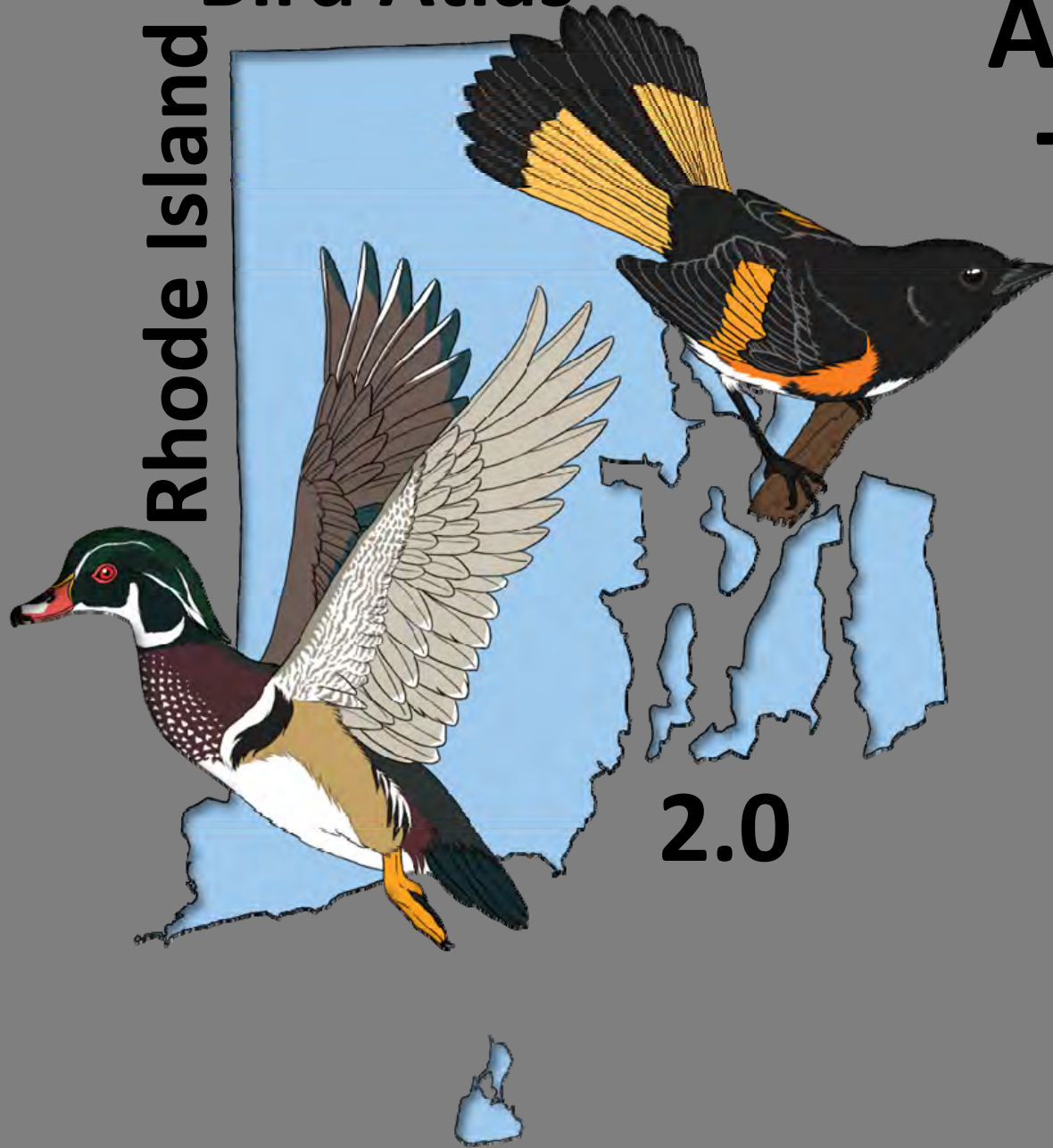


# Bird Atlas

Rhode Island



2.0

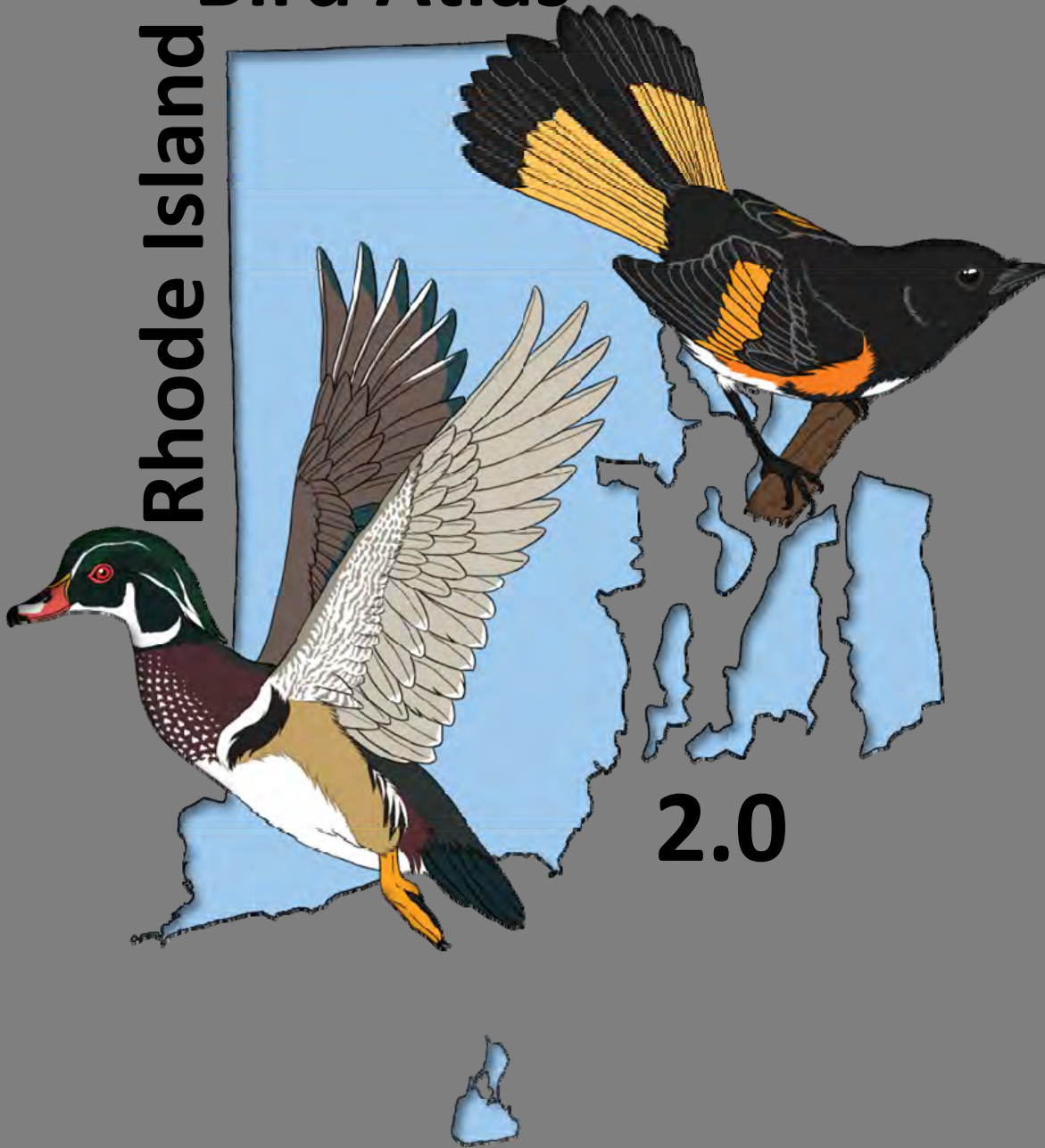
# A Conservation Tool for Land Managers

Land Water Summit  
7 March 2020



# Bird Atlas

Rhode Island



2.0

# Outline

---

## I. Atlas Background

---Q&A BREAK---

## II. Atlas Change Analysis

---Q&A BREAK---

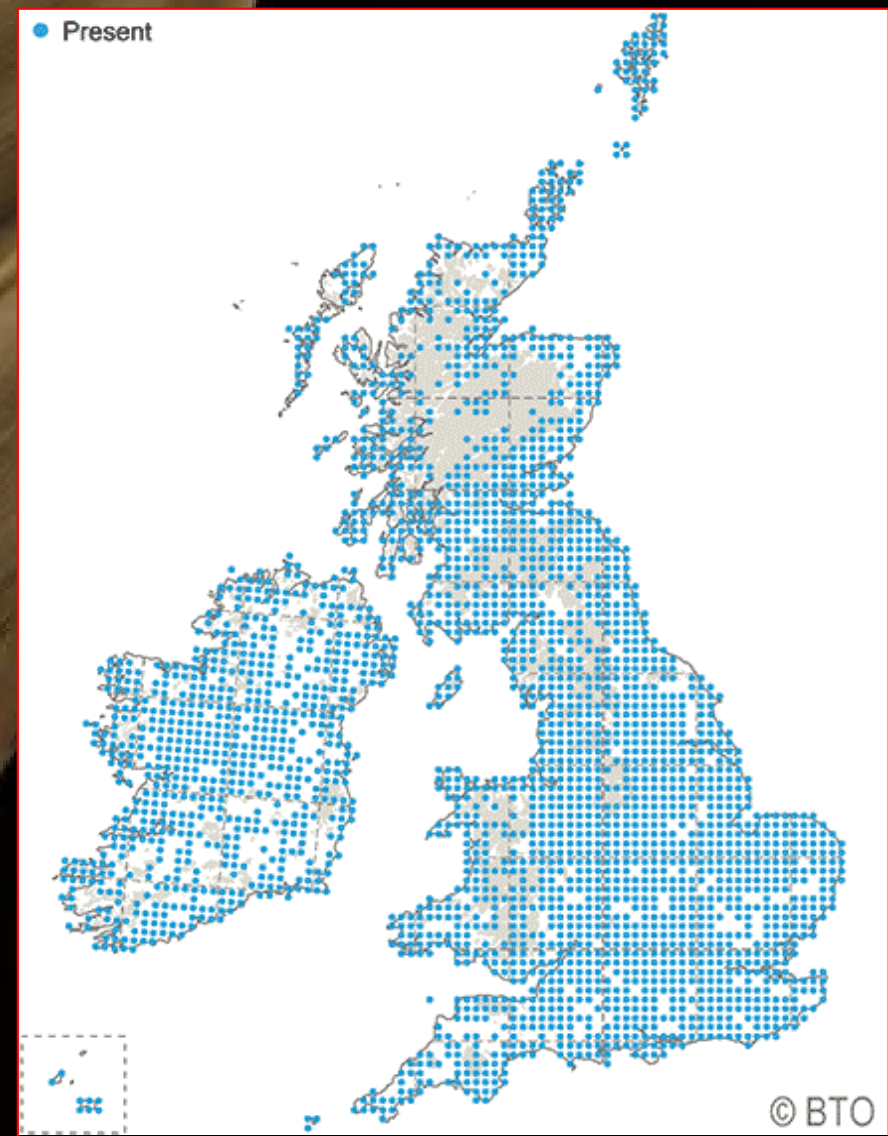
## III. Advanced Analyses

---Q&A BREAK---

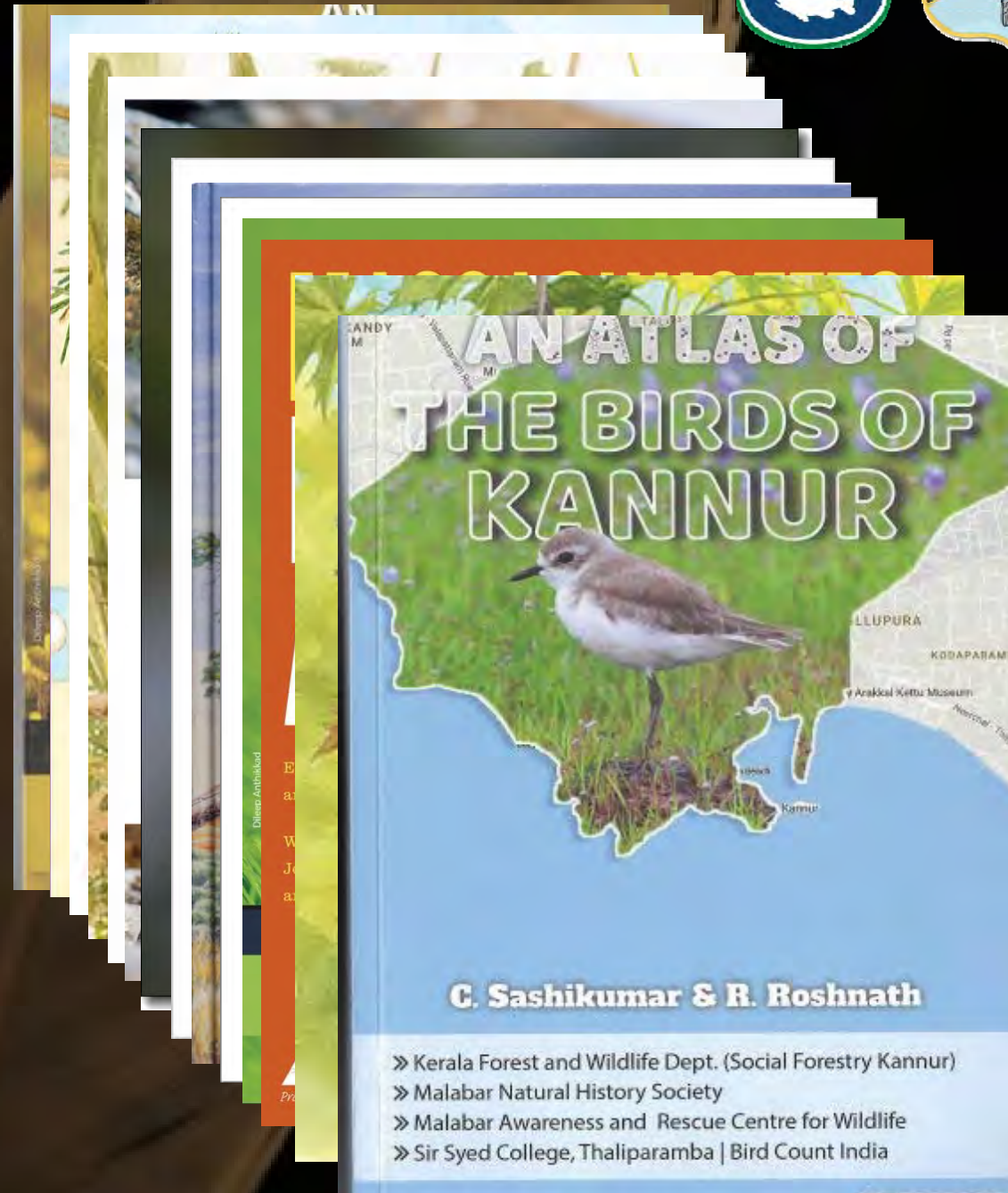
## IV. Atlas Tools



# I. Atlas Background



# I. Atlas Background

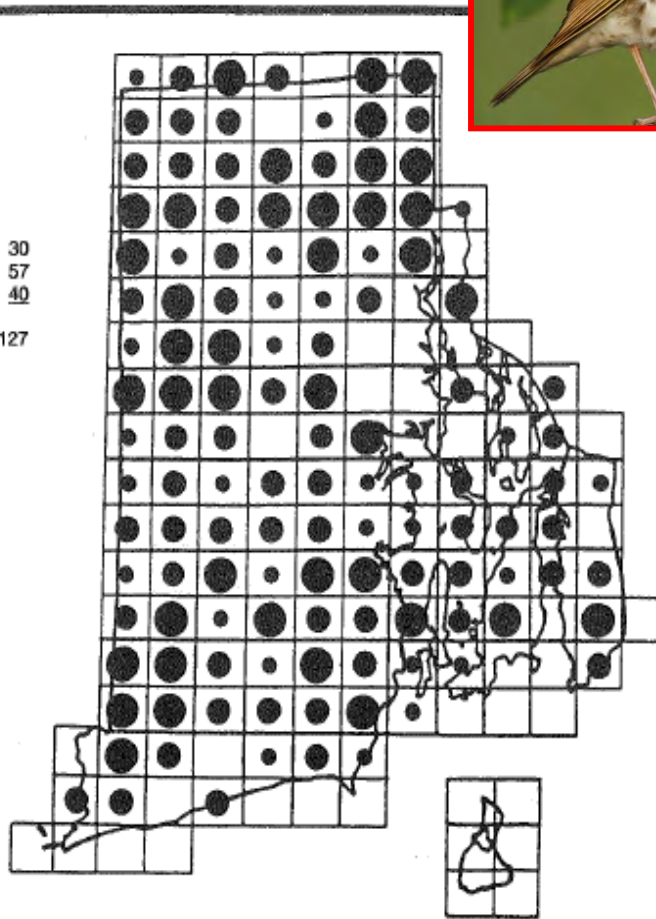


# I. Atlas Background



**Wood Thrush**  
*Hylocichla mustelina*

Possible	30
Probable	57
<u>Confirmed</u>	<u>40</u>
Total	127



## RIBA1.0

- 1982-1987
- 69 Volunteers
- 164 species

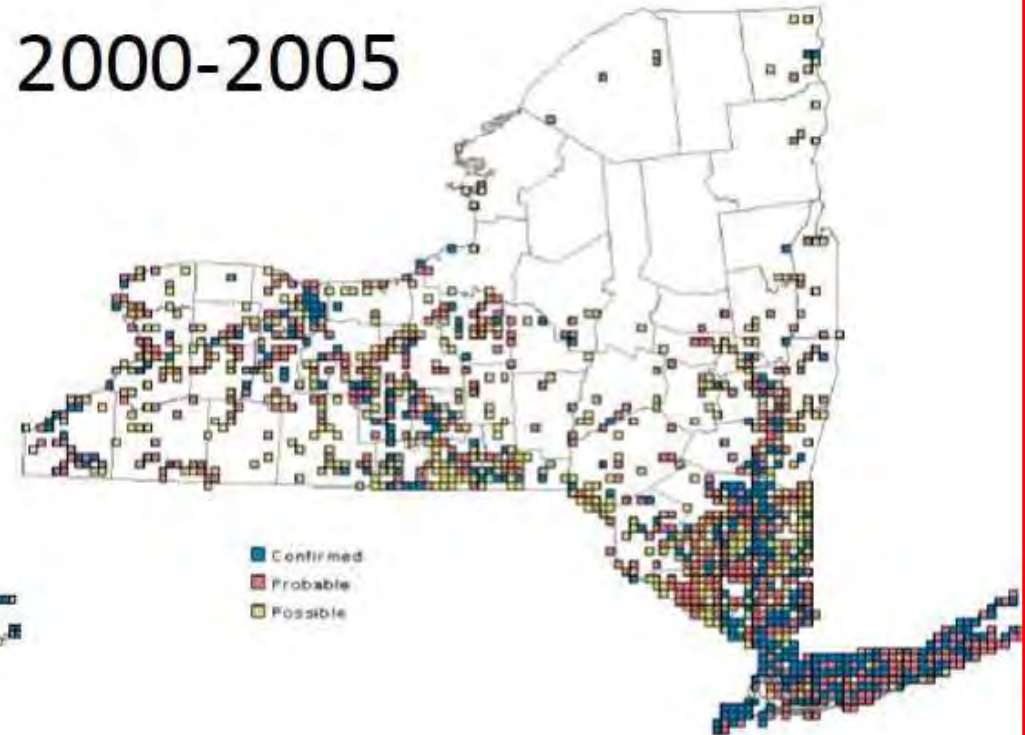
# I. Atlas Background



1980-1985

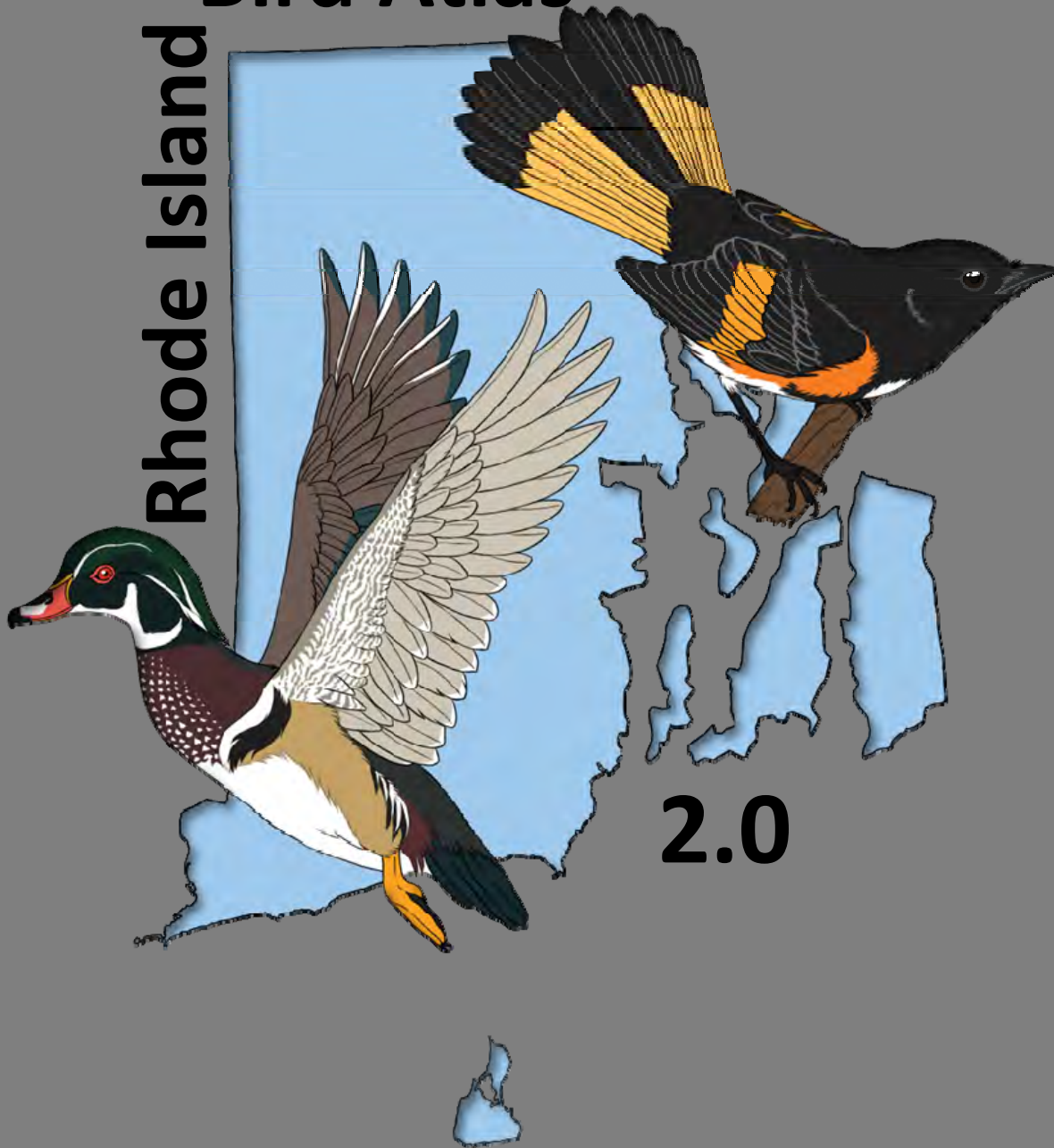


2000-2005



# Bird Atlas

Rhode Island

