Mesic, Mesic to Xeric, n/a, Xeric
 - LANDFORM:** (empty)
 - ELEVATION:** (empty)
 - PHYSIOGRAPHY only:** (empty)
 - SPECIES COMP only:** (empty)
- Species:** *Empidonax virescens*
- Auxiliary Buffer:** A dropdown menu with a distance input field.
- Map:** A satellite-style map showing a coastal area with various land units overlaid in different colors.
- Map Unit List:**

MU:	Aux:	Map Unit Name
<input type="checkbox"/>	<input type="checkbox"/>	Row Crop
<input type="checkbox"/>	<input type="checkbox"/>	Pasture/Hay
<input type="checkbox"/>	<input type="checkbox"/>	Successional Gr...
<input type="checkbox"/>	<input type="checkbox"/>	...
<input type="checkbox"/>	<input type="checkbox"/>	Anthropogenic Urban
<input type="checkbox"/>	<input type="checkbox"/>	Anthropogenic Urban
<input type="checkbox"/>	<input type="checkbox"/>	Anthropogenic Urban
<input type="checkbox"/>	<input type="checkbox"/>	Bald
<input type="checkbox"/>	<input type="checkbox"/>	Bald
<input type="checkbox"/>	<input type="checkbox"/>	Bald
<input type="checkbox"/>	<input type="checkbox"/>	Bald
<input type="checkbox"/>	<input type="checkbox"/>	Beach
<input type="checkbox"/>	<input type="checkbox"/>	Atlantic Coastal Plain Northern Sandy Beach
<input type="checkbox"/>	<input type="checkbox"/>	Southwest Florida Beach
<input type="checkbox"/>	<input type="checkbox"/>	Southeast Florida Beach
<input type="checkbox"/>	<input type="checkbox"/>	South Florida Shell Hash Beach
<input type="checkbox"/>	<input type="checkbox"/>	Beach
<input type="checkbox"/>	<input type="checkbox"/>	Atlantic Coastal Plain Southern Beach
- Map Unit Descriptions:** FL, GA, KY, MS, NC, SC, TN, VA, WV
- Records:** 1 of 243 (Filtered)
- Buttons:** Close Form

Map Unit Selection (245 types)

The screenshot displays the 'Map Unit Selection' window. At the top, there are filter categories: CLASS only, SUB CLASS only, MOISTURE, LANDFORM, ELEVATION, PHYSIOGRAPHY only, and SPECIES COMP only. A species filter for *Empidonax-virescens* is active. Below the filters is a map showing a landscape with red and yellow patches. A red-bordered box highlights a section of the interface with the following elements:

- Auxiliary Buffer: [Dropdown menu]
- Distance: [Input field]
- MU: Aux: Map Unit Name
- Legend items:
 - Row Crop
 - Pasture/Hay
 - Successional Gr

Below the legend is a list of map units with checkboxes and names:

- Anthropogenic Urban
- Anthropogenic Urban
- Anthropogenic Urban
- Bald
- Bald
- Bald
- Bald
- Beach
- Beach
- Beach
- Beach
- Beach
- Beach

At the bottom, there are state selection buttons (FL, GA, KY, MS, NC, SC, TN, VA, WV), a 'Close Form' button, and a record count: 'Records: 1 of 243 (Filtered)'.

Ancillary Data Form

Ancillary Data Parameters x

Sistrurus miliarius Pygmy Rattlesnake

Land Cover Derivatives

Patch Size

Contiguous: hectares

Min. Size: hectares

Buffer In: meters

Buffer From: meters

NonContiguous: % in hectares

Edge

Edge Type:

Buffer Values:

Ecotone Width: meters

Hydrography

Type/Buffer

Type:	Buffer From:	Buffer Into:
<input type="checkbox"/> Flowing Water	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Open/Standing Water	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> Wet Vegetation	<input type="text"/>	<input type="text"/>

Salinity

Type:

Stream Flow

Min: Max:

Accumulation:

Velocity:

Road Density/Urban Avoid Mask

Level:

Elevation

Minimum: meters

Maximum: meters

Landforms

<input type="checkbox"/> Cliffs	<input type="checkbox"/> Coves/Draws
<input type="checkbox"/> Steep Slopes	<input type="checkbox"/> Dry Flats
<input type="checkbox"/> Slope Crests	<input type="checkbox"/> Moist Flats
<input type="checkbox"/> Upper Slopes	<input type="checkbox"/> Wet Flats
<input type="checkbox"/> Flat Summits	<input type="checkbox"/> Slope Bottoms
<input type="checkbox"/> Side Slopes	

Modeling Notes:

Check here if this species requires modeling by hand

View State Modeling Criteria

Close Form

Ancillary Data Form

LAND COVER DERIVATIVES

Patch Size

Contiguous:
Size, Buffers

NonContiguous:
% in X area

The image shows a software interface for configuring parameters for a Pygmy Rattlesnake model. The main window is titled "Ancillary Data Parameters" and "Sistrurus miliarius". It features several tabs: "Land Cover Derivatives" (highlighted in yellow), "Hydrography", and "Road Density/Urban Avoid Mask". The "Land Cover Derivatives" section is divided into "Patch Size" and "Edge" sub-sections. The "Patch Size" section includes options for "Contiguous" and "NonContiguous" patch types, with input fields for "Min. Size" (in hectares), "Buffer In" (in meters), and "Buffer From" (in meters). The "Edge" section includes a dropdown for "Edge Type", a "Buffer Values" field, and an "Ecotone Width" (in meters). Below the "Patch Size" section are two buttons: "View State Modeling Criteria" and "Close Form". A larger, semi-transparent version of the "Land Cover Derivatives" form is overlaid on the right side of the image, showing additional sections: "Forest Interior (static)" with a "Forest/Non-Forest Use" dropdown and a "Buffer Distance from Forest Edge" (in meters) field, and a "Graphic Example" button.



Ancillary Data Parameters
Sistrurus miliarius Pygmy Rattlesnake
Land Cover Derivatives Hydrography Road Density/Urban Avoid Mask



Ancillary Data Form

LAND COVER DERIVATIVES

Patch Size

Contiguous:
Size, Buffers

NonContiguous:
% in X area

50ha minimum contiguous patch



Ancillary Data Parameters
Sistrurus miliarius Pygmy Rattlesnake
Land Cover Derivatives Hydrography Road Density/Urban Avoid Mask