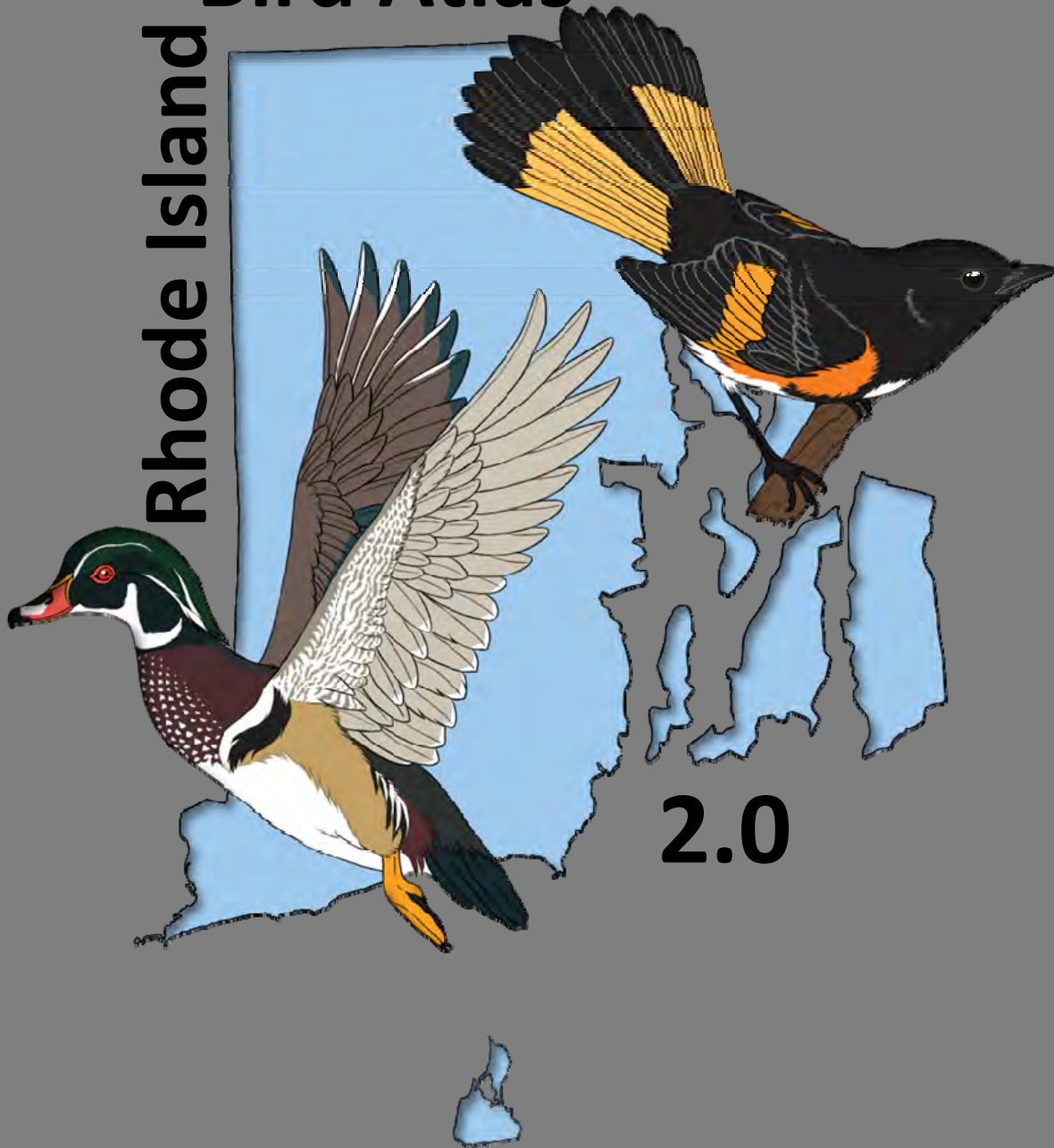


## What is the RIBA2.0?

- Objectives:
  - Change Analysis
  - Annual Obs.
- 244 volunteers
- 5-years
- Four Distinct Efforts

# Bird Atlas

Rhode Island

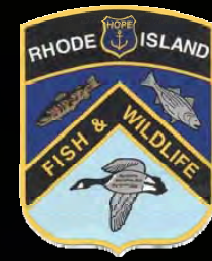


2.0

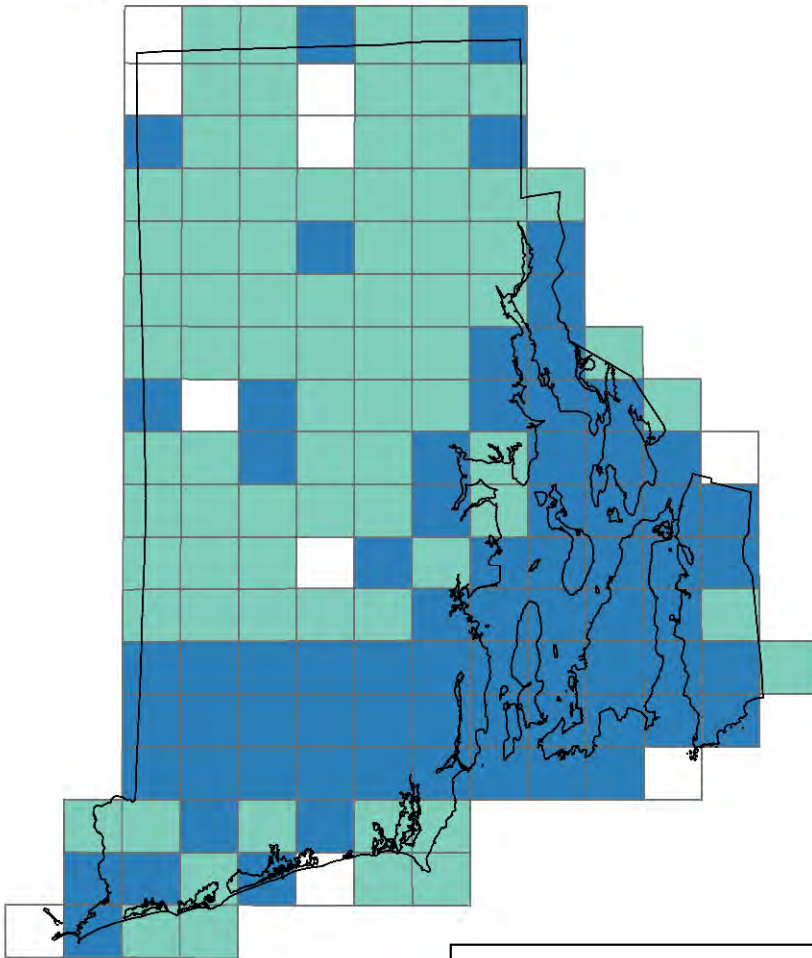
BREAK 1:  
ATLAS BACKGROUND



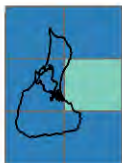
# II. Atlas Change Analysis



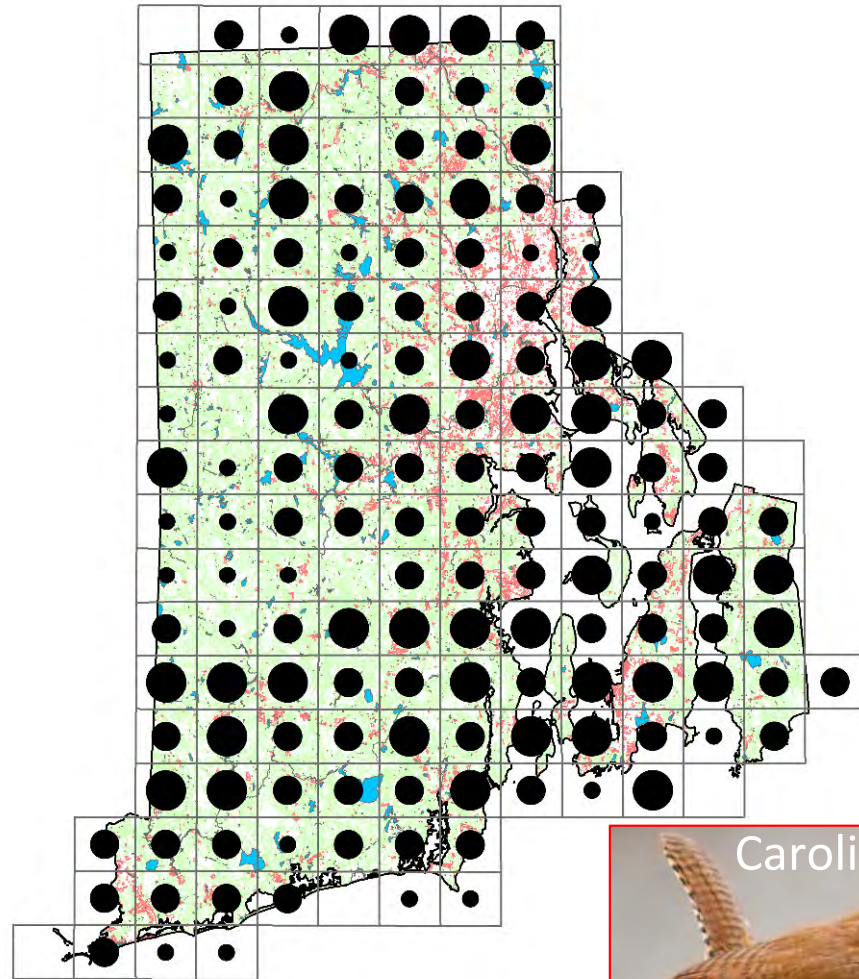
1982-87 only 2015-19 only Both Atlases



+78 blocks  
101.3% increase



○ OB ● PO ● PR ● CO

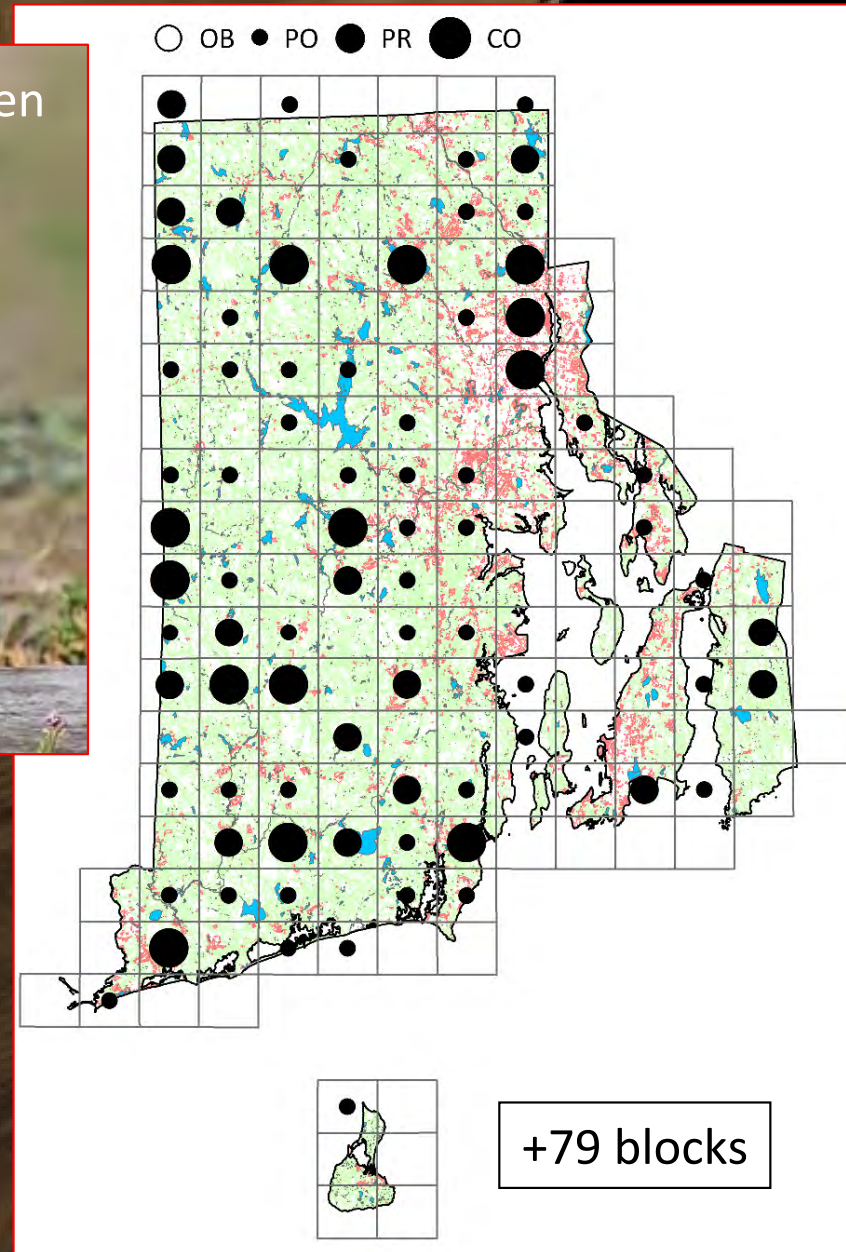


Carolina Wren

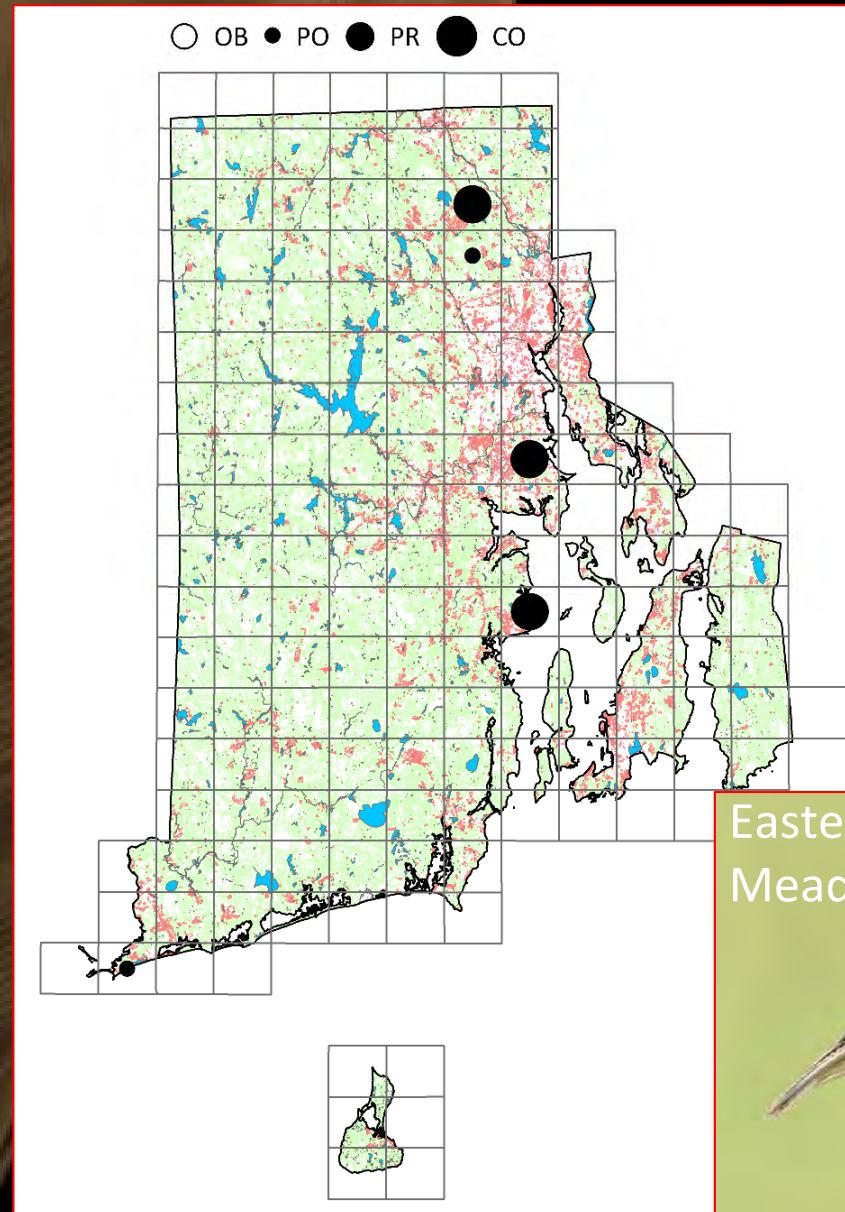
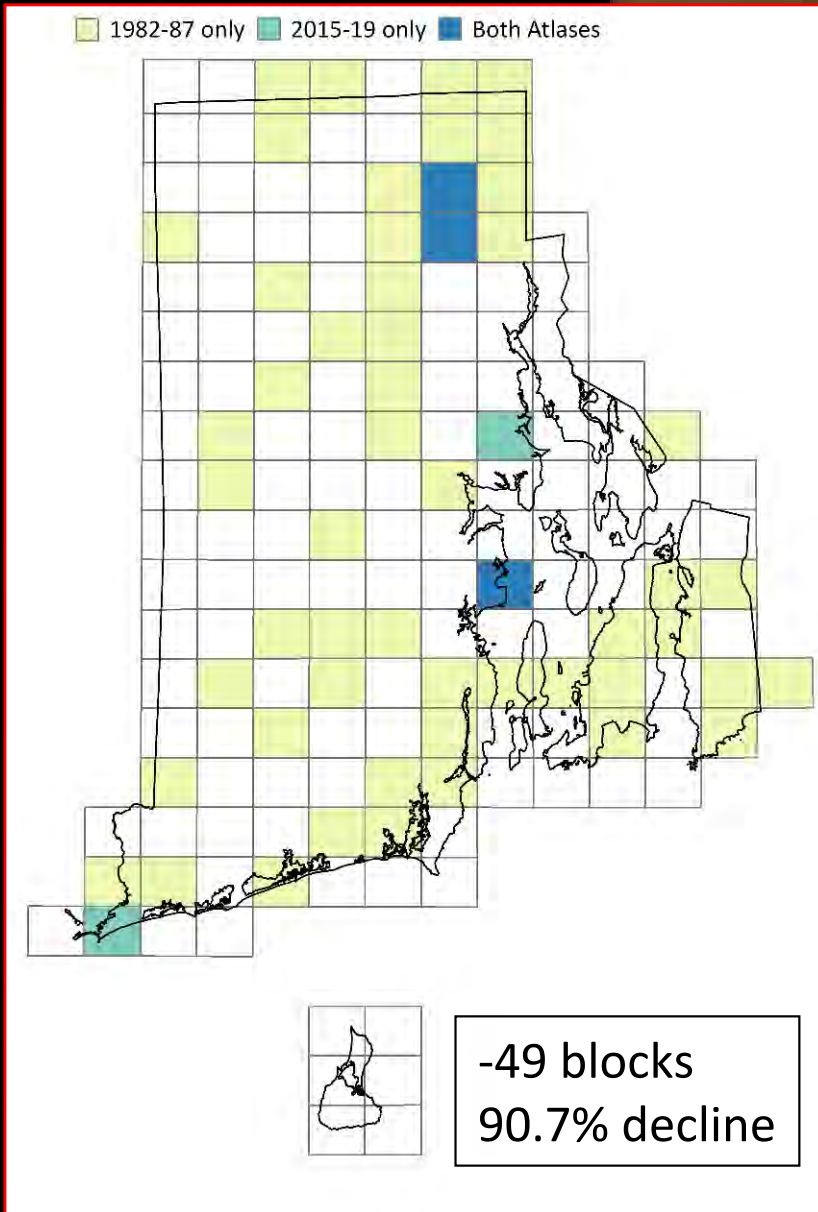
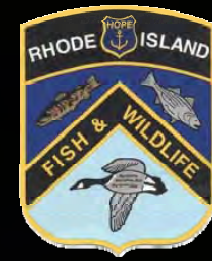
# II. Atlas Change Analysis



Common Raven



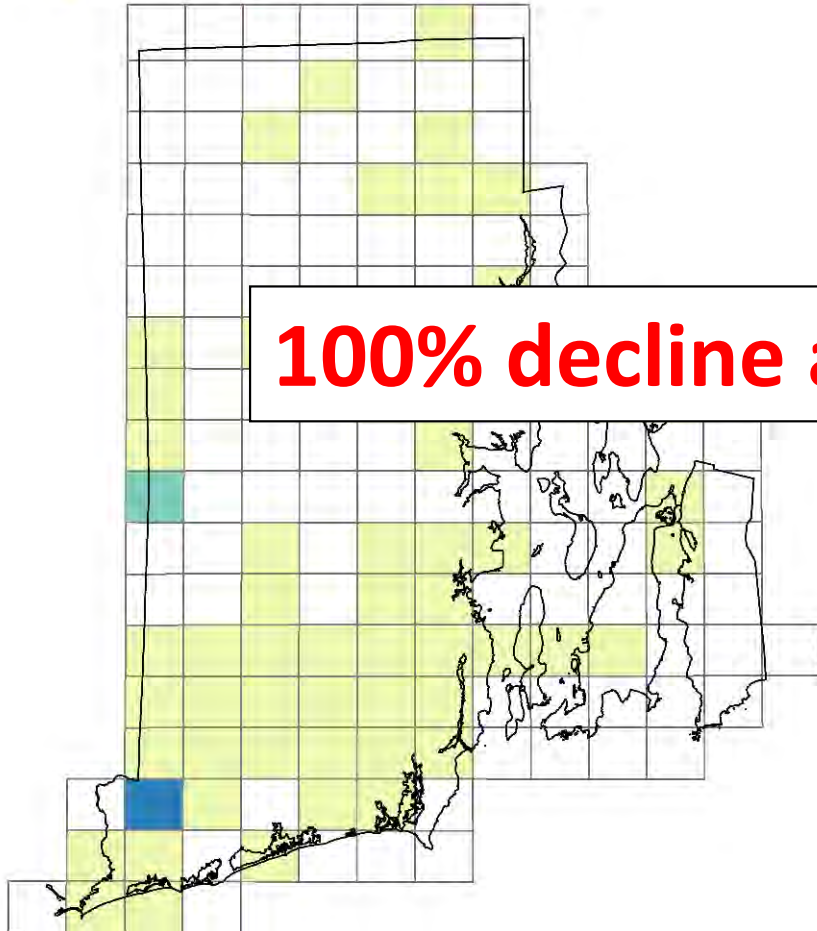
# II. Atlas Change Analysis



# II. Atlas Change Analysis

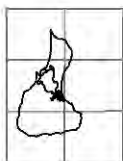
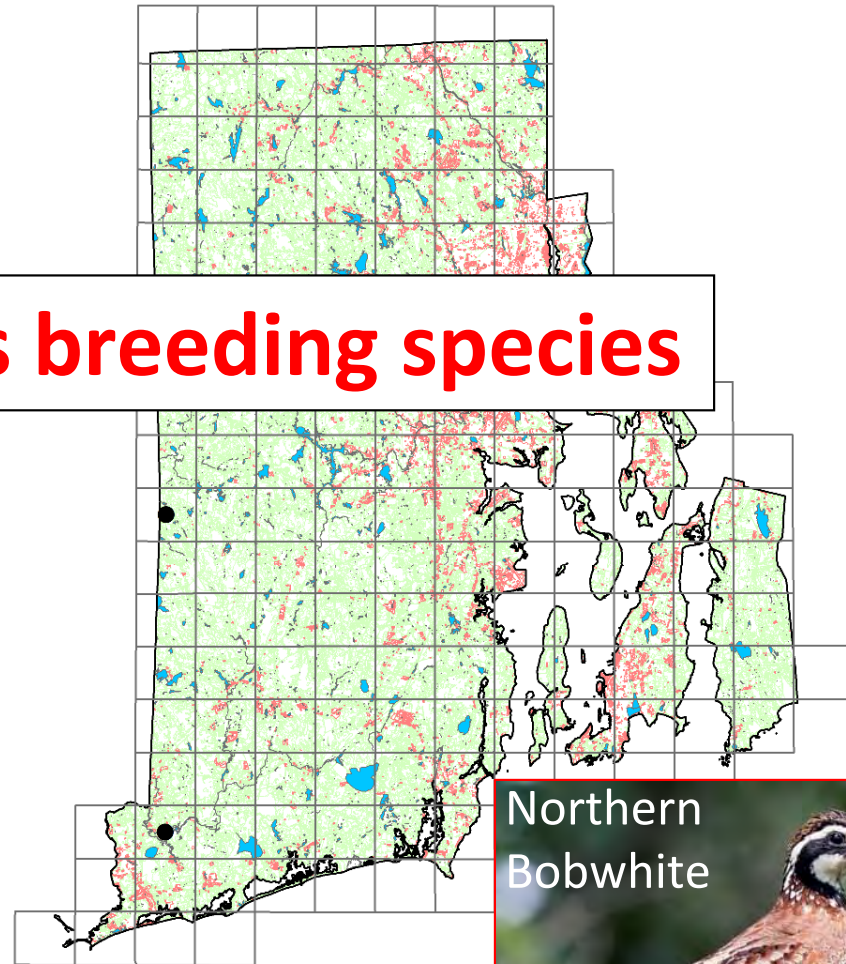


1982-87 only 2015-19 only Both Atlases



**100% decline as breeding species**

○ OB ● PO ● PR ● CO



-53 blocks  
96.4% decline

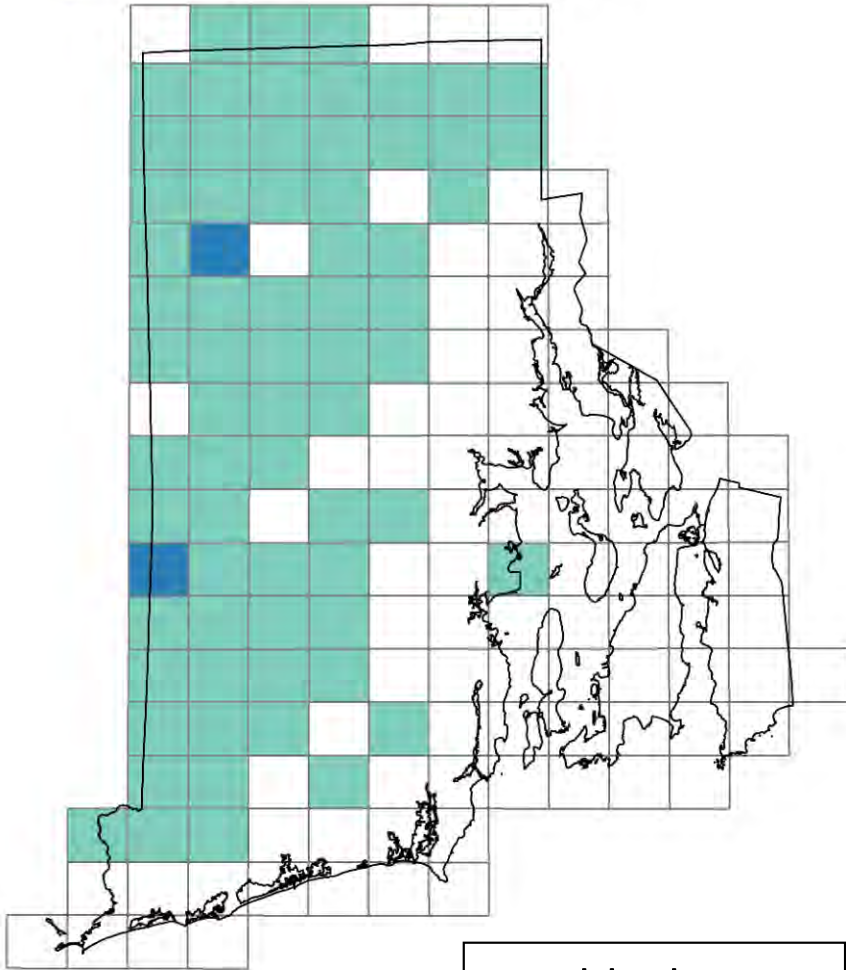
Northern Bobwhite



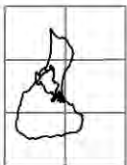
# II. Atlas Change Analysis



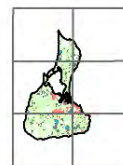
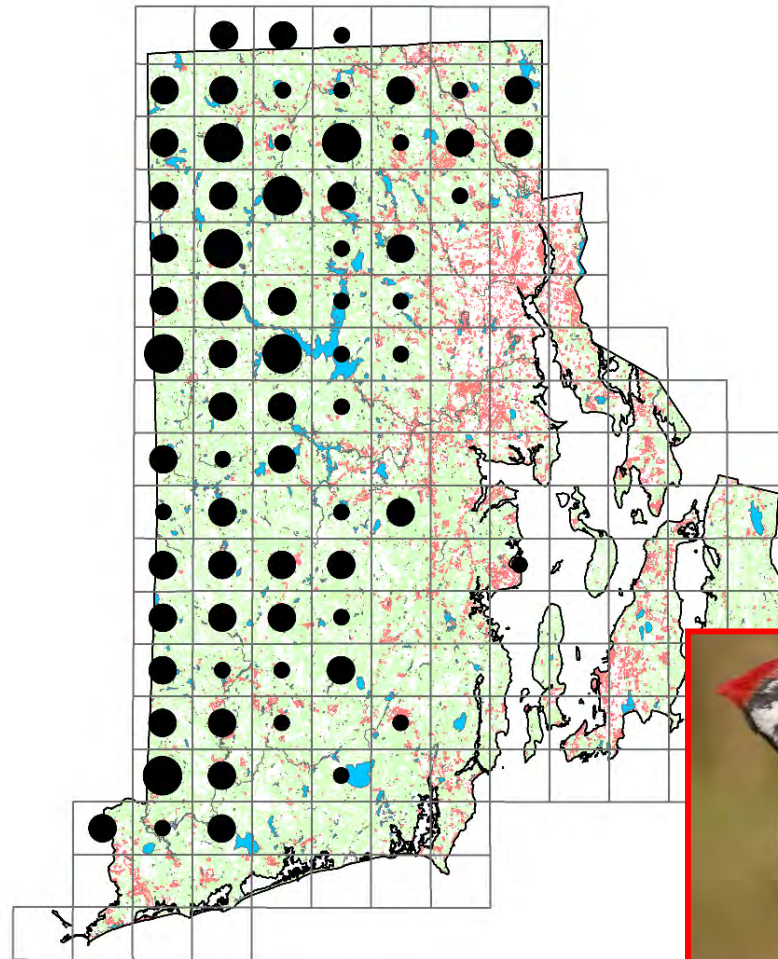
1982-87 only 2015-19 only Both Atlases



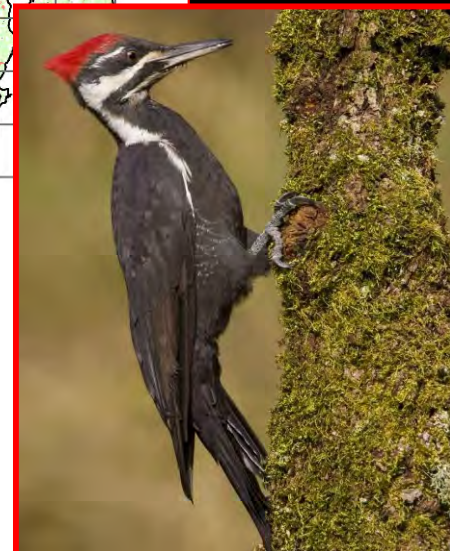
+67 blocks  
3350% increase



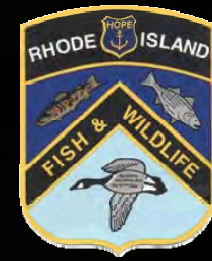
○ OB ● PO ● PR ● CO



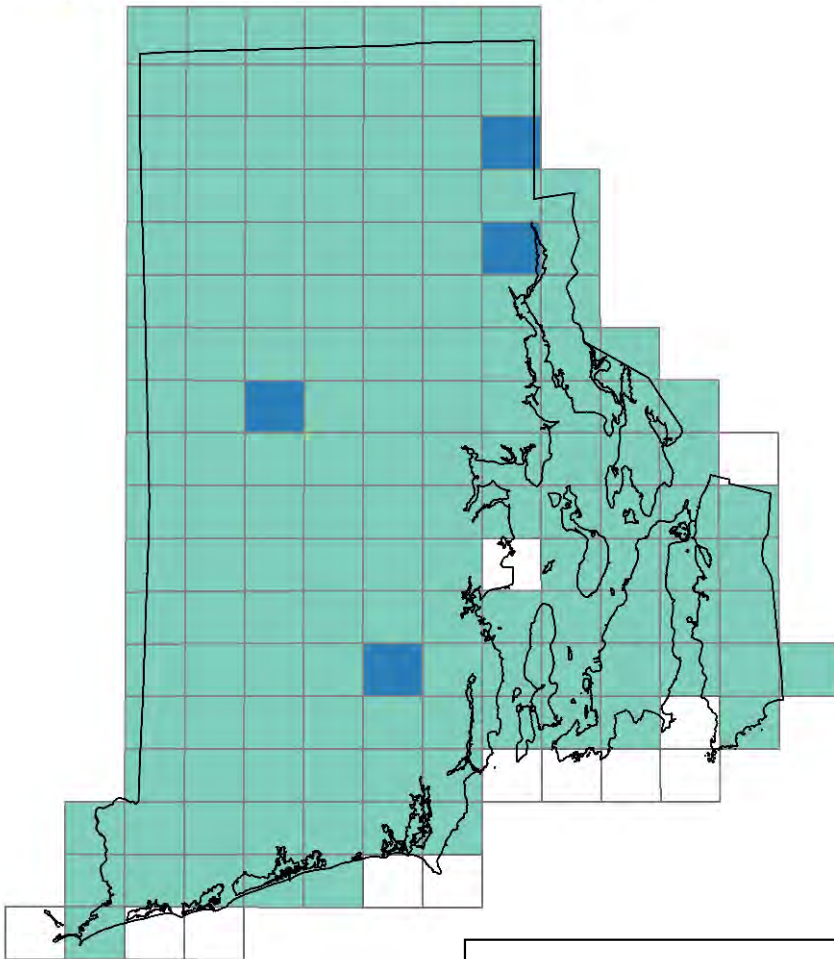
Pileated  
Woodpecker



# II. Atlas Change Analysis



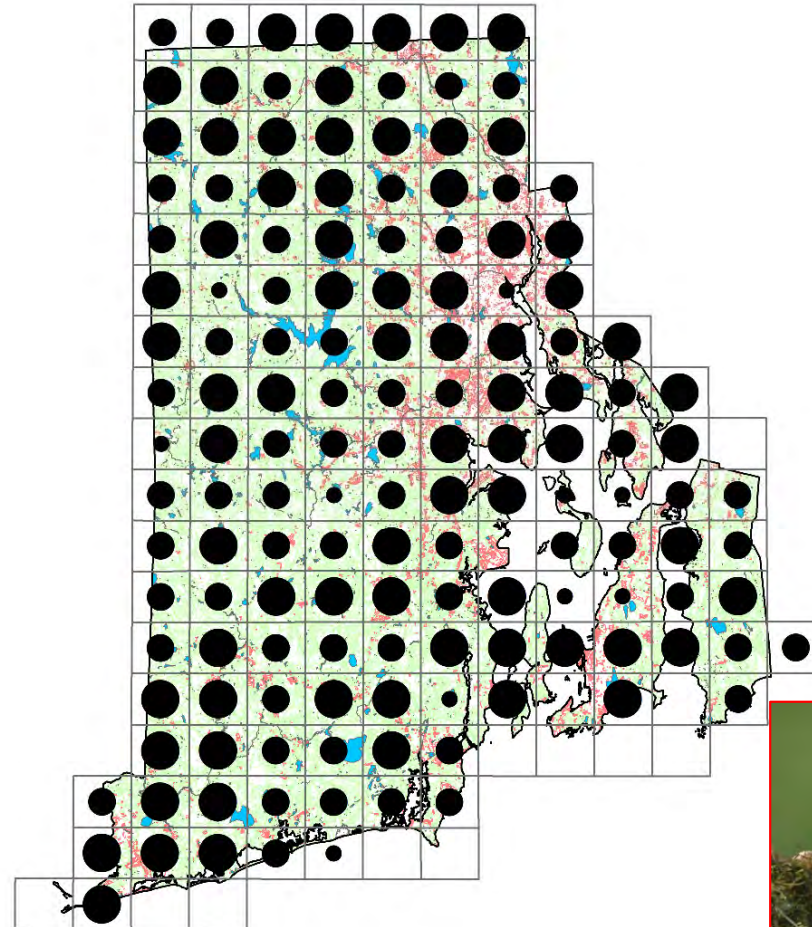
1982-87 only 2015-19 only Both Atlases



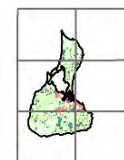
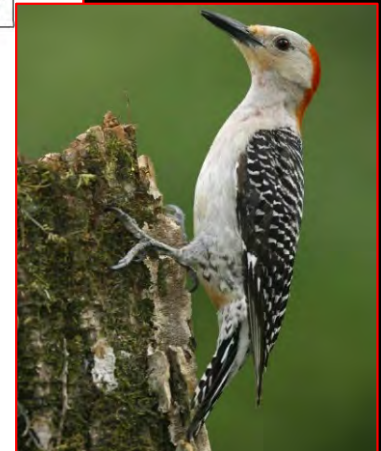
+145 blocks  
3625% increase



○ OB ● PO ● PR ● CO

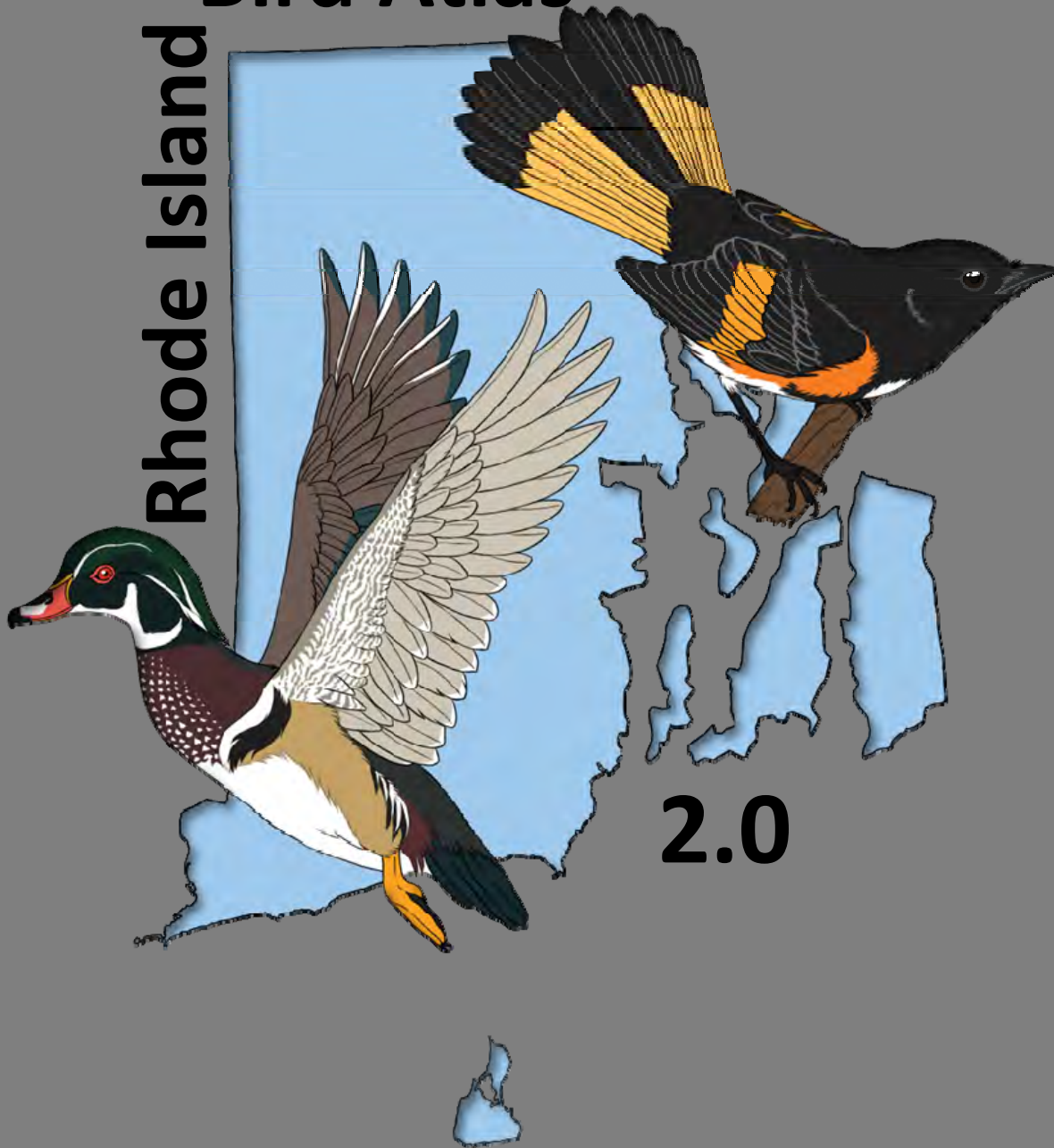


Red-bellied  
Woodpecker



# Bird Atlas

Rhode Island

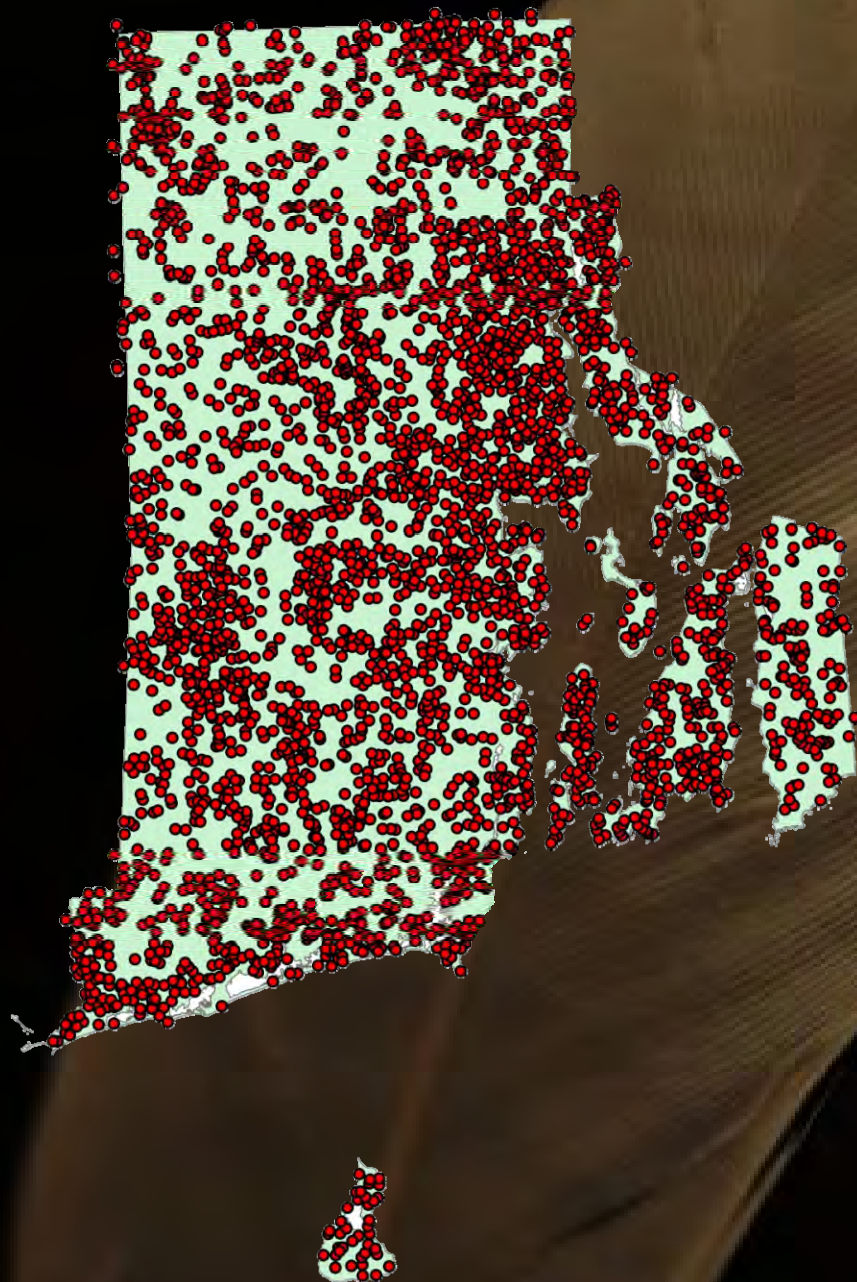


2.0

BREAK 2:

CHANGE ANALYSIS

# III. Advanced Analyses



- 3,705 point-counts
- 100,000 Detections
- 167 Species



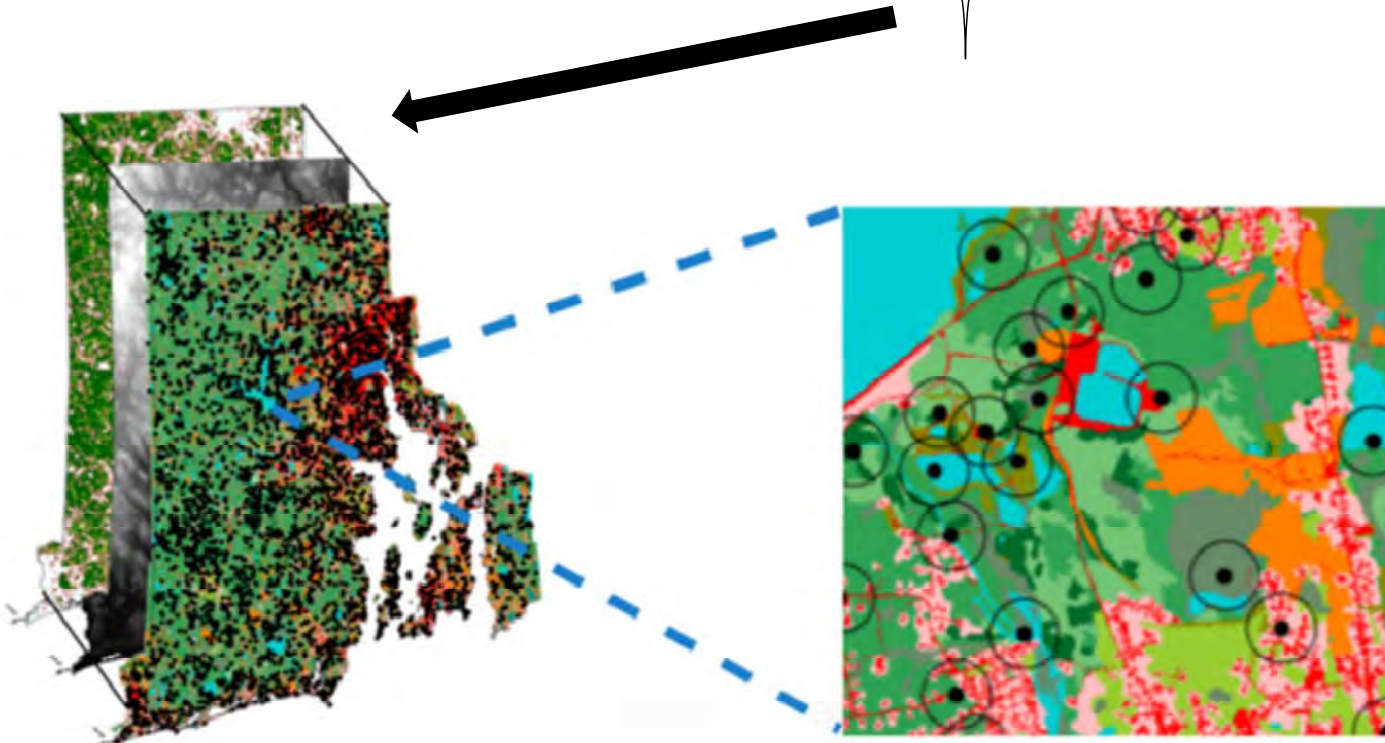
# Species distribution models

## 1. Data Treatment

Point-counts

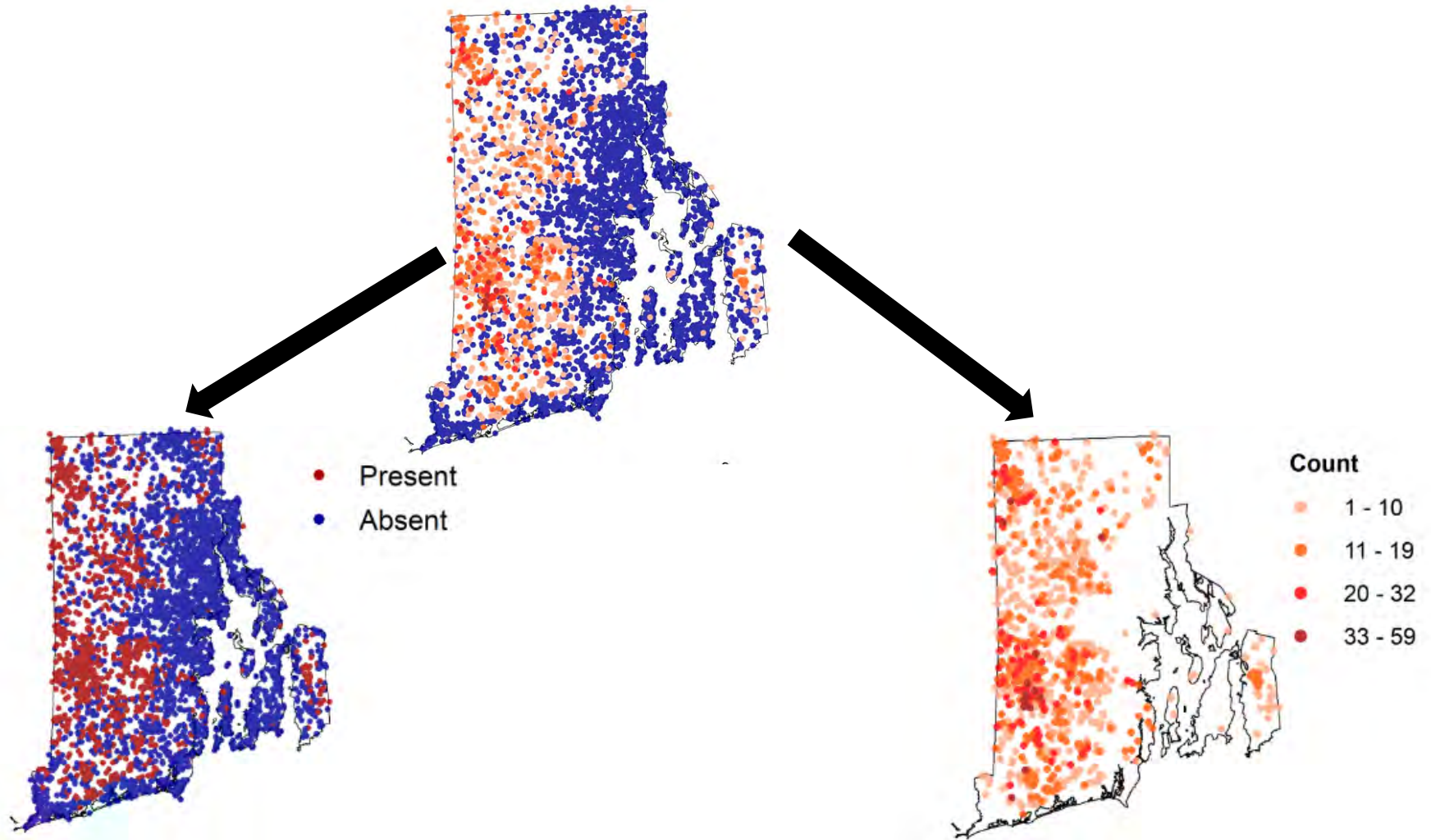


Environmental layers



# Species distribution models – hurdle model

## 2. Separate model occurrence and non-zero counts

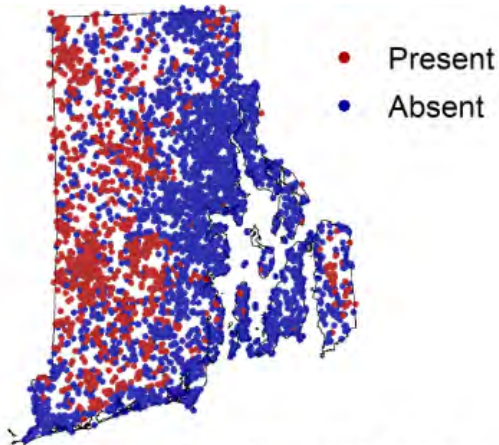


Occurrence model: Bernoulli  
Boosted regression tree model

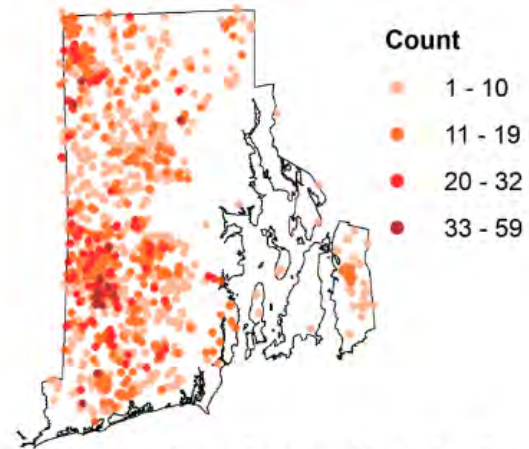
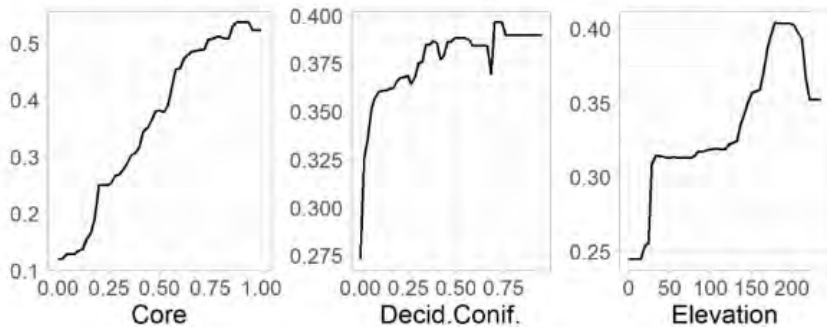
Count model: Poisson Boosted  
regression tree model

# Species distribution models – hurdle model

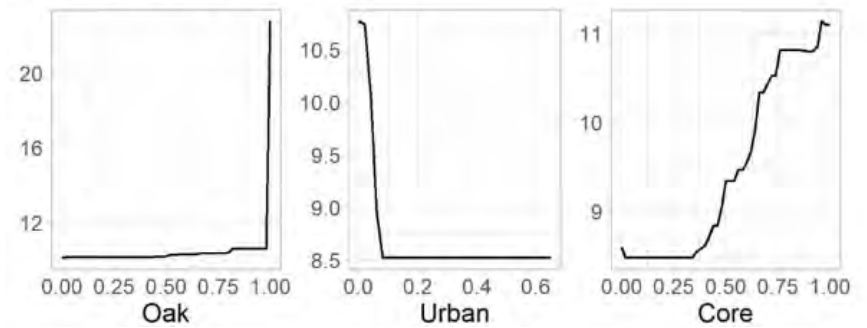
## 2. Separate model occurrence and non-zero counts



Example output showing estimated environmental relationships with probability of presence



Example output showing estimated environmental relationships with count

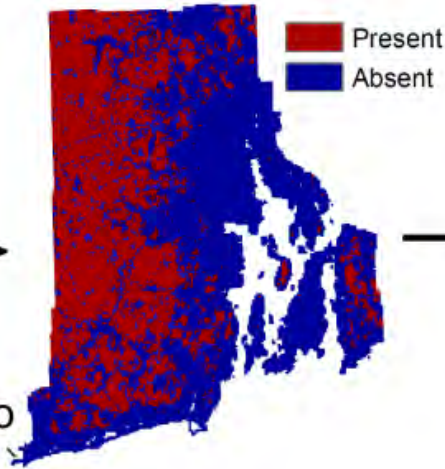
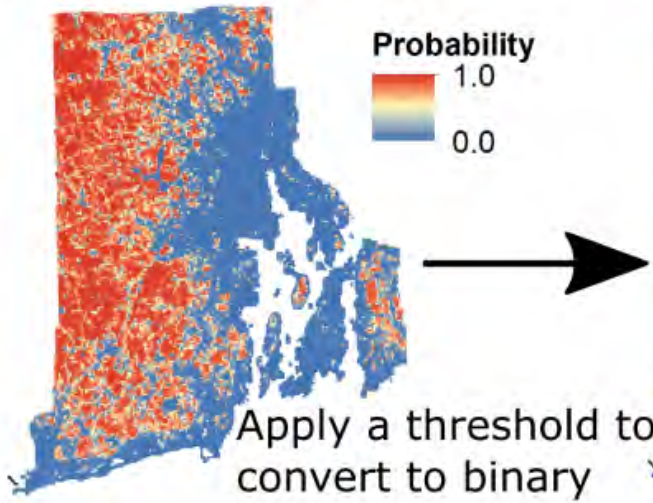


# Species distribution models – hurdle model

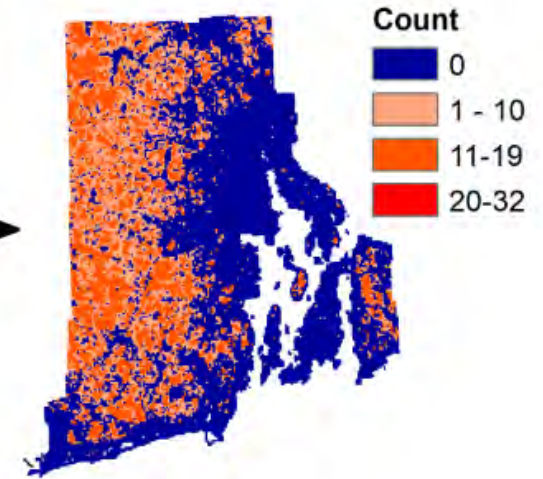
## 3. Predictions

### Predictions

Bernoulli BRTs predict probability



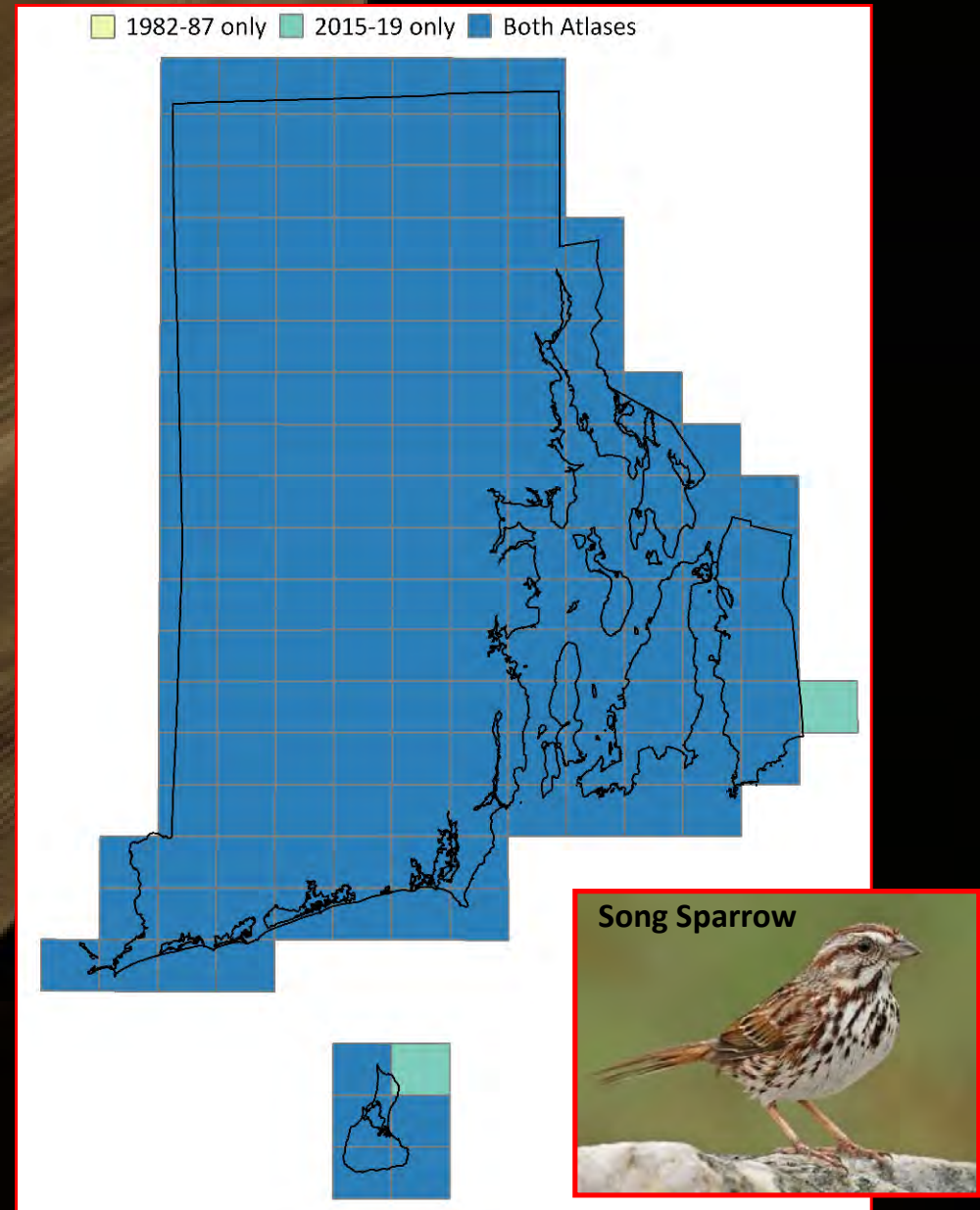
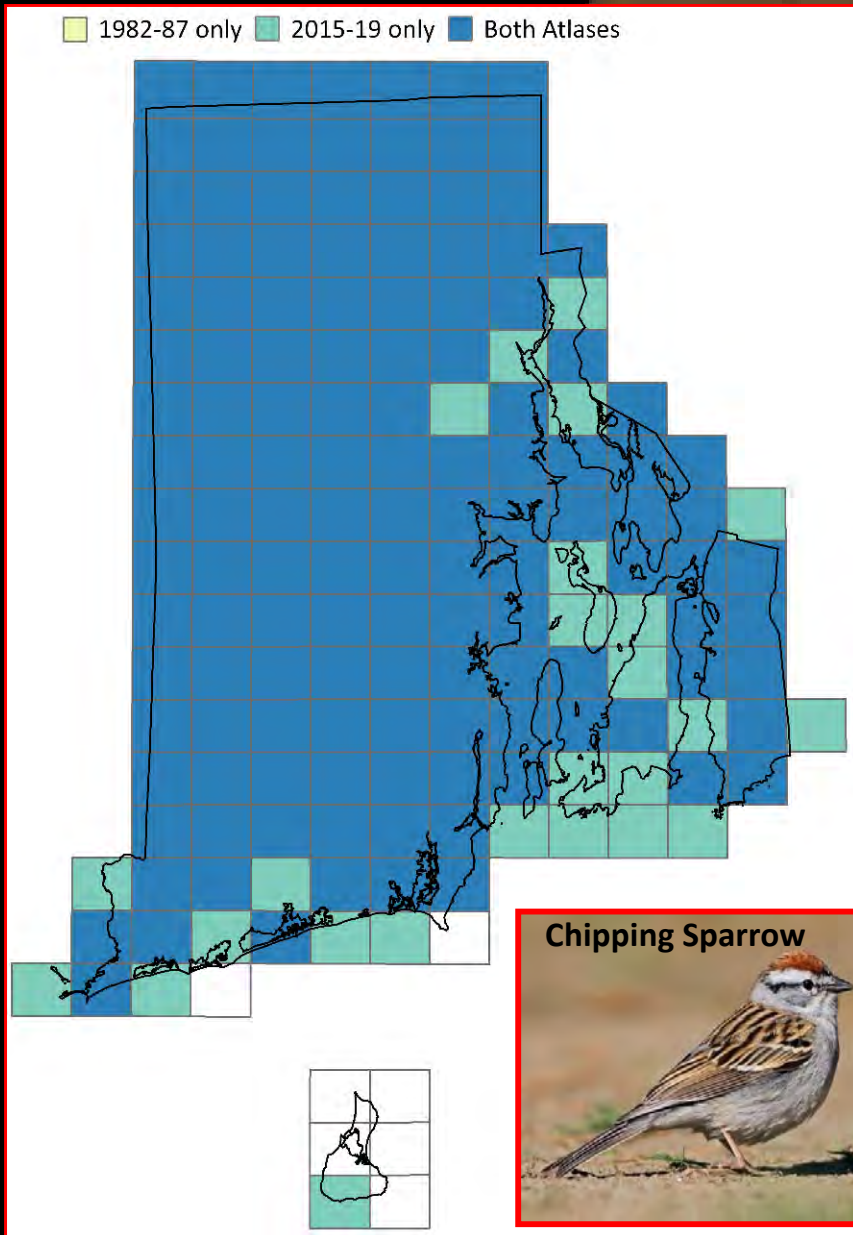
Poisson BRTs predict count at 'present' locations



# III. Advanced Analyses



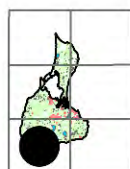
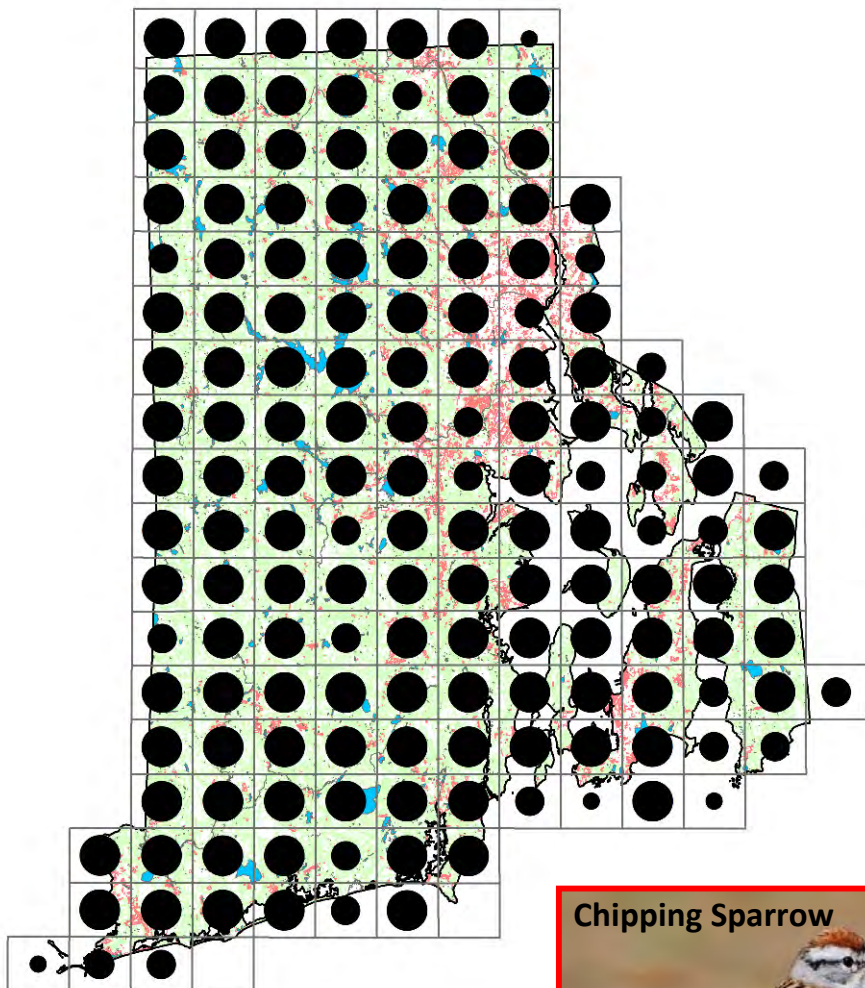
# III. Advanced Analyses



# III. Advanced Analyses



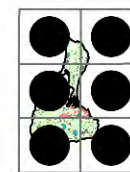
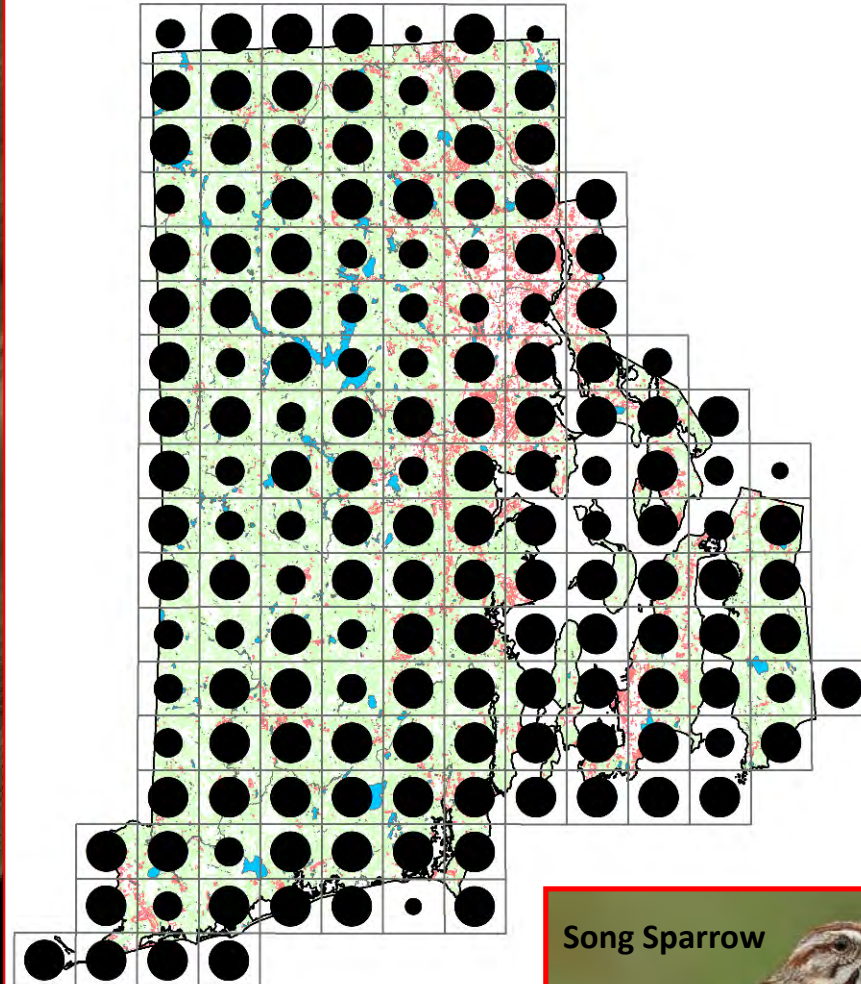
○ OB ● PO ● PR ● CO