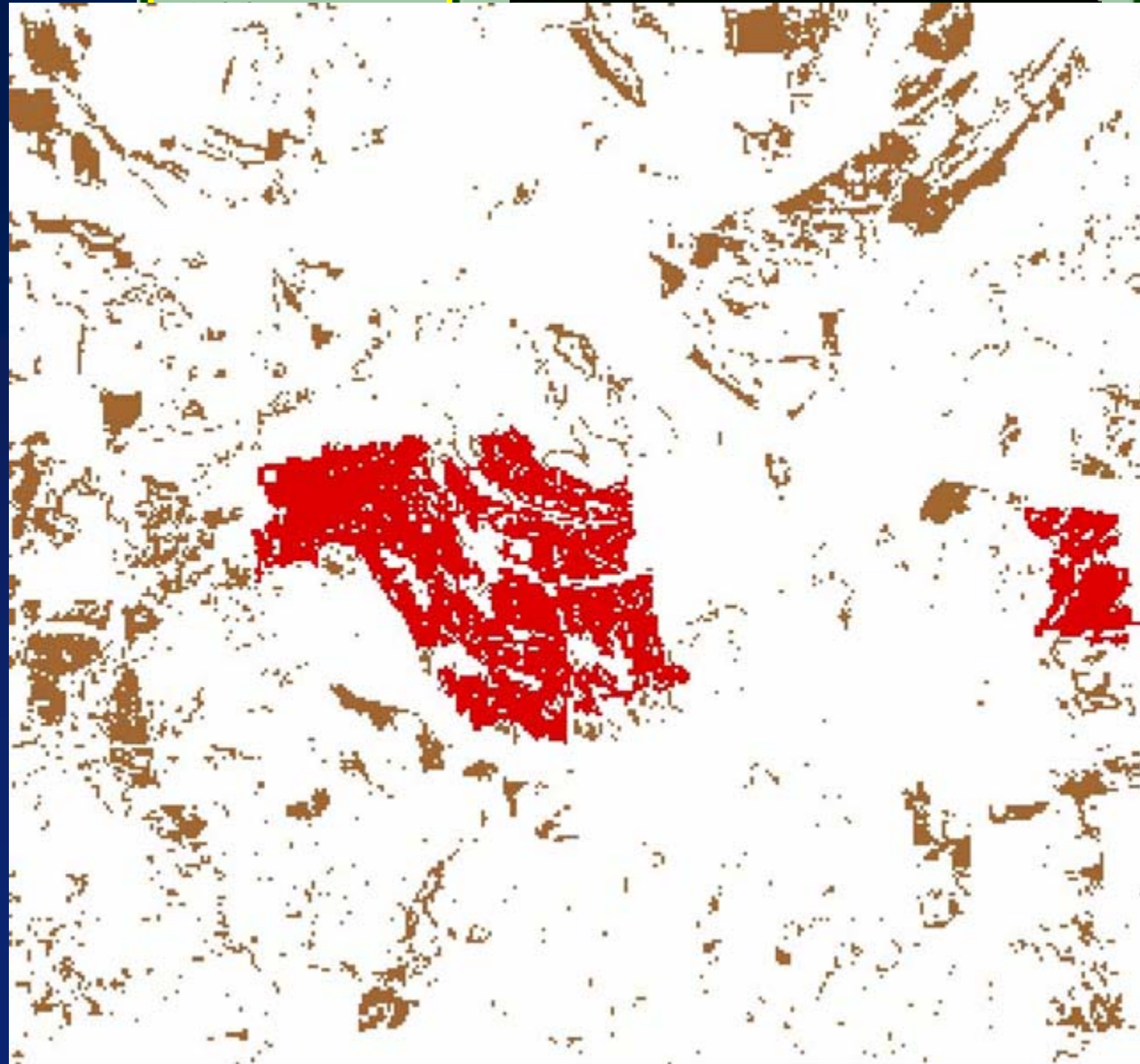
Ancillary Data Form

LAND COVER DERIVATIVES

Patch Size

Contiguous:
Size, Buffers

NonContiguous:
% in X area



50ha minimum contiguous patch

Ancillary Data Form

LAND COVER DERIVATIVES

Patch Size

Contiguous:
Size, Buffers

NonContiguous:
% in X area

Edge

Edge Type:
Forest/Open Ecotone Only
F/O + Shrubland/Woodland

Forest Interior

The image shows a software interface titled "Ancillary Data Parameters" for "Sistrurus miliarius" (Pygmy Rattlesnake). The "Land Cover Derivatives" section is highlighted with a yellow border. This section contains two sub-sections: "Patch Size" and "Edge".

Patch Size

- Contiguous:
 - Min. Size: [] hectares
 - Buffer In: [] meters
 - Buffer From: [] meters
- NonContiguous:
 - [] % in [] hectares

Edge

- Edge Type: []
- Buffer Values: []
- Ecotone Width: [] meters

Buttons: "View State Modeling Criteria", "Close Form"

Other sections visible:

- Hydrography**
- Road Density/Urban Avoid Mask**
- Land Cover Derivatives (detailed view):**
 - Contiguous:
 - Min. Size: [] hectares
 - Buffer In: [] meters
 - Buffer From: [] meters
 - NonContiguous:
 - [] % in [] hectares
- Edge (detailed view):**
 - Edge Type: []
 - Buffer Values: []
 - Ecotone Width: [] meters
- Forest Interior (static)**
 - Forest/Non-Forest Use: []
 - Buffer Distance from Forest Edge: [] meters
 - Graphic Example

Ancillary Data Form

HYDROGRAPHY

Type/Buffer

Buffer distances:

30, 60, 120, 250, 500,
1000, 2000, 4000, >4k

Salinity

Type:

Freshwater Only

Brackish/Saltwater Only

Stream Flow

Velocity:

Fast Only, Slow Only

Ancillary Data Parameters
Sistrurus miliarius
Pygmy Rattlesnake

Land Cover Derivatives

Patch Size

Contiguous:
Min. Size: [] hectares
Buffer In: [] meters
Buffer From: [] meters

NonContiguous:
[] % in []

Edge

Edge Type: []
Buffer Values: []
Ecotone Width: []

Hydrography

Type/Buffer

Type:	Buffer From:	Buffer Into:
<input type="checkbox"/> Flowing Water	[]	[]
<input type="checkbox"/> Open/Standing Water	[]	[]
<input type="checkbox"/> Wet Vegetation	[]	[]

Salinity

Type: []

Stream Flow

Min: [] Max: []

Accumulation: [] []

Velocity: []

Road Density/Urban Avoid Mask

Level: []

Elevation

Minimum: [] meters
Maximum: [] meters

es/Draws
Flats
st Flats
t Flats
pe Bottoms

View Sta
Modeling C
Close Fo

Ancillary Data Form

ROAD DENSITY /
URBAN AVOID MASK

Level:
Low, Medium, High

ELEVATION

LANDFORMS

Ancillary Data Parameters
Sistrurus miliarius Pygmy Rattlesnake

Land Cover Derivatives

Patch Size

Contiguous:
Min. Size: [] hectares
Buffer In: [] meters
Buffer From: [] meters

NonContiguous:
[] % in []

Edge

Edge Type: []
Buffer Values: []
Ecotone Width: []

Hydrography

Type/Buffer

Type	Buffer From	Buffer Into
<input type="checkbox"/> Flowing Water	[]	[]
<input type="checkbox"/> Open/Standing Water	[]	[]
<input type="checkbox"/> Wet Vegetation	[]	[]

Road Density/Urban Avoid Mask

Level: []

Elevation

Minimum: [] meters
Maximum: [] meters

Landforms

<input type="checkbox"/> Cliffs	<input type="checkbox"/> Coves/Draws
<input type="checkbox"/> Steep Slopes	<input type="checkbox"/> Dry Flats
<input type="checkbox"/> Slope Crests	<input type="checkbox"/> Moist Flats
<input type="checkbox"/> Upper Slopes	<input type="checkbox"/> Wet Flats
<input type="checkbox"/> Flat Summits	<input type="checkbox"/> Slope Bottoms
<input type="checkbox"/> Side Slopes	