Chipping Sparrow



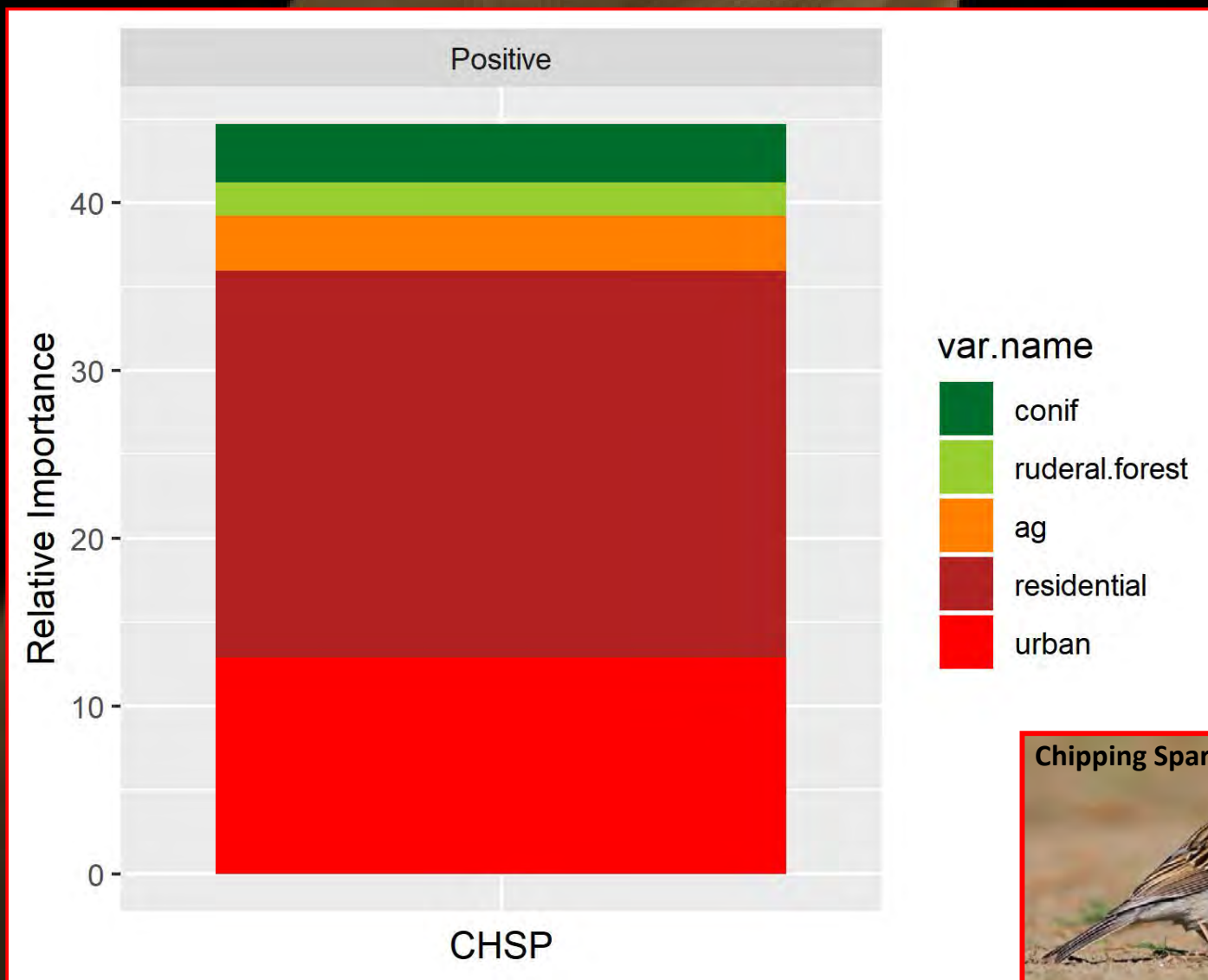
○ OB ● PO ● PR ● CO



Song Sparrow

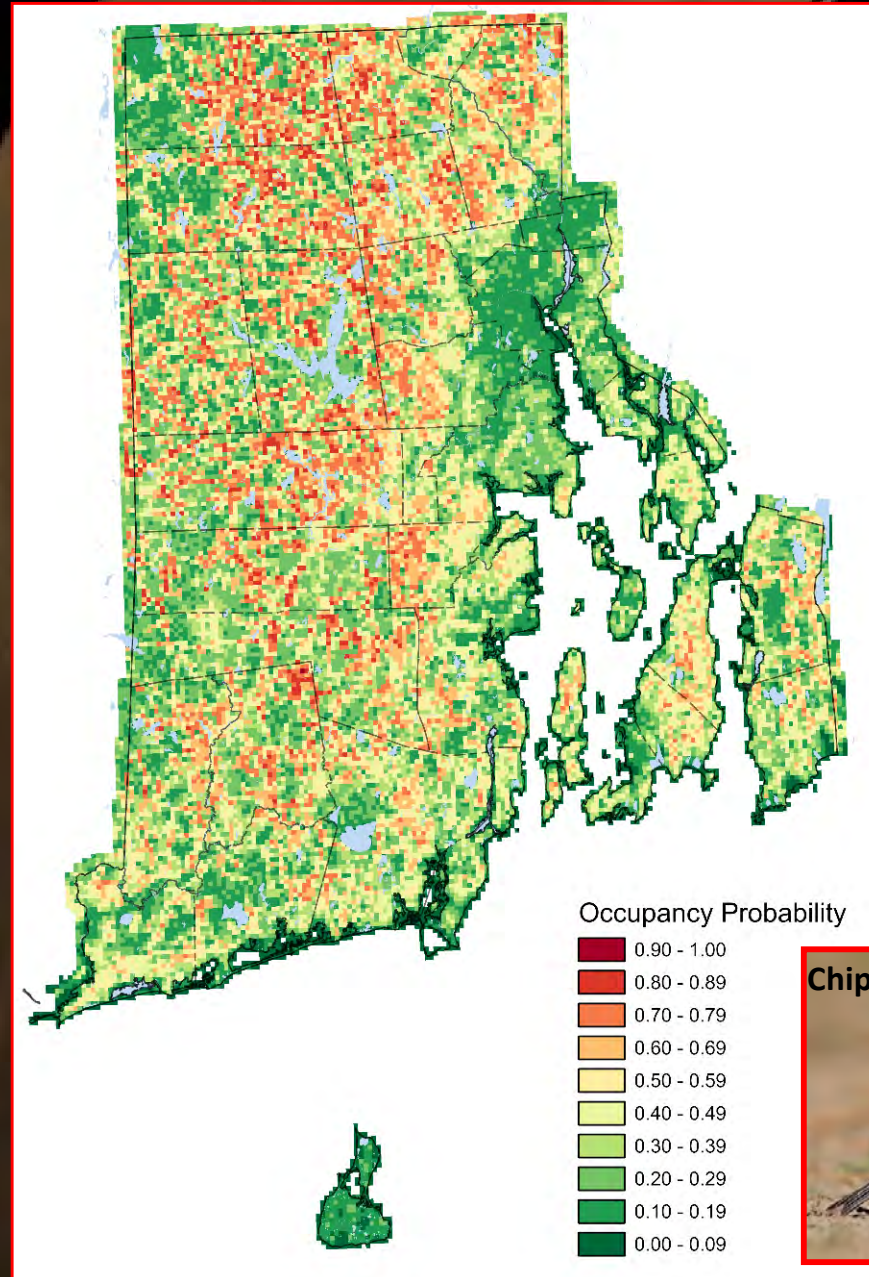


# III. Advanced Analyses

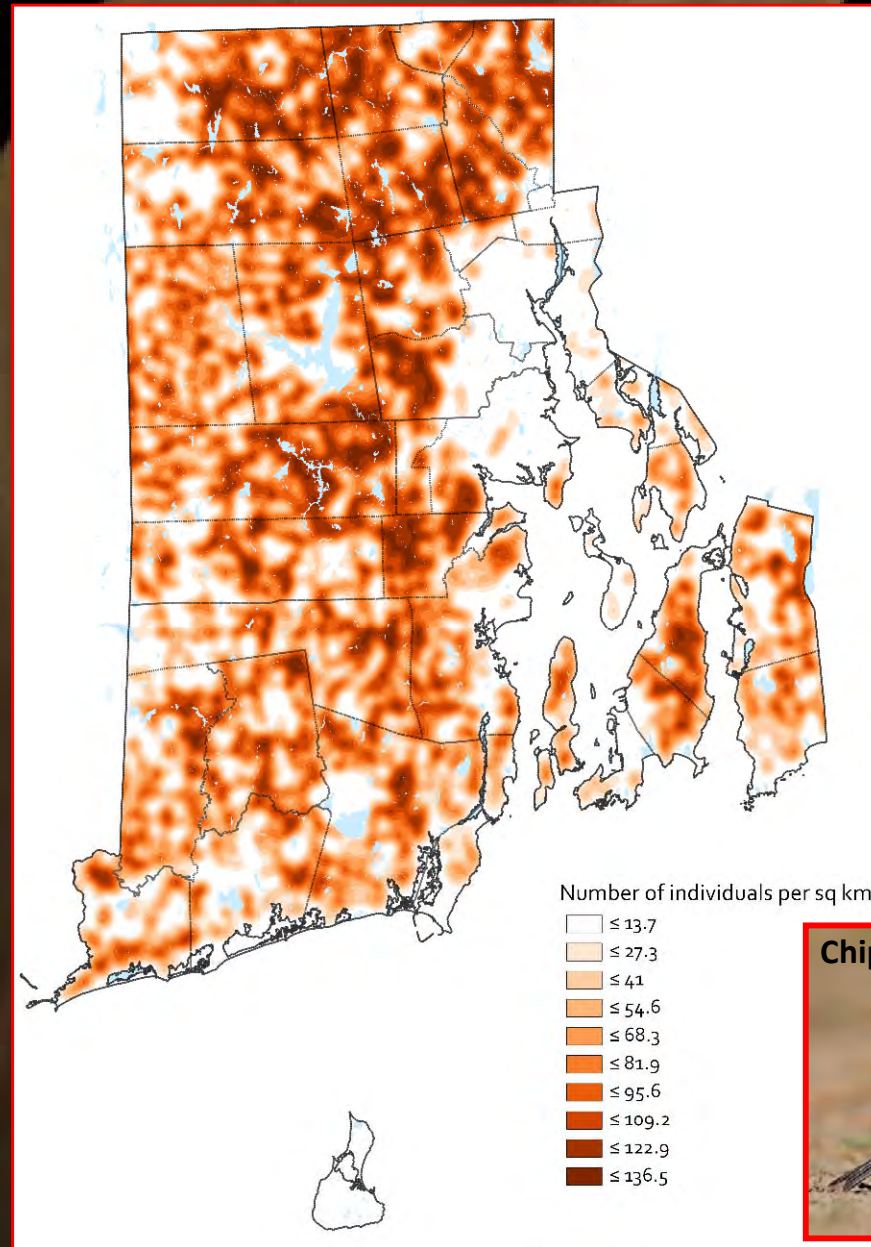




# III. Advanced Analyses



# III. Advanced Analyses



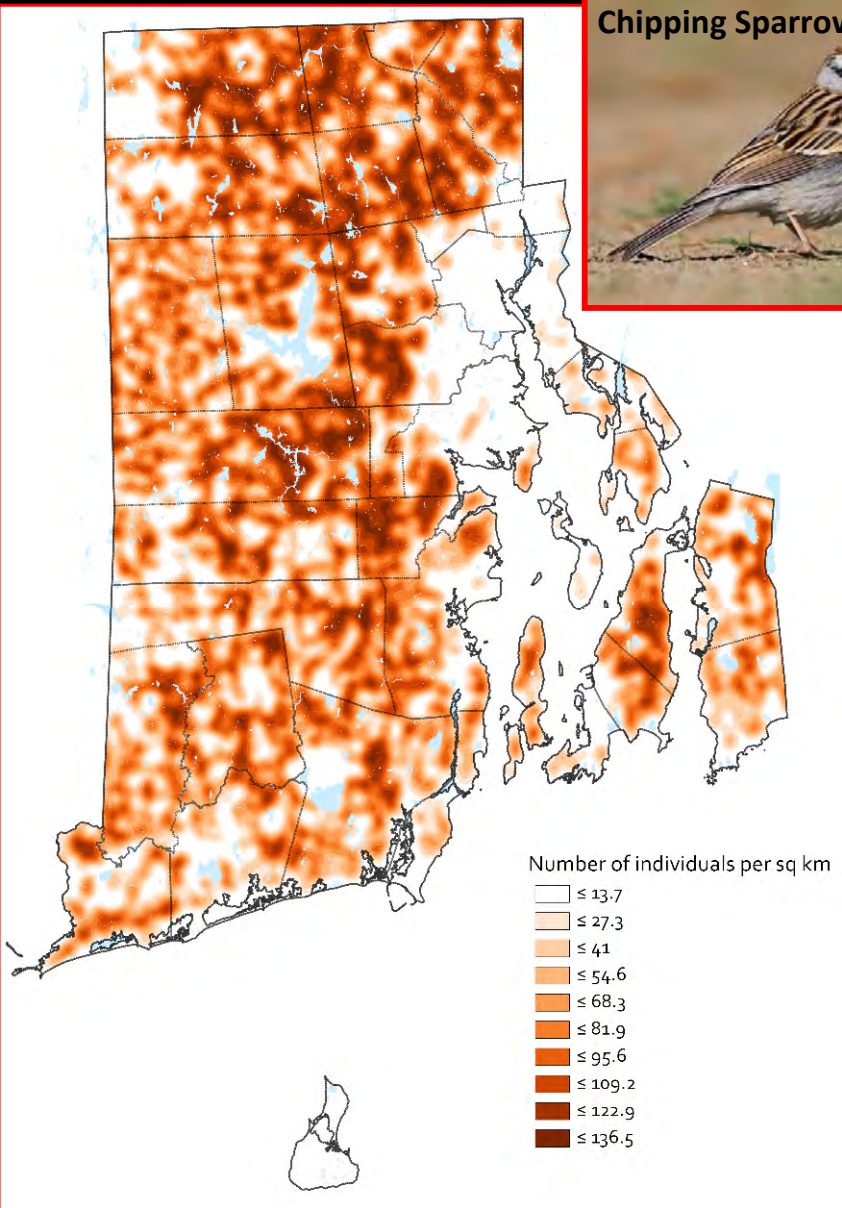
Chipping Sparrow



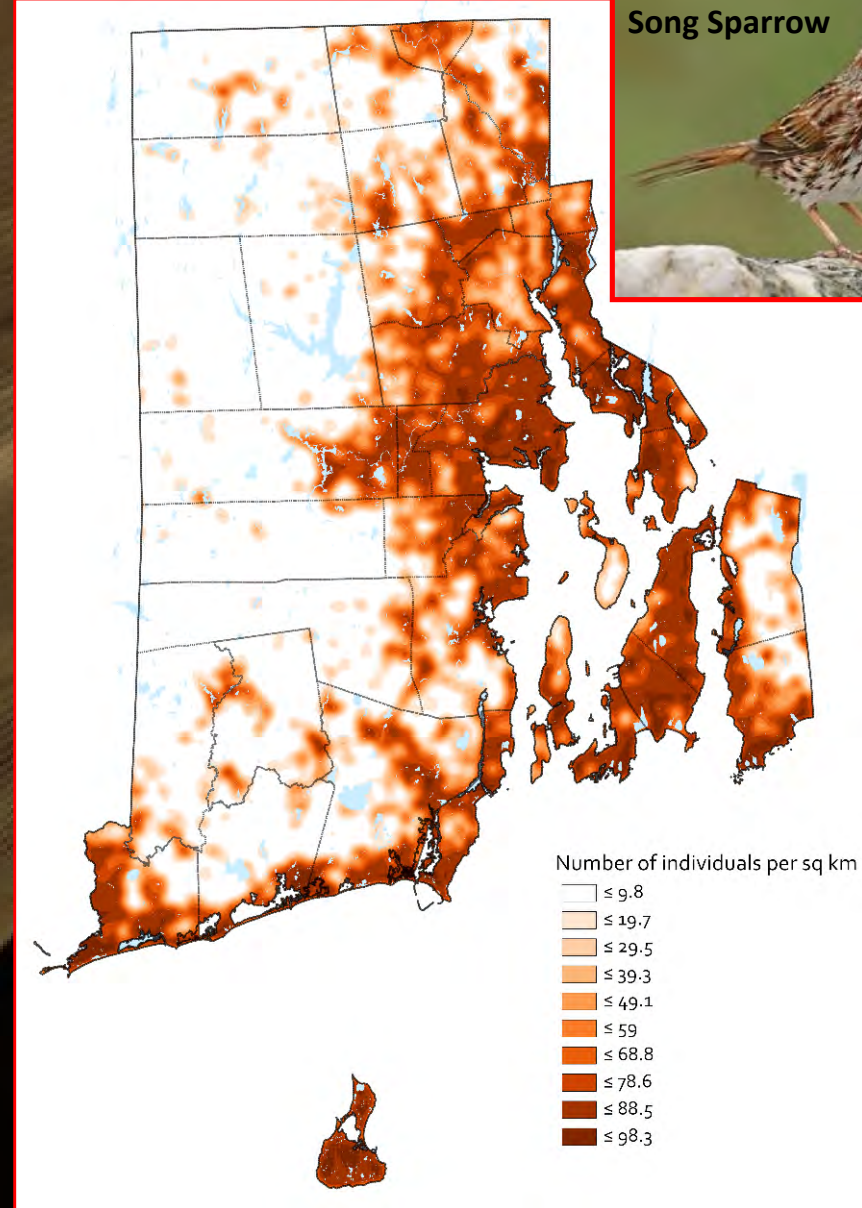
# III. Advanced Analyses



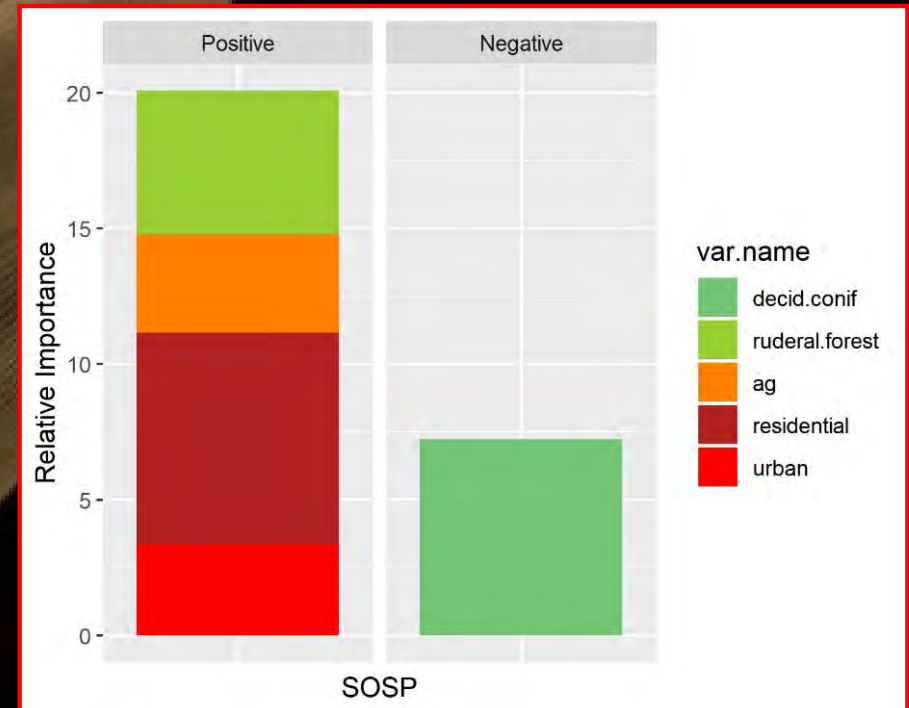
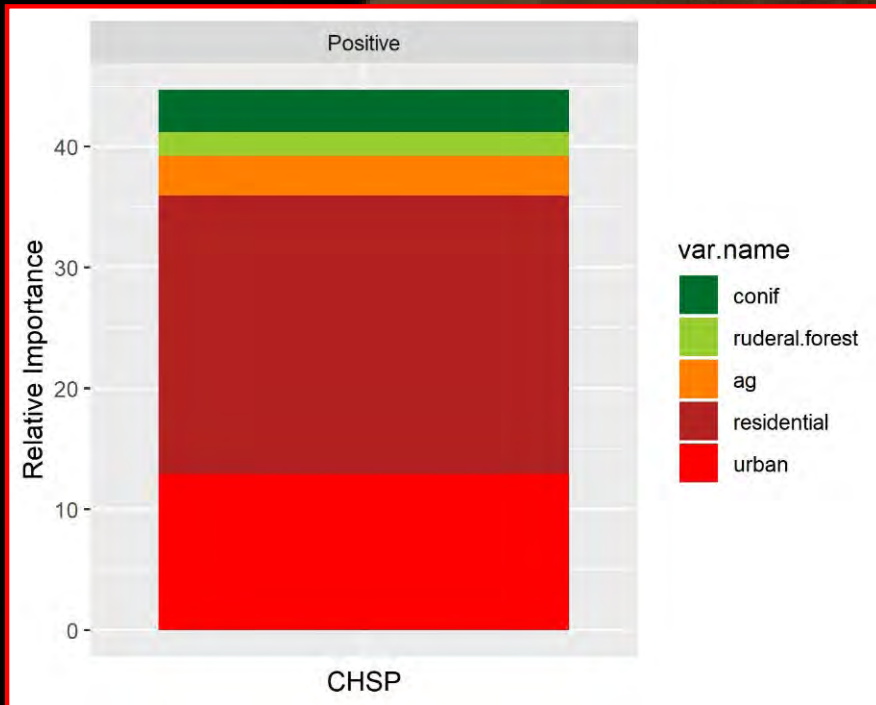
Chipping Sparrow