Road Density/Urban Avoid Mask

Level: []

Elevation

Minimum: [] meters
Maximum: [] meters

Landforms

<input type="checkbox"/> Coves/Draws
<input type="checkbox"/> Dry Flats
<input type="checkbox"/> Moist Flats
<input type="checkbox"/> Wet Flats
<input type="checkbox"/> Slope Bottoms

View State Modeling Crit
Close Form

Ancillary Data Form

MODELING NOTES

Ancillary Data Parameters
Bufo americanus American Toad

Land Cover Derivatives

Patch Size
 Contiguous:
Min. Size: hectares
Buffer In: meters
 NonContiguous:
 % in hectares

Edge
Edge Type:
Buffer Values:
Ecotone Width: meters
From Patch: meters

Forest Canopy Closure
Minimum: percent
Maximum: percent

Hydrography

Type/Buffer
Type: Buffer From: Buffer Into:
 Flowing Water
 Open/Standing Water
 Wet Vegetation

Salinity
Type:

Stream Flow Min: Max:
Accumulation:
Velocity:

Road Density/Urban Avoid Mask
Level:

Elevation
Minimum: meters
Maximum: meters

Landforms
 Cliffs
 Steep Slopes
 Slope Crests
 Upper Slopes
 Flat Summits
 Side Slopes
 Coves/Draws
 Dry Flats
 Moist Flats
 Wet Flats
 Slope Bottoms

Modeling Notes:
 Check here if this species requires modeling by hand

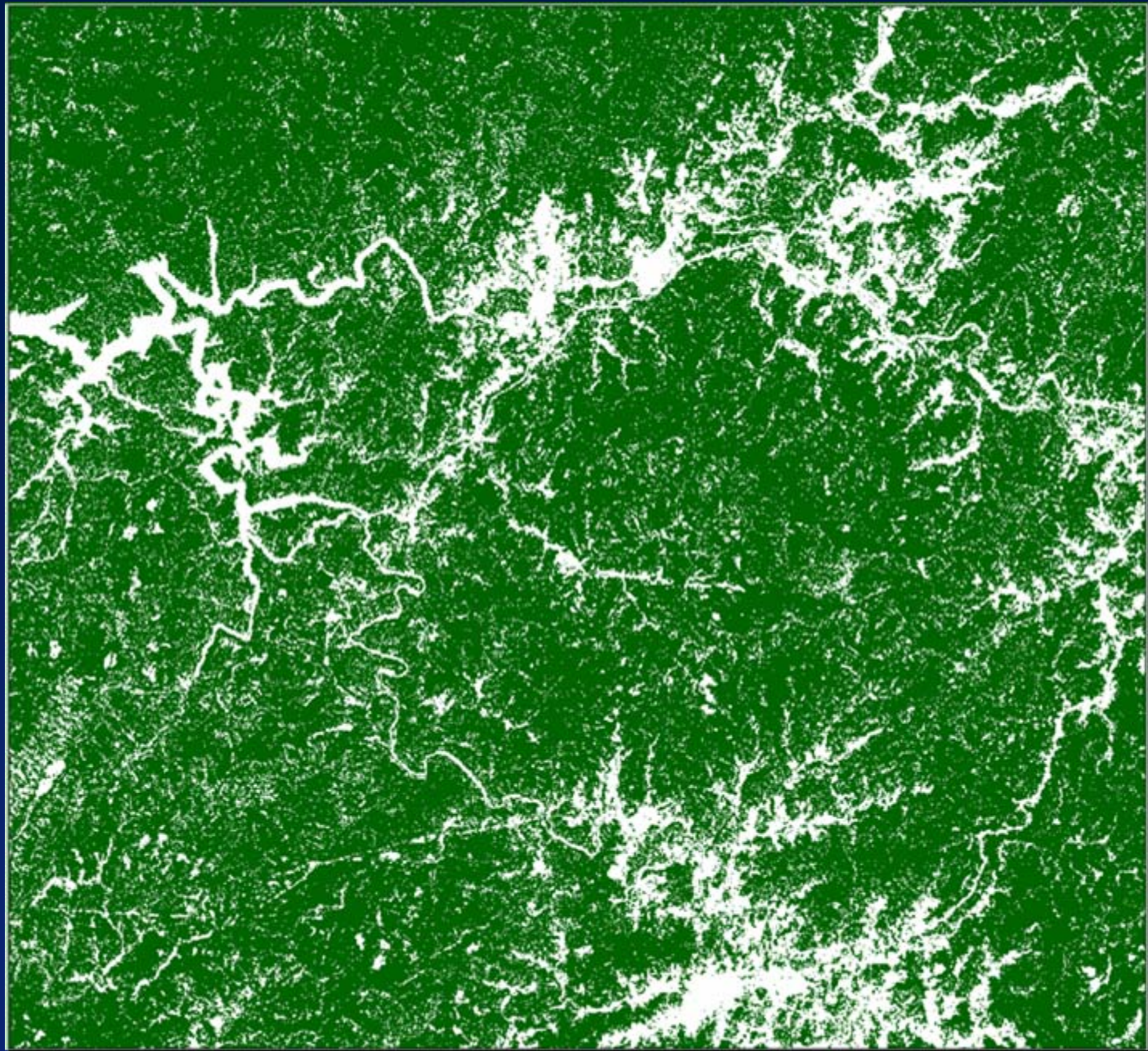
Modeling Notes:

Check here if this species requires modeling by hand



Acadian
Flycatcher
*Epidonax
virescens*

Appropriate
Vegetation
(forested map
units)

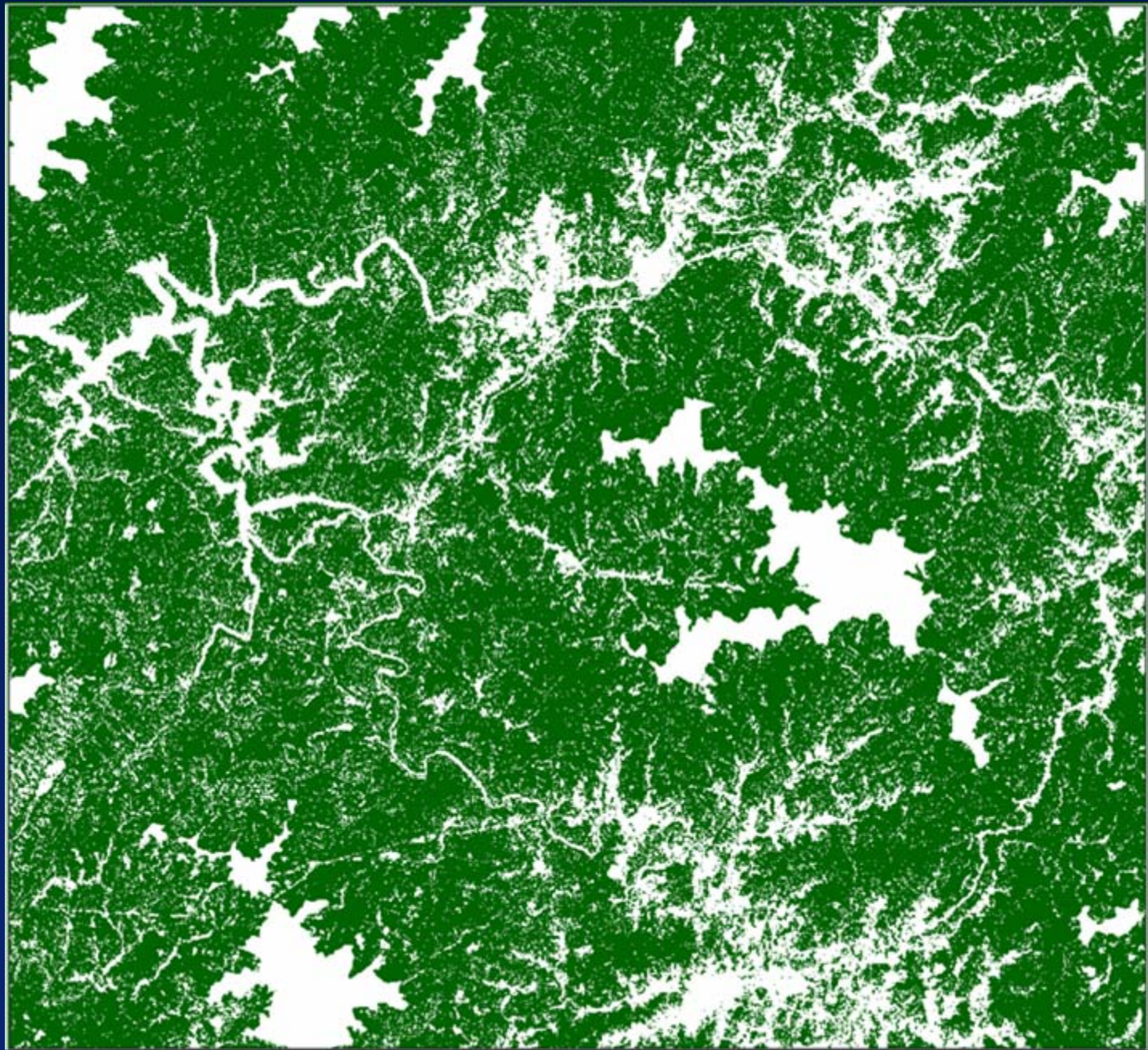




Acadian
Flycatcher
*Epidonax
virescens*

Appropriate
Vegetation
(forested map
units)