Song Sparrow

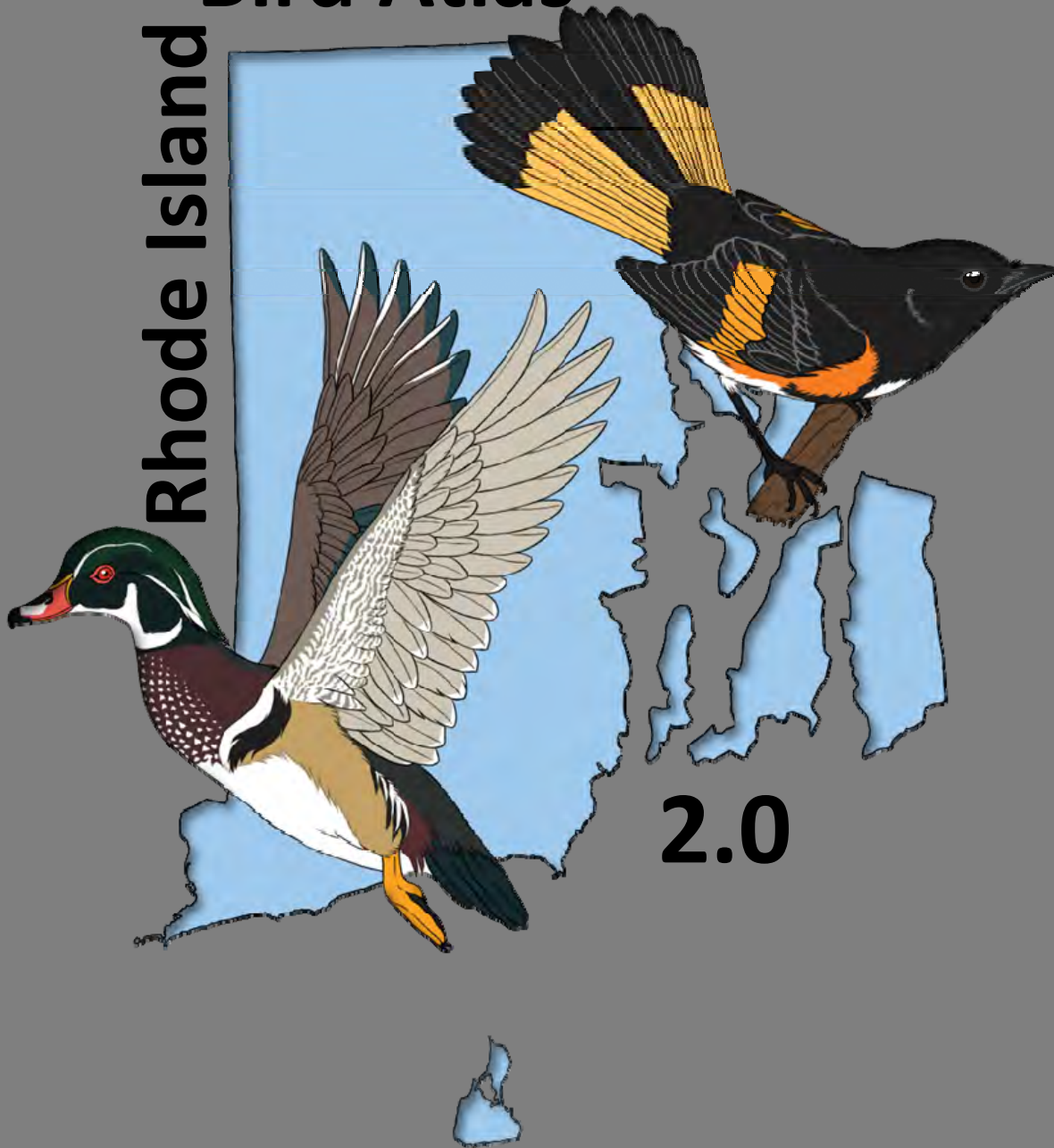


# III. Advanced Analyses



# Bird Atlas

Rhode Island



2.0

BREAK 3:  
DENSITY AND  
PROBABILITY MAPS

# IV. Atlas Tools

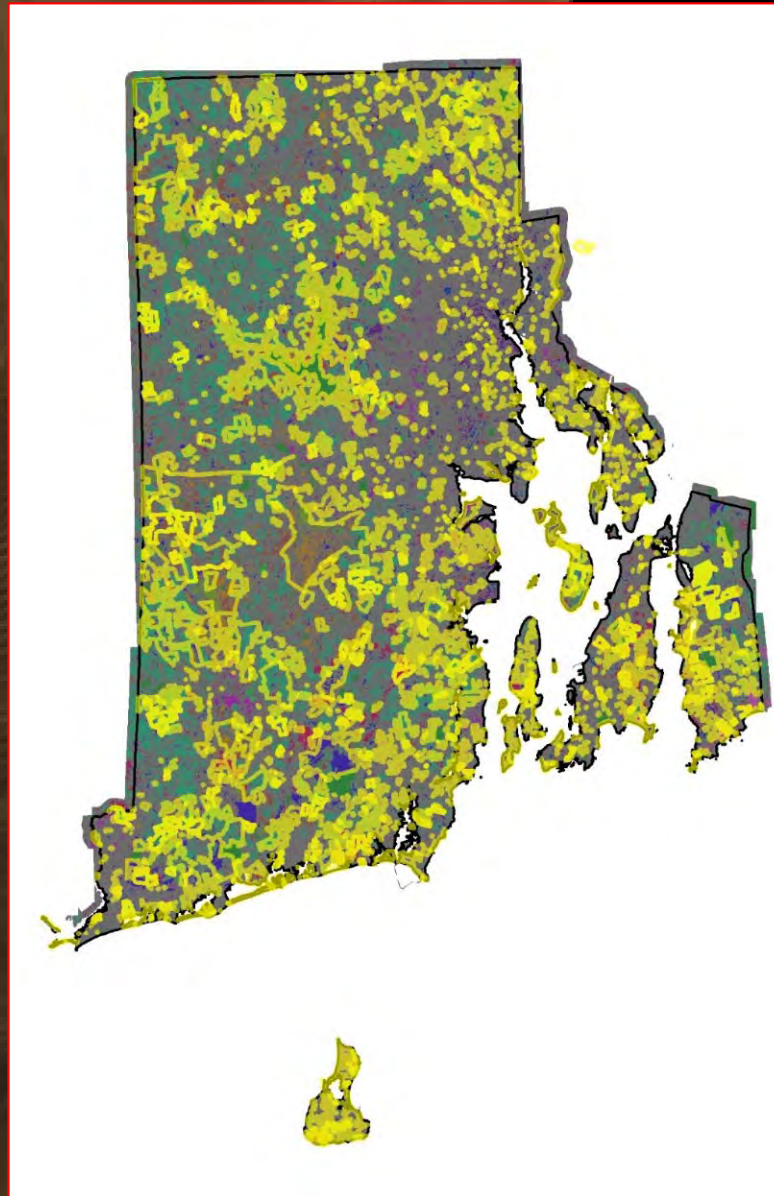


- Huge dataset
- Conservation Tool
  - Inform land use decisions
  - Strengthen habitat management plans
  - Direct funds and effort
  - Assess potential impacts

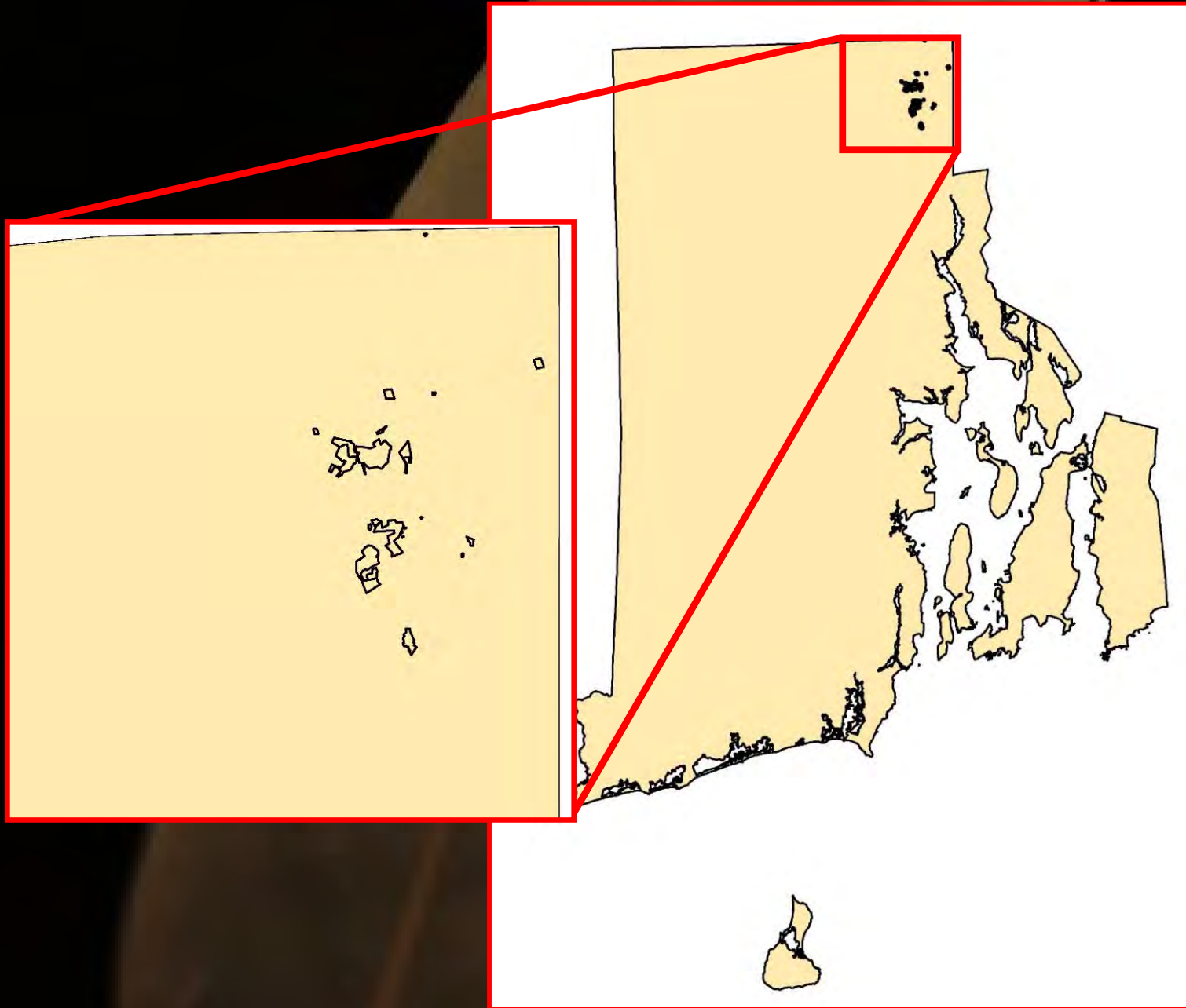
# IV. Atlas Tools



- Land Trusts

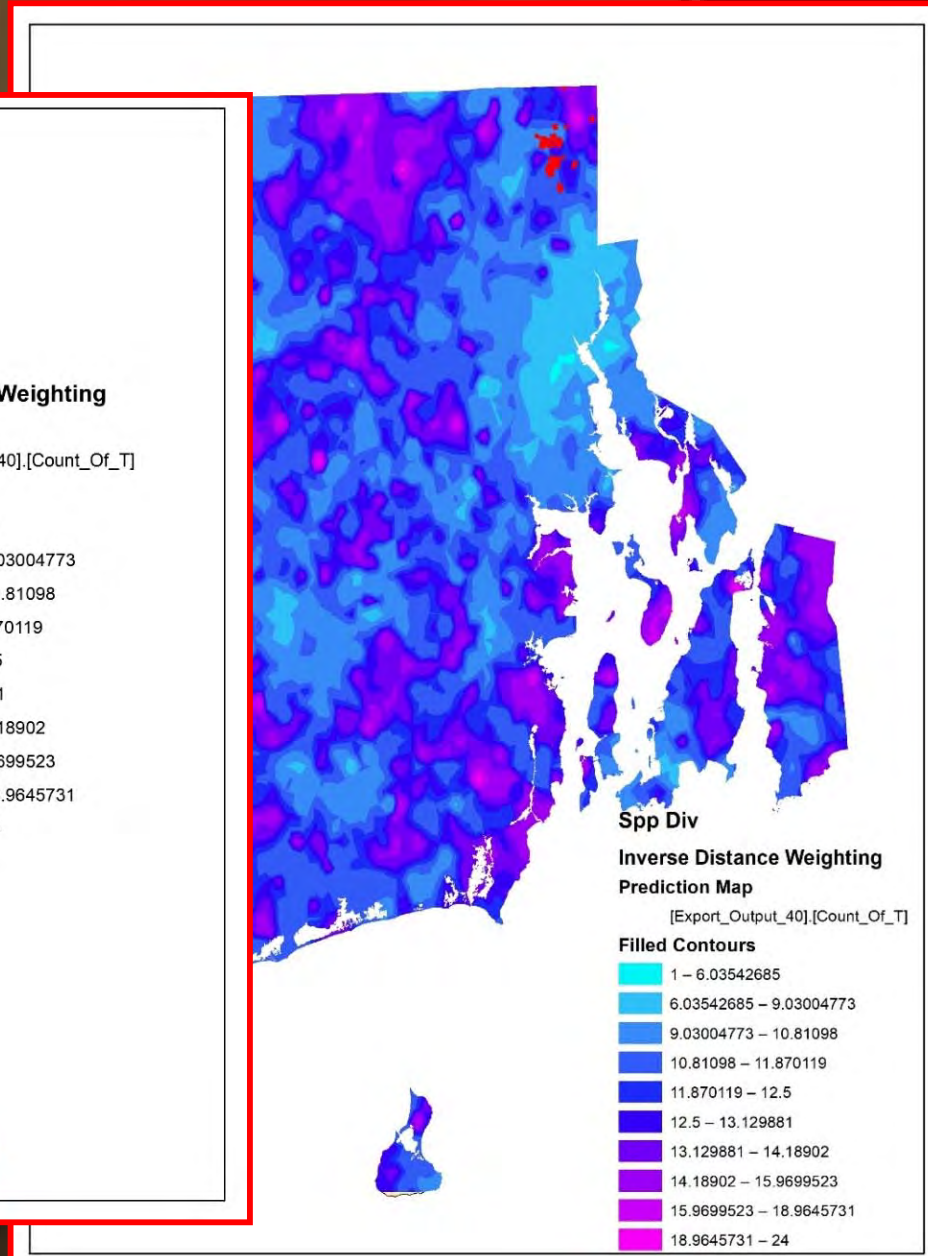
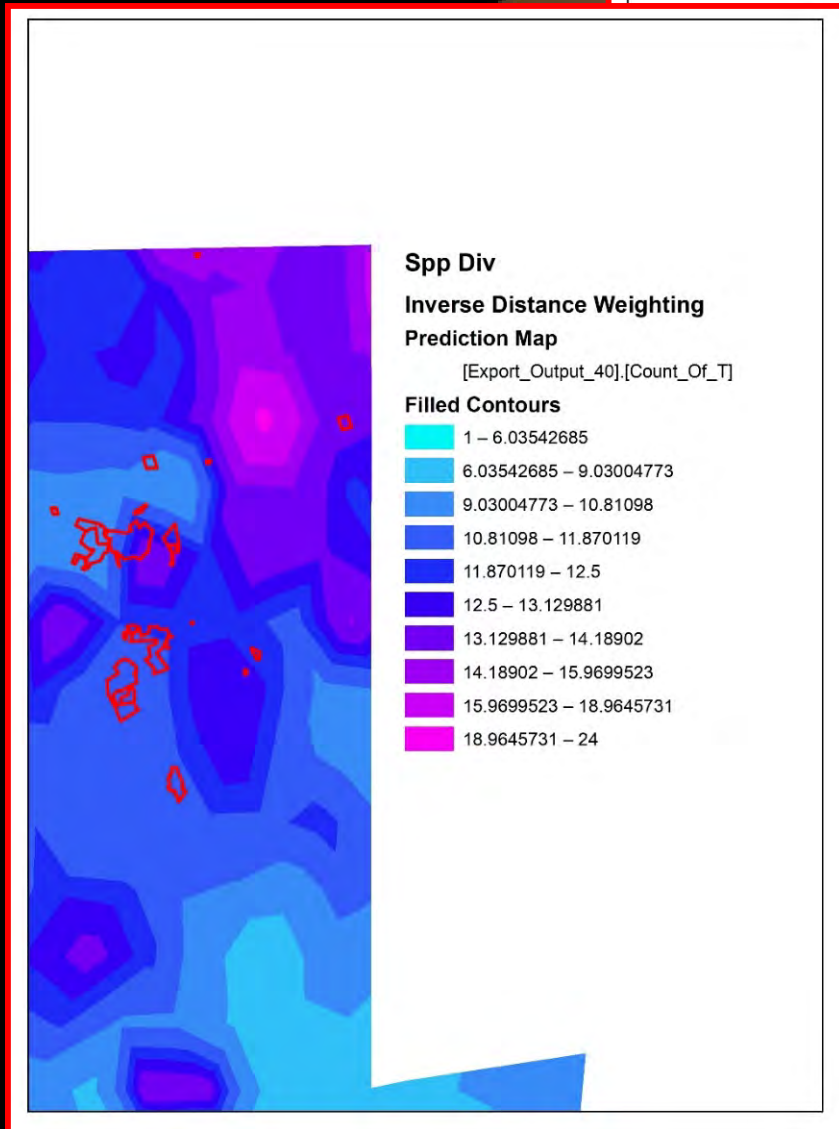


# Cumberland Land Trust

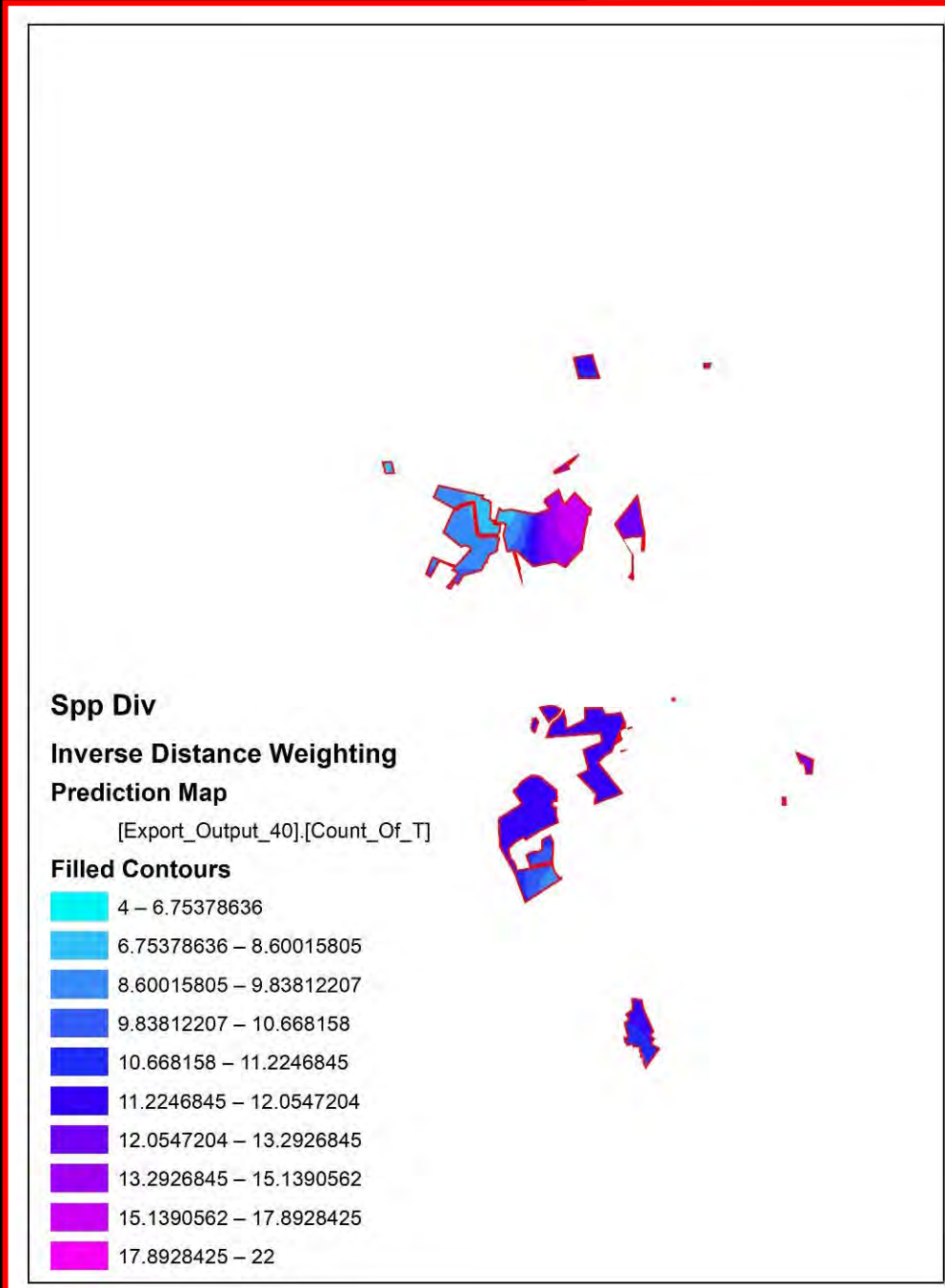
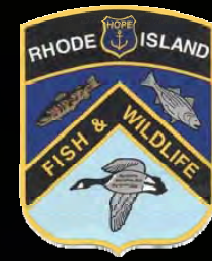