Elevation
Mask
($< 4000'$)

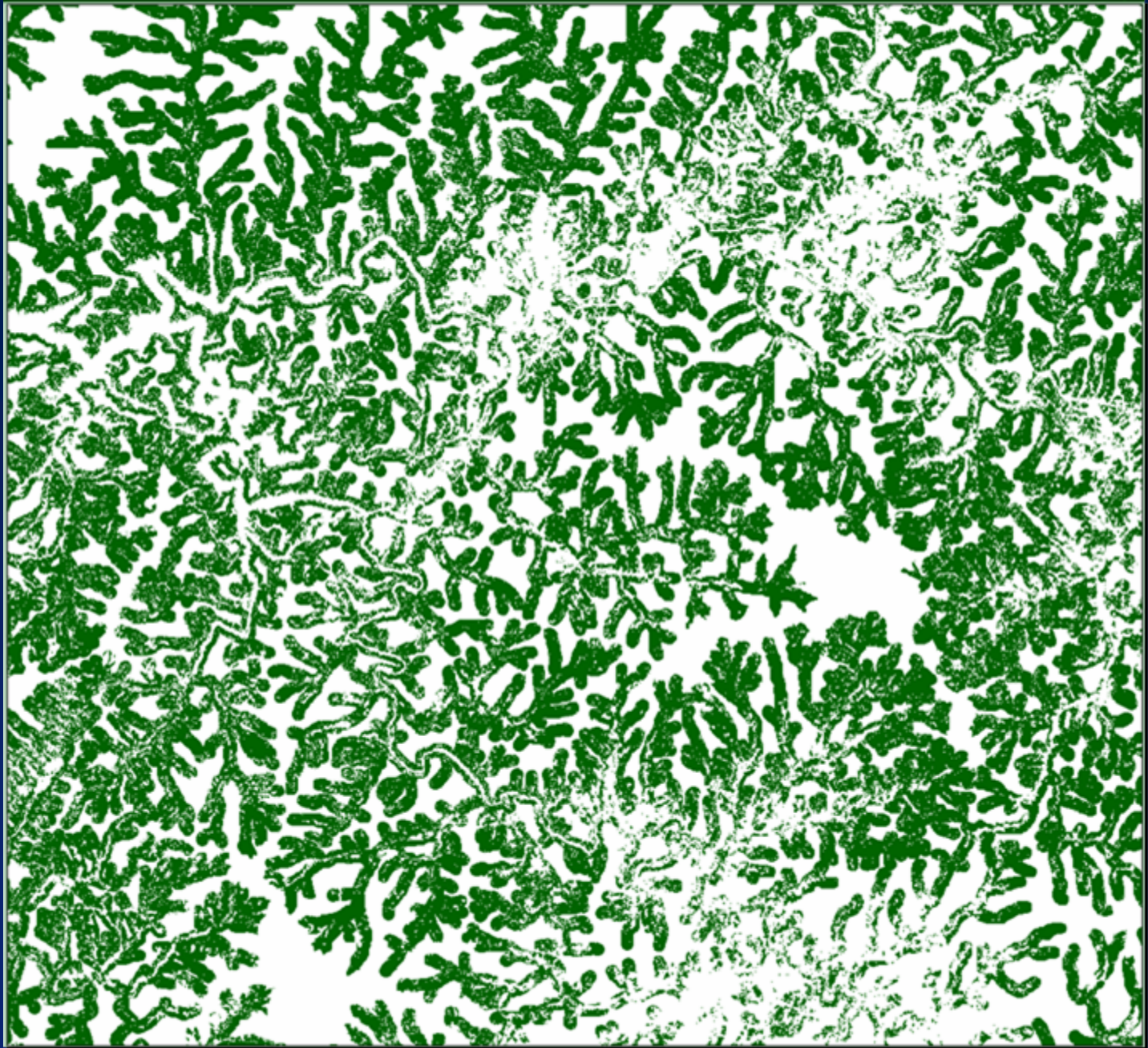


Acadian
Flycatcher
*Epidonax
virescens*

Appropriate
Vegetation
(forested map
units)