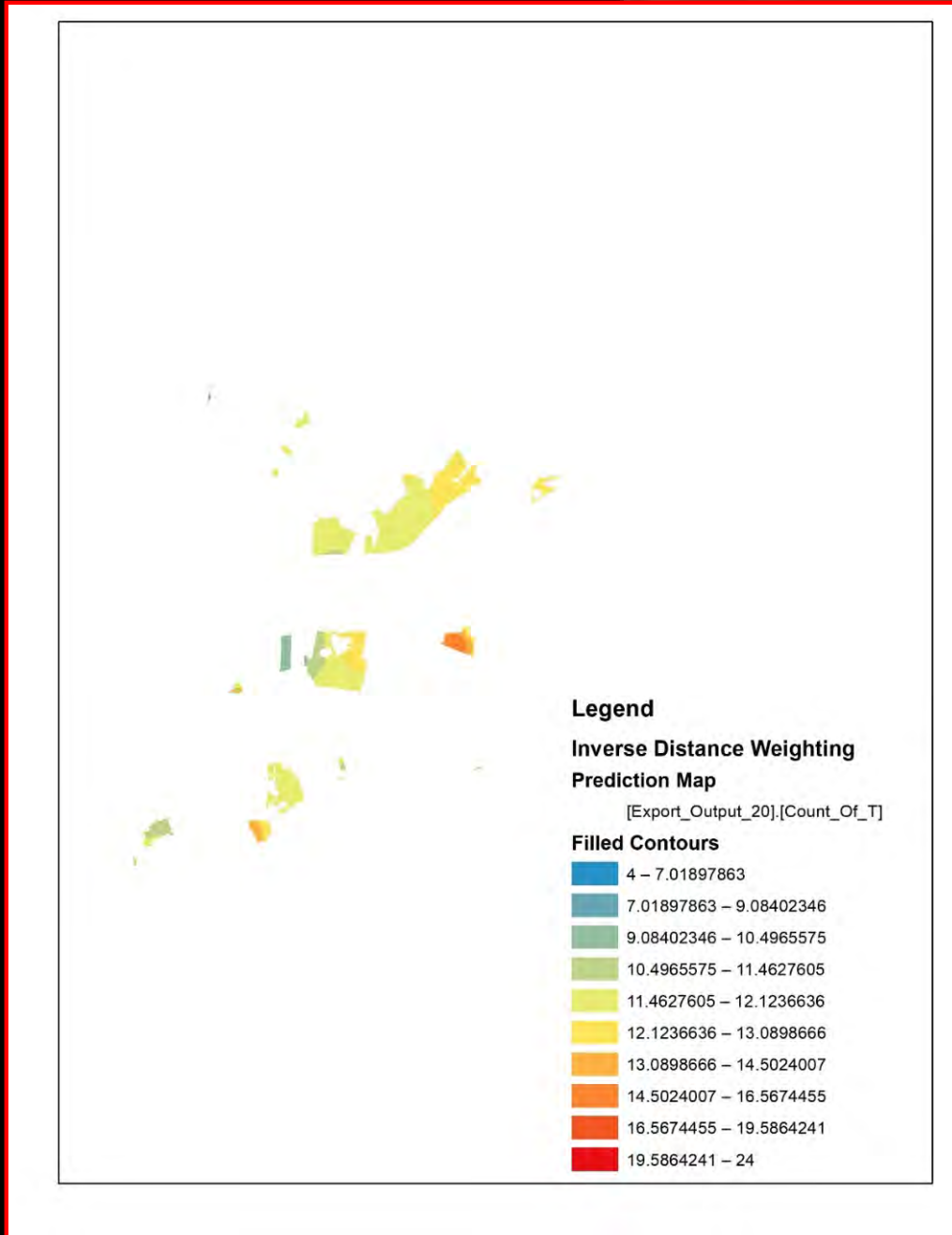
# Cumberland Land Trust



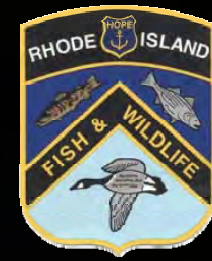
# Cumberland Land Trust



# Westerly Land Trust



# Barrington Land Trust



## Legend

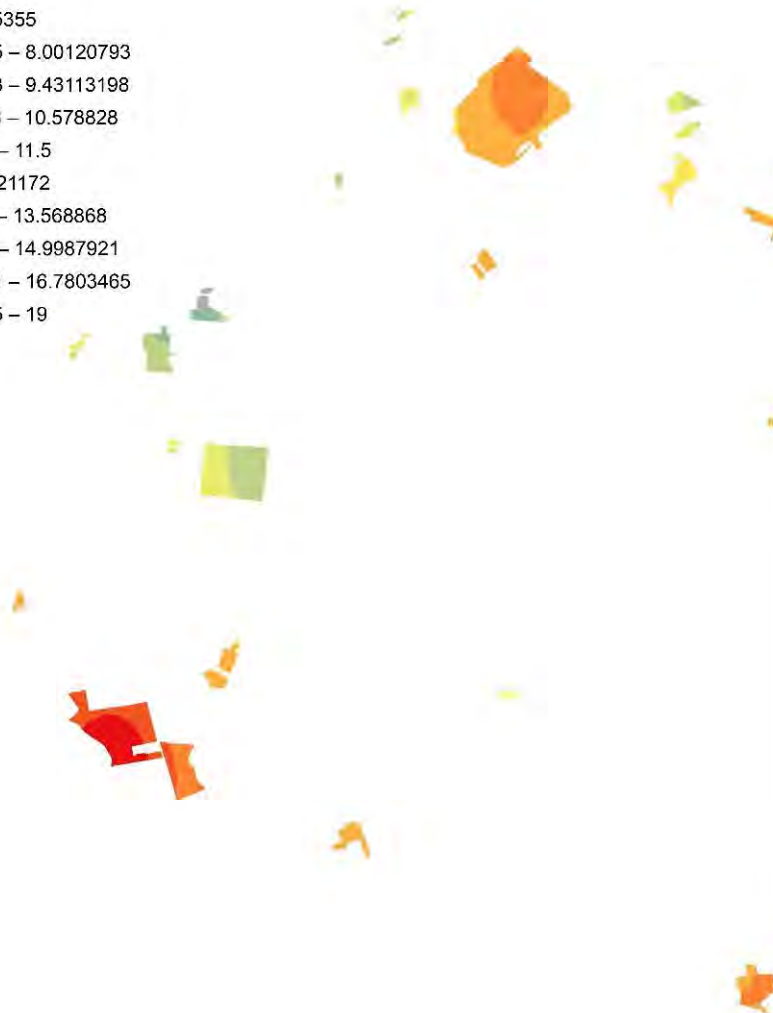
### Inverse Distance Weighting

### Prediction Map

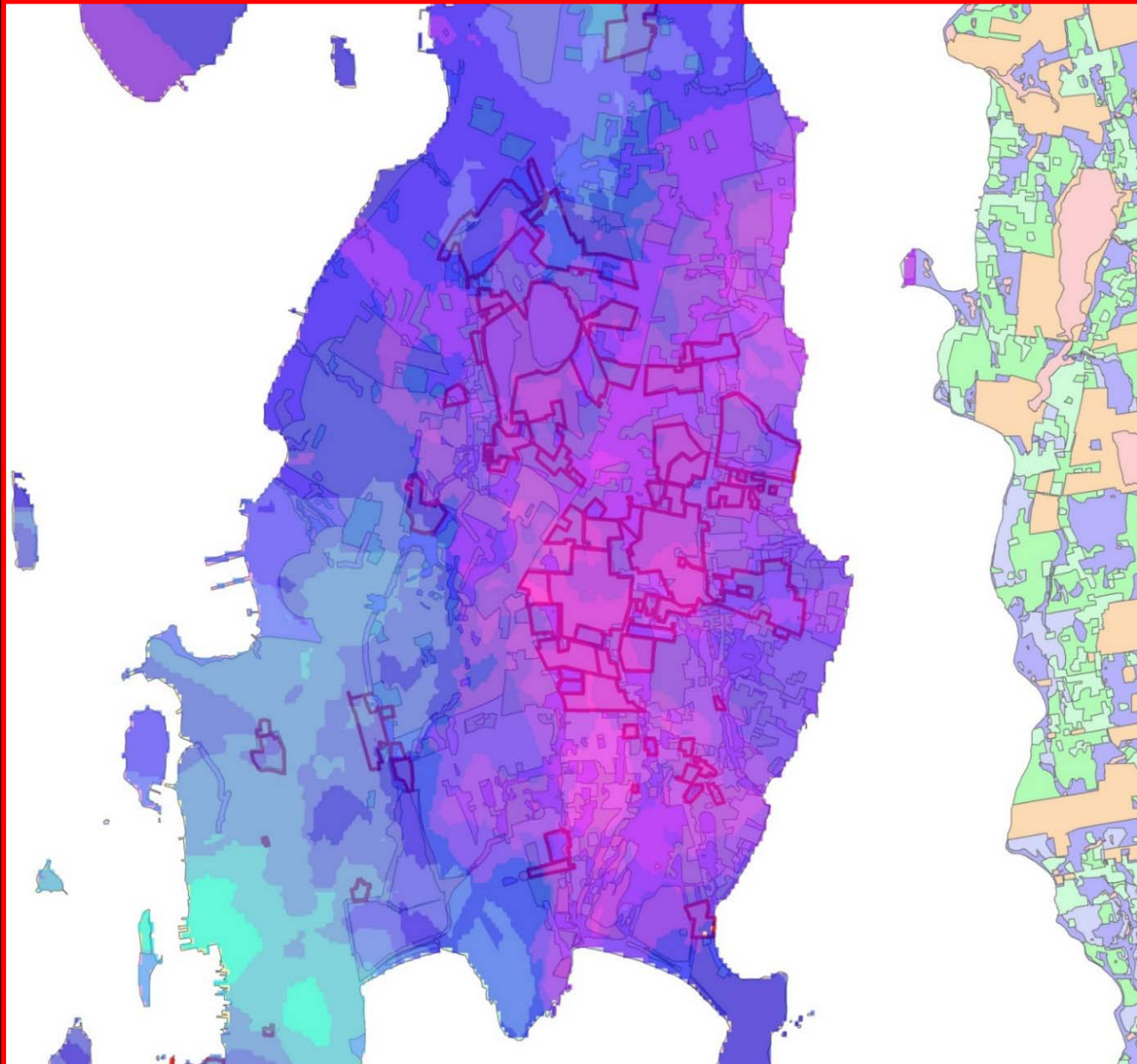
[Export\_Output\_3].[Count\_Of\_T]

### Filled Contours

- 4 – 6.21965355
- 6.21965355 – 8.00120793
- 8.00120793 – 9.43113198
- 9.43113198 – 10.578828
- 10.578828 – 11.5
- 11.5 – 12.421172
- 12.421172 – 13.568868
- 13.568868 – 14.9987921
- 14.9987921 – 16.7803465
- 16.7803465 – 19



# Aquidneck Land Trust



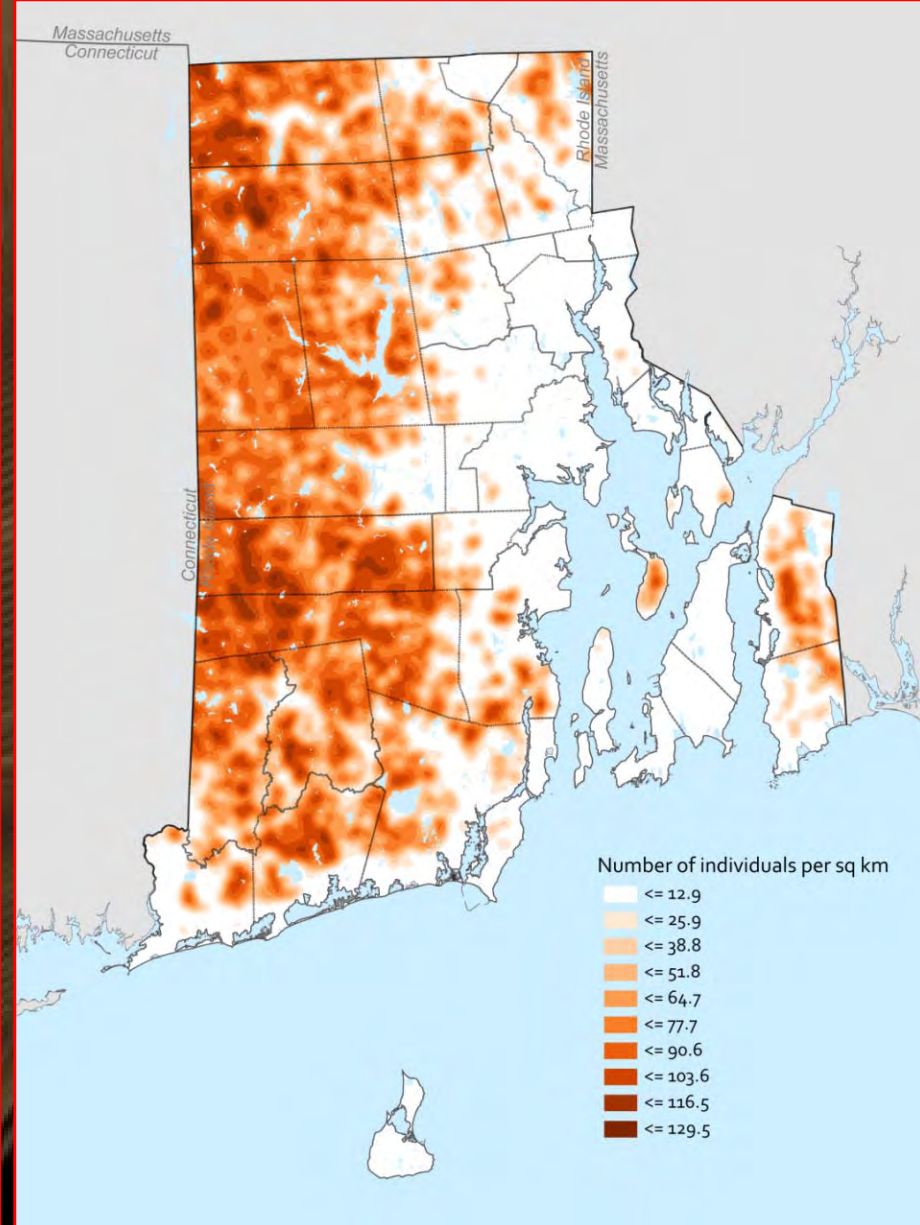
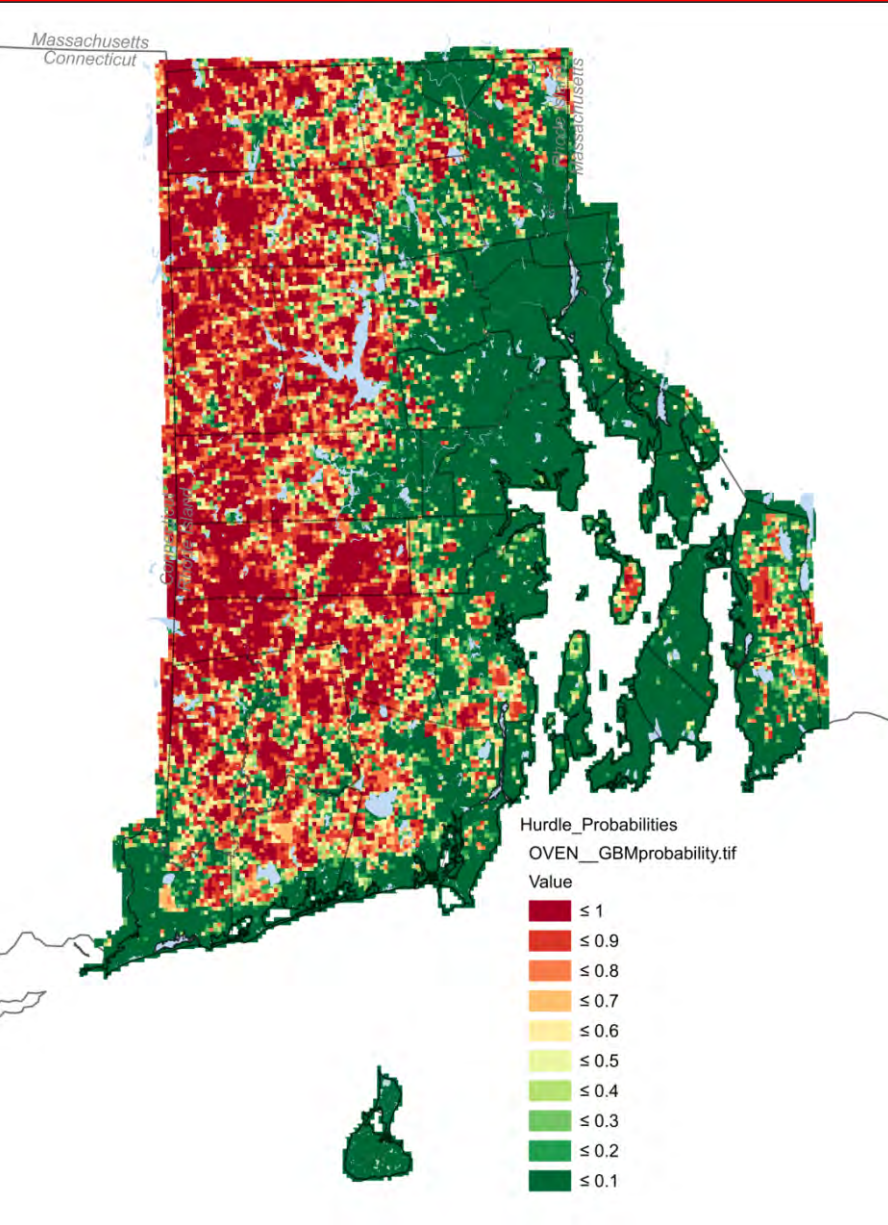
# Solar Arrays in RI



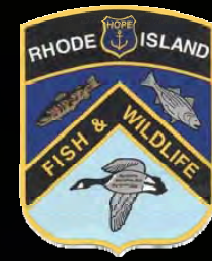
Ovenbird



# Solar Arrays in RI



# Solar Arrays in RI



## Landscape size affects the relative importance of habitat amount, habitat fragmentation, and matrix quality on forest birds

Adam C. Smith, Lenore Fahrig and Charles M. Francis

*A. C. Smith (adam\_c\_smith@sympatico.ca) and L. Fahrig, Geomatics and Landscape Ecology Research Laboratory, Carleton Univ., 1125 Colonel By Drive, Ottawa, ON, Canada K1S 5B6. – C. M. Francis, Environment Canada, Canadian Wildlife Service, National Wildlife Research Center, Carleton Univ., Ottawa, ON, Canada K1A 0H3.*

## The Early Development of Forest Fragmentation Effects on Birds

JOHN M. HAGAN,\* W. MATTHEW VANDER HAEGEN,†† AND PETER S. MCKINLEY\*

\*Manomet Observatory, P.O. Box 1770, Manomet, MA 02345, U.S.A., email:jmhagan@aol.com

††Northeastern Forest Experiment Station, U.S.D.A. Forest Service, 5 Godfrey Drive, Orono, ME 04473, U.S.A.

## Regional Forest Fragmentation and the Nesting Success of Migratory Birds

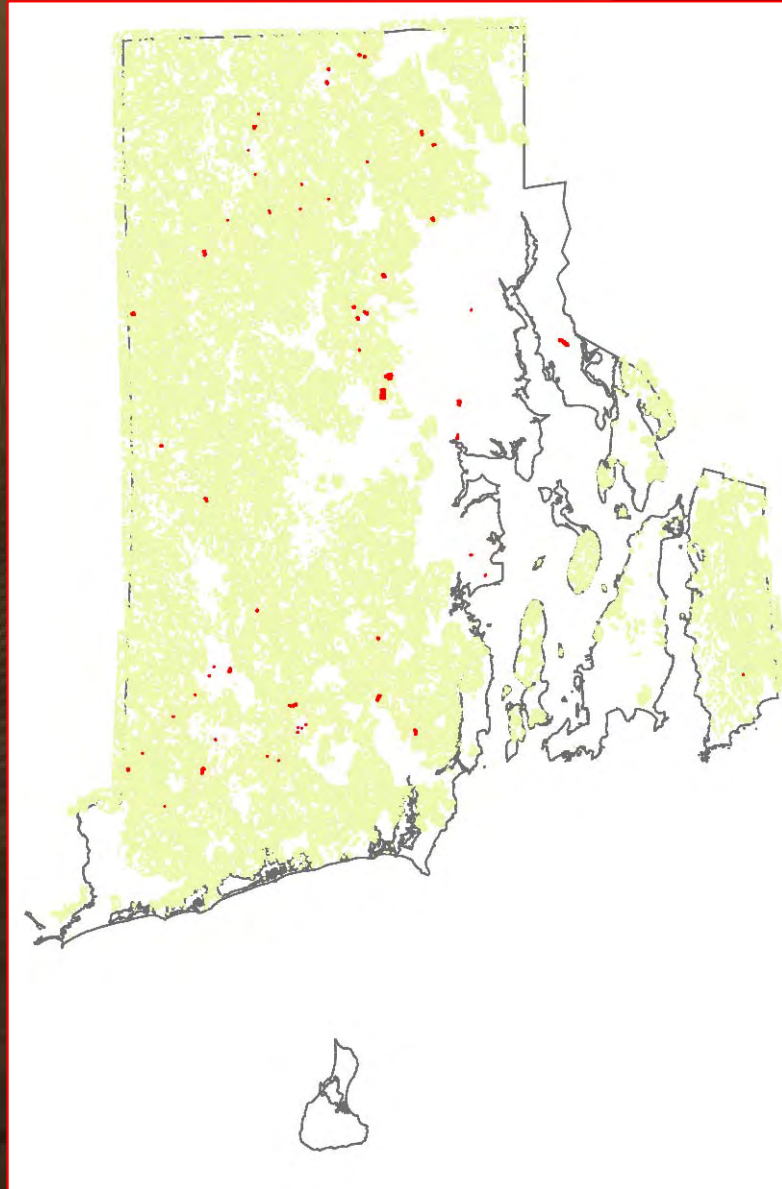
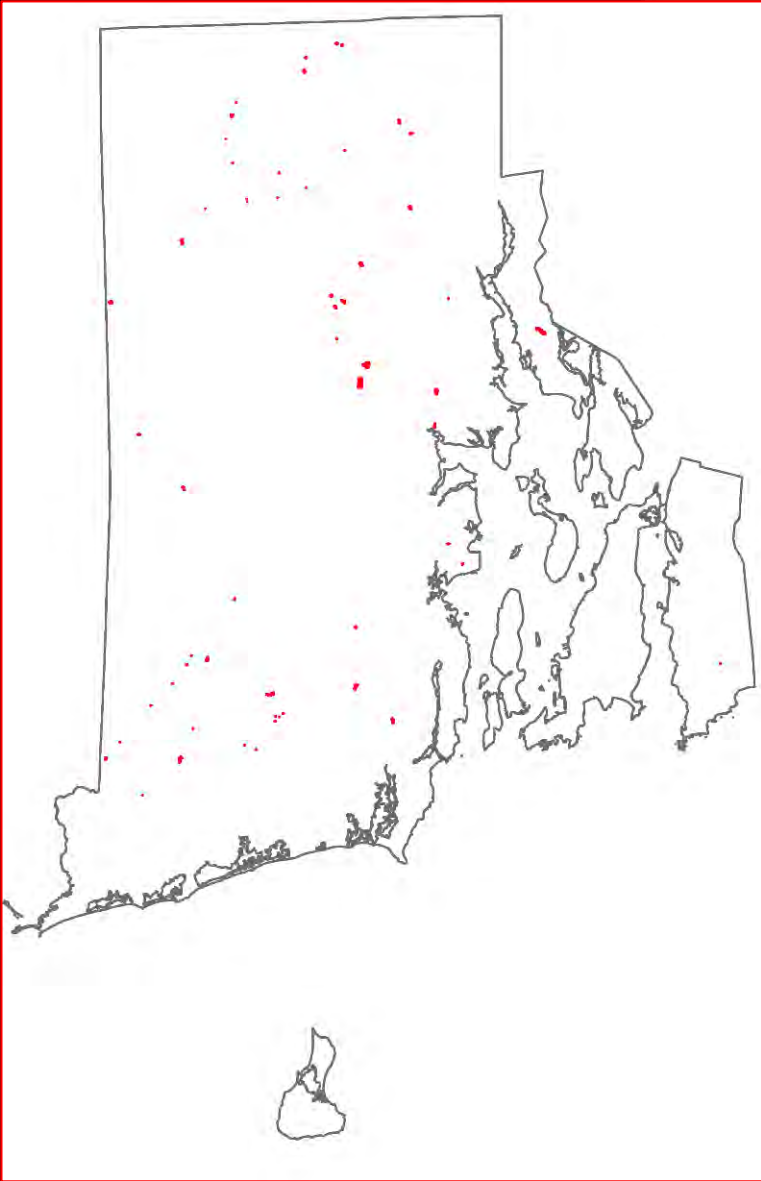
Scott K. Robinson,\* Frank R. Thompson III,  
Therese M. Donovan, Donald R. Whitehead, John Faaborg







# Solar Arrays in RI



## SOLAR FARMS

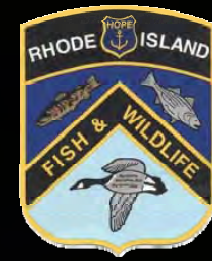
- 431 Acres
- 128 in Oak Forest

# Solar Arrays in RI



- 114,157 Total Population
- 276 Individuals Lost
- **0.2%**

# Solar Arrays in RI



- What about the other mature forest species?



# Solar Arrays in RI



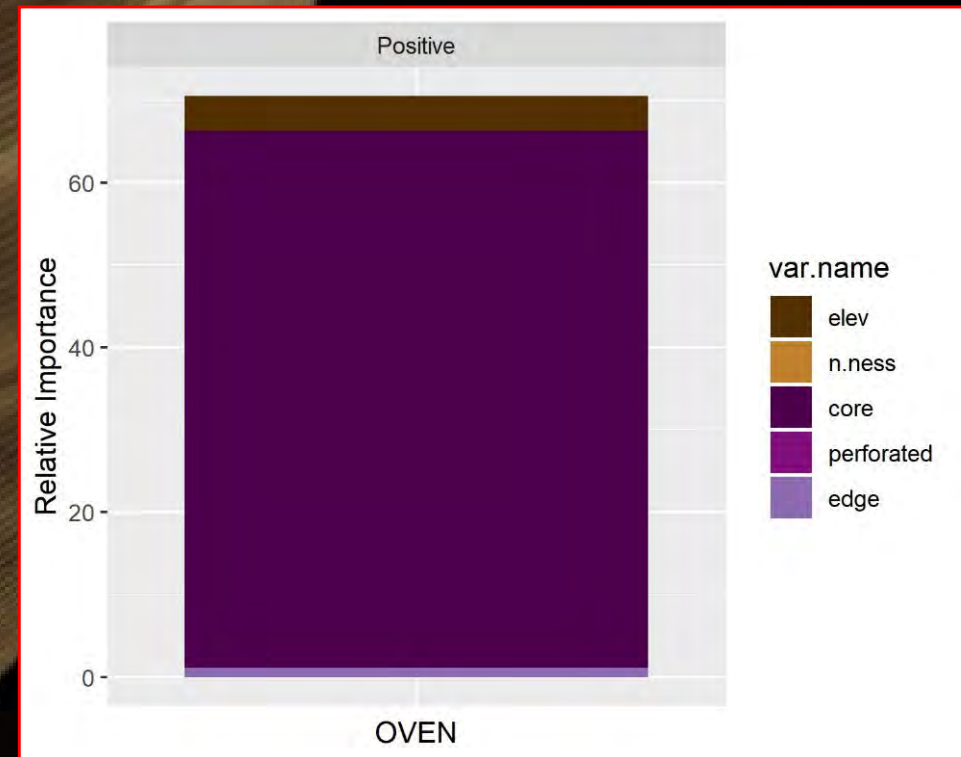
- What about the forest edge species?