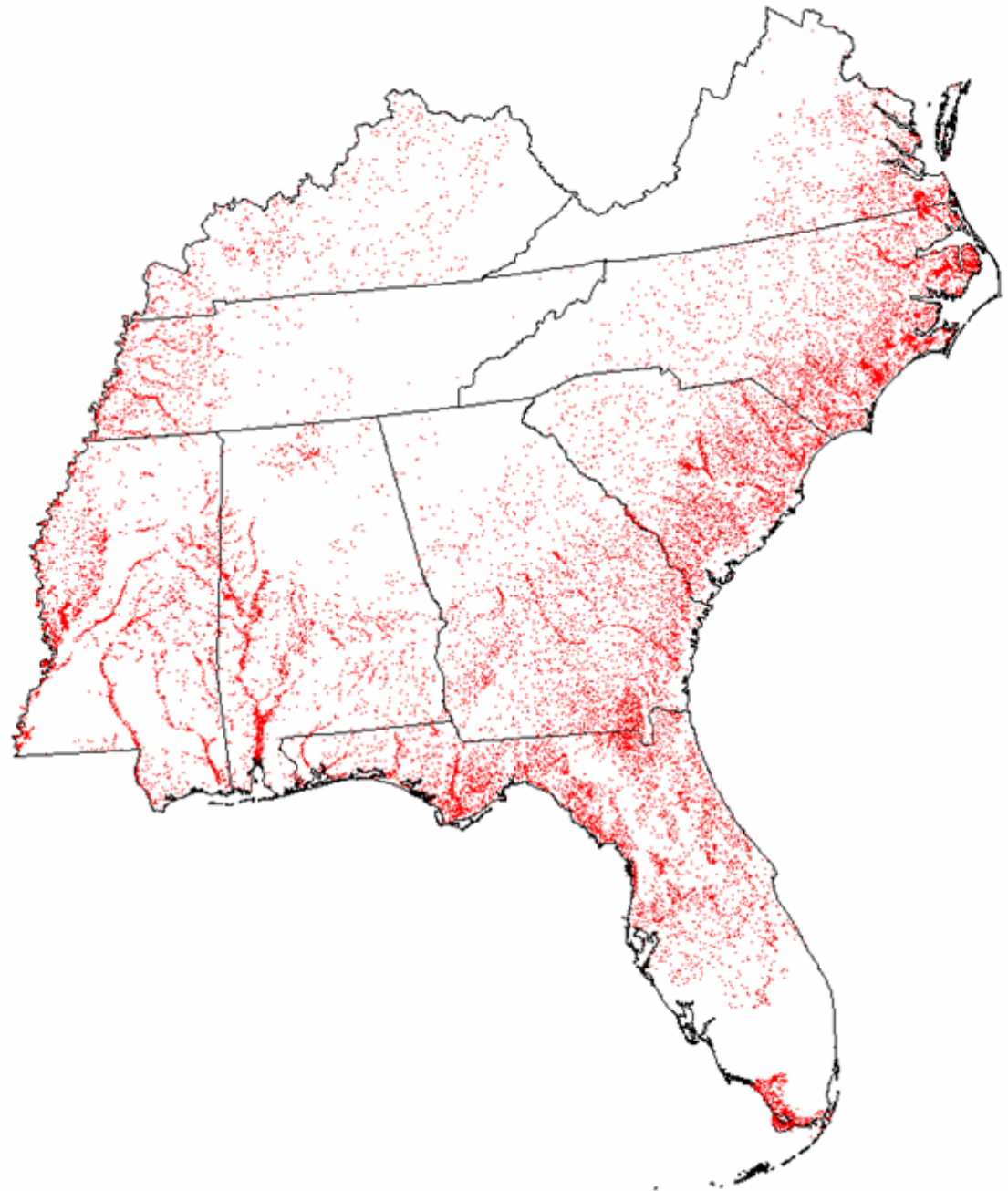
Elevation
Mask
($\leq 4000'$)

Proximity to
Water
Mask
($\leq 200m$)





SE-GAP Pres./Abs. Distribution Model



Prothonotary Warbler
Protonotaria citrea



Model Assessment

◆ Reviewer Agreement with model

- Need to keep it relatively simple and concise
- Assess major model components and overall model performance
- Bayesian Belief Network Framework

A Priori Rankings generated by Modelers

Bayesian Belief Network Prior Confidence Level Question Form

Scientific Name: Species Code:

Common Name:

Bayesian Belief Network Prior Confidence Level Questions by SE-GAP

Confidence levels are rated 1 - 5 (Lowest - Highest)

	SE-GAP EVALUATIONS		
	MJR	ALS	SE-GAP
1) Rate your level of agreement with the identified geographic range	<input type="text" value="4"/>	<input type="text" value="4"/>	<input type="text" value="4"/>
2) Rate your level of agreement that there is ample literature available describing the appropriate habitat for the species within the region	<input type="text" value="5"/>	<input type="text" value="5"/>	<input type="text" value="5"/>
3) Rate your level of agreement in the identified habitat relationship (model) parameters	<input type="text" value="4"/>	<input type="text" value="4"/>	<input type="text" value="4"/>
4) Rate your level of agreement in the available spatial data representing appropriate habitat parameters for the species within the region	<input type="text" value="4"/>	<input type="text" value="4"/>	<input type="text" value="4"/>
5) Rate your level of agreement in the predicted distribution performance	<input type="text" value="4"/>	<input type="text" value="4"/>	<input type="text" value="4"/>

MJR Comments:

Date of Evaluation:

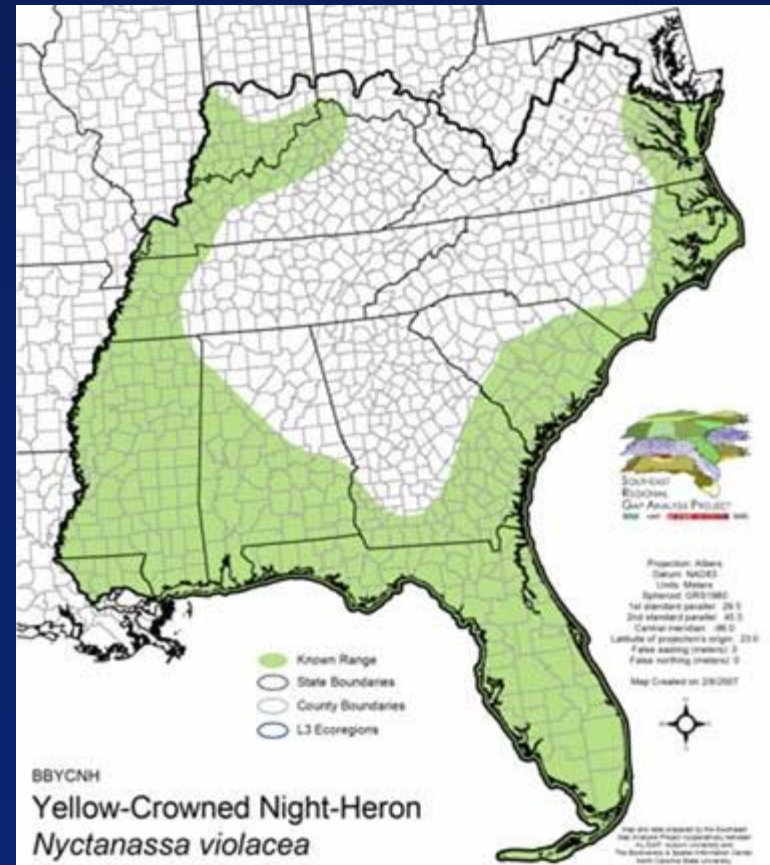
ALS Comments:

SE-GAP Overall Comments:

Record: 1 of 1 (Filtered)

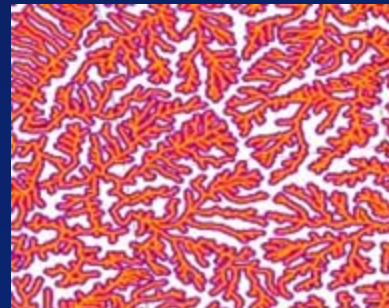
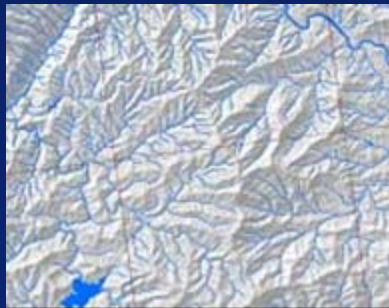
Reviewer Agreement with Model

1. The light green shaded area is an accurate representation of the known range extent of this species.



Reviewer Agreement with Model

1. The light green shaded area is an accurate representation of the known range extent of this species.
2. The parameters used to model the predicted distribution of this species accurately represent its habitat requirements in the southeastern United States.
3. The spatial data adequately represent the species' habitat requirements.



Reviewer Agreement with Model

1. The light green shaded area is an accurate representation of the known range extent of this species.
2. The parameters used to model the predicted distribution of this species accurately represent its habitat requirements in the southeastern United States.
3. The spatial data adequately represent the species' habitat requirements.
4. The red pixels on the map adequately represent the distribution of this species' habitat within the identified range extent.



Reviewer Agreement with Model

1. The light green shaded area is an accurate representation of the known range extent of this species.
2. The parameters used to model the predicted distribution of this species accurately represent its habitat requirements in the southeastern United States.
3. The spatial data adequately represent the species' habitat requirements.
4. The red pixels on the map adequately represent the distribution of this species' habitat within the identified range extent.
5. The published literature adequately documents the breeding habitat requirements for this species in the southeastern United States.

Reviewer Agreement with Model

1. The light green shaded area is an accurate representation of the known range extent of this species.
2. The parameters used to model the predicted distribution of this species accurately represent its habitat requirements in the southeastern United States.
3. The spatial data adequately represent the species' habitat requirements.
4. The red pixels on the map adequately represent the distribution of this species' habitat within the identified range extent.
5. The published literature adequately documents the breeding habitat requirements for this species in the southeastern United States.
6. I am an expert in the natural history of this species.

Bayesian Belief Network