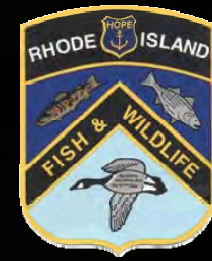
# Solar Arrays in RI



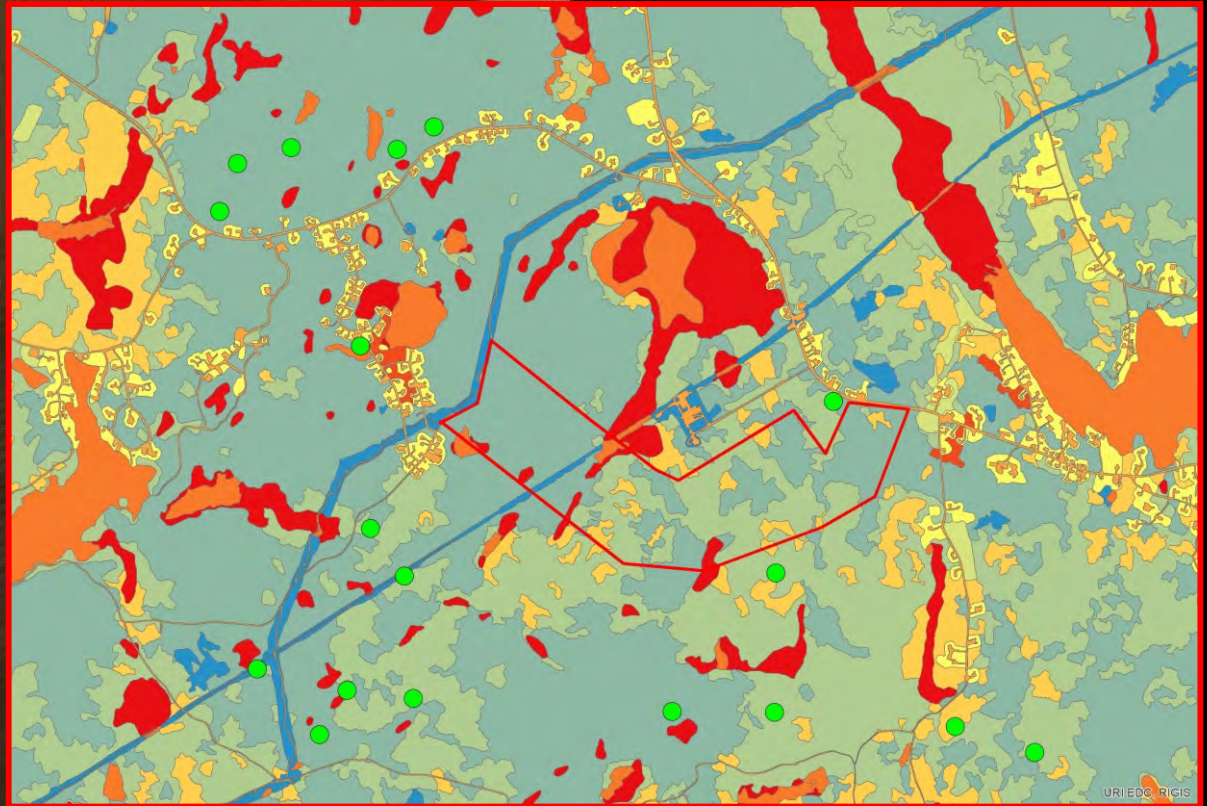
- Outright loss vs. edge effects



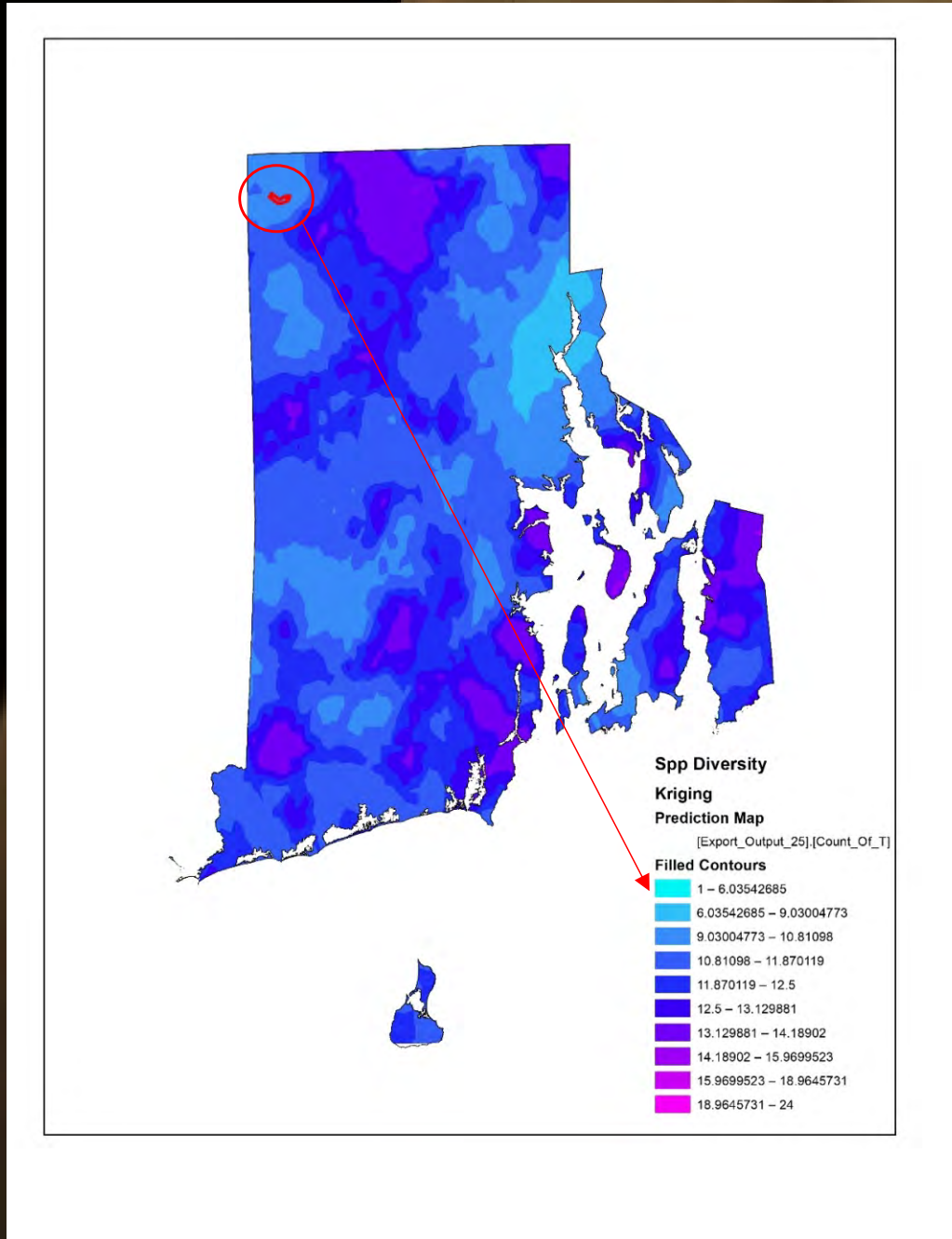
# Invenegy Powerplant



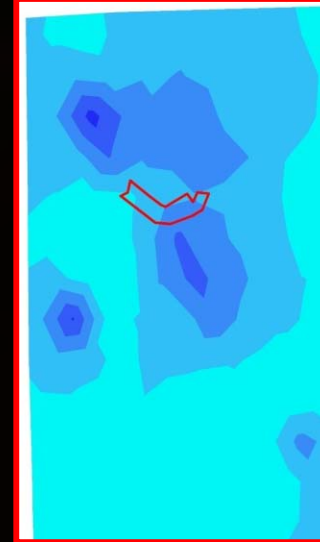
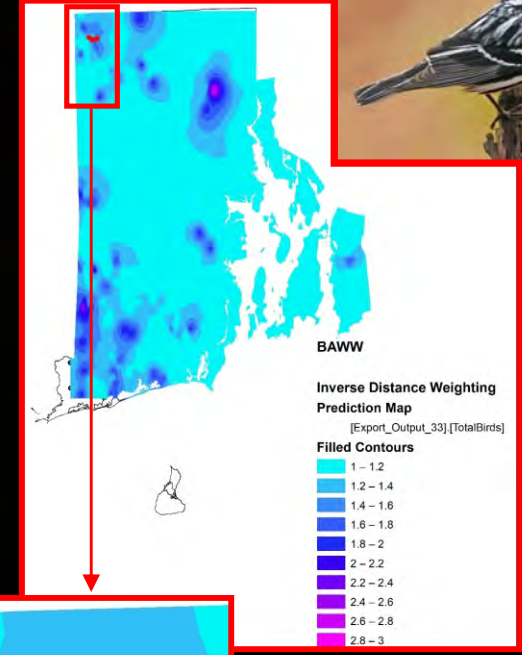
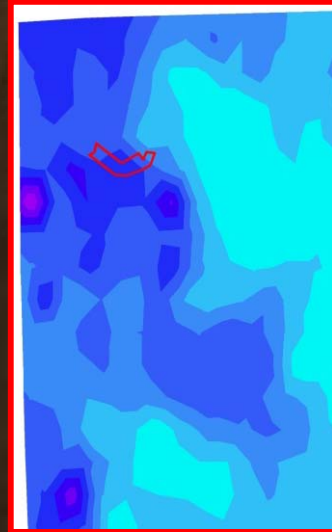
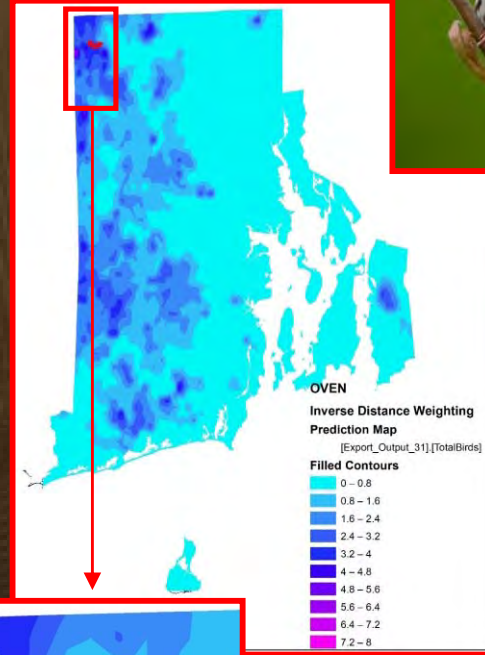
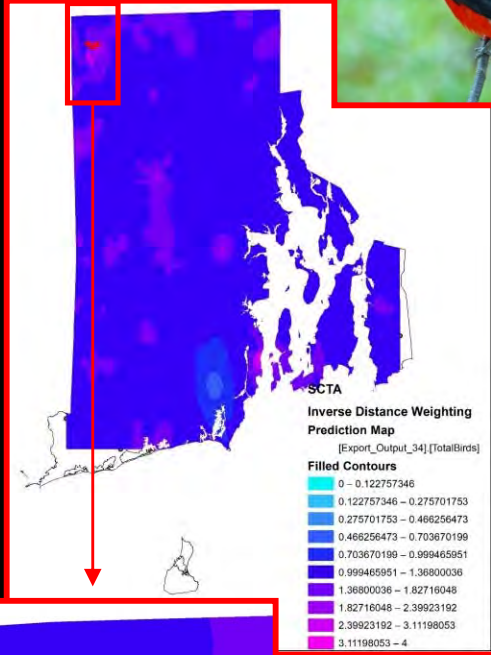
- 18 Point count stations located within 1.5km from proposed site.
- All sampled similar habitats as that found on proposed site



# Invenergy Powerplant



# Invenergy Powerplant







# Species Accounts

### Status

**Rhode Island:** Abundant Migrant, found in 67.3% of blocks (+59 blocks [113.5% increase] since first atlas.

**Southern New England:** -0.6% annual decline (-1.6 to 0.3%); n = 45 routes

## Indigo Bunting (*Passerina cyanea*)

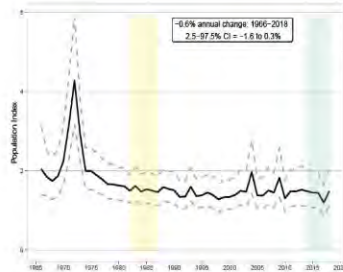


### Life History

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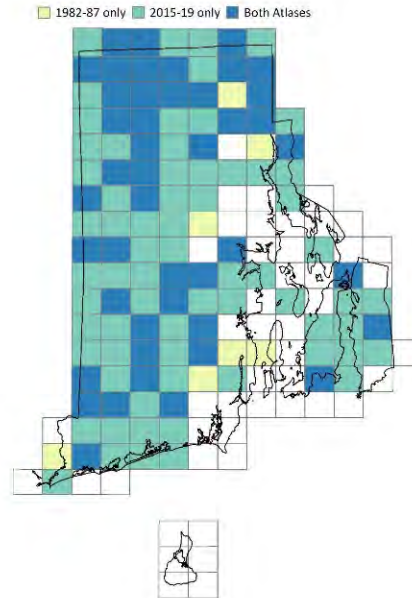
**Breeding range:** Eastern US into southern Canada.

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### Conservation and Management

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### Breeding ecology and migration phenology

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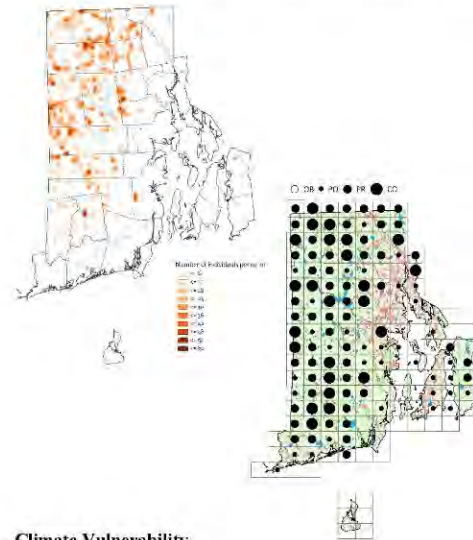
**Clutch initiation dates:** Late May to early July; **Clutch size:** 3-4 eggs.

**Incubation period:** 12-13 d; **Parental duties:** Females incubate and brood chicks, females do most of feeding of chicks, with little assistance from males. Altricial chicks.

**Fledging period:** 9-12 d; **Estimated fledging dates:** Mid-June to late Aug. Recently fledged individuals observed from 11 June to 15 July during the RIBA2.0.

**Parental care after fledging:** Young independent 3-wks after fledging, male occasionally helps to feed 1 fledging from brood, young birds often flock together.

**Fall departure dates:** Late Aug to early Nov, peaking in late Sept.



### Distribution and abundance

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### Climate Vulnerability

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# RI Trend Data

## Indigo Bunting (*Passerina cyanea*)



**Status**

*Rhode Island: Abundant Migrant, found in 67.3% of blocks (+59 blocks [113.5% increase] since first atlas.*

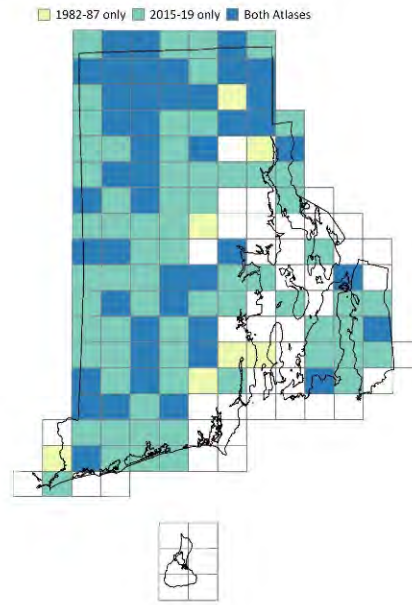
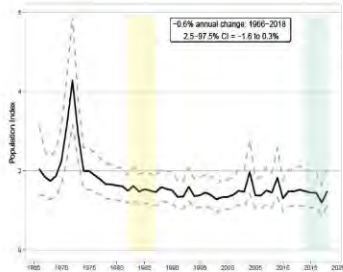
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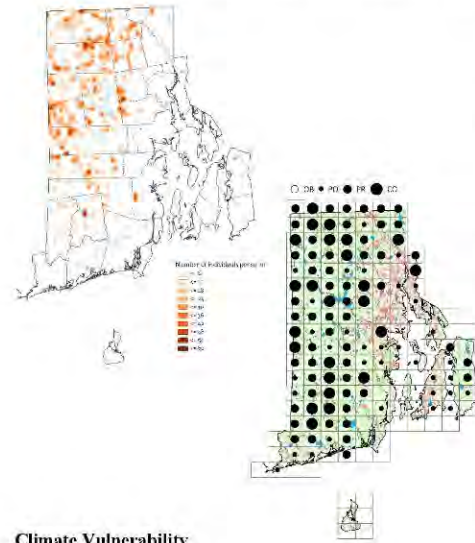
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# General Natural History

## Indigo Bunting (*Passerina cyanea*)



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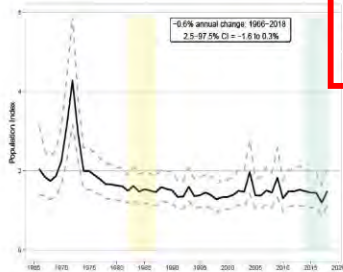
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### Life History

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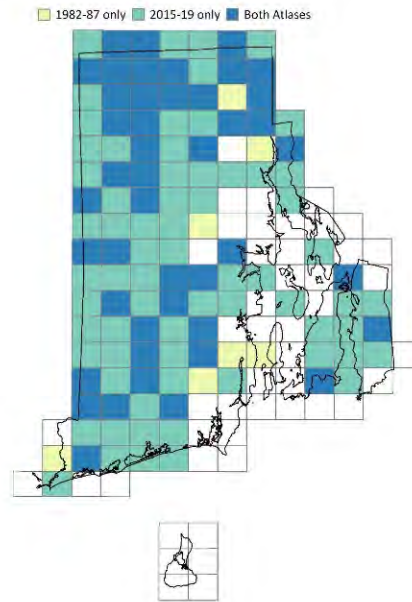
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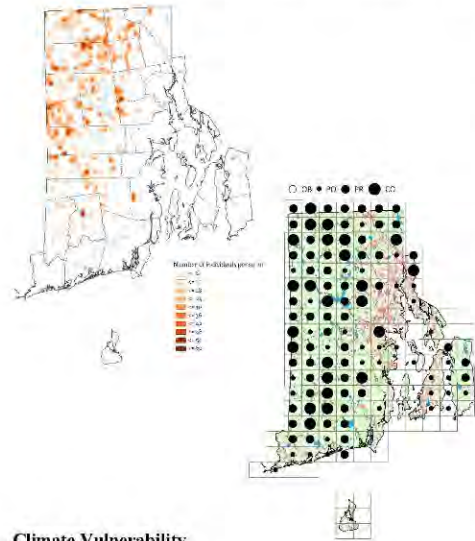
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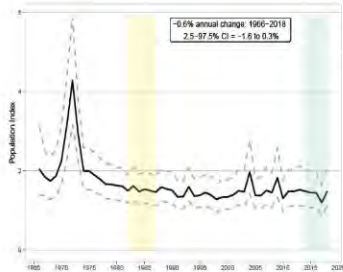


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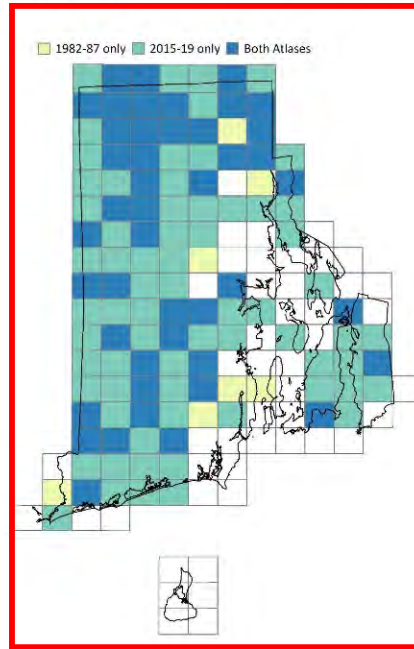
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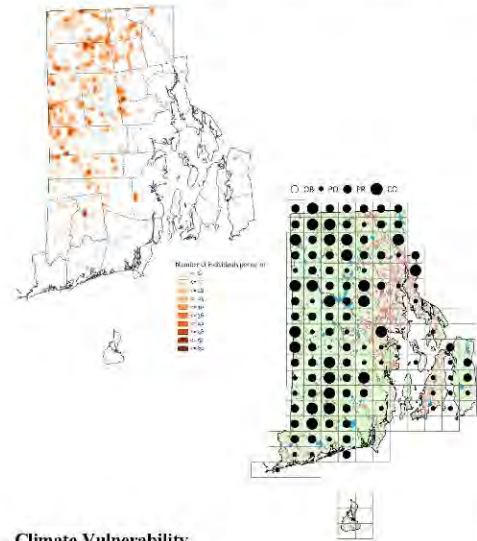
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Atlas 1 vs 2 Change

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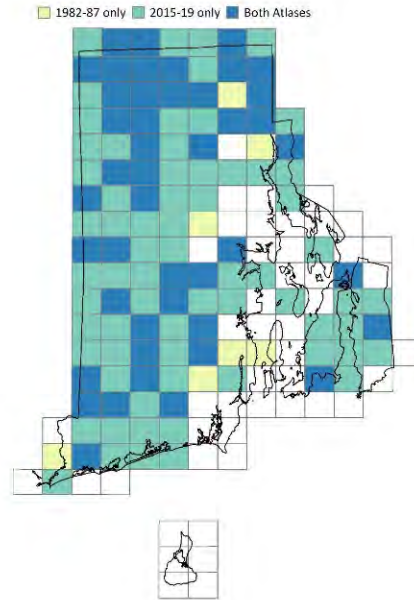
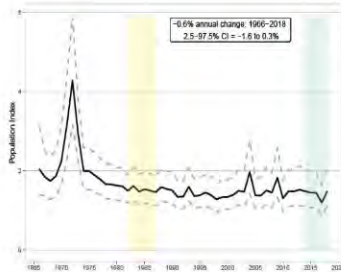


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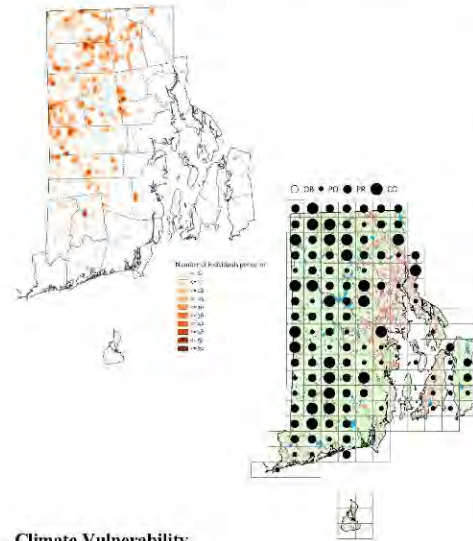
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Conservation and Management within Rhode Island

# Breeding/Migration Phenology (Local)

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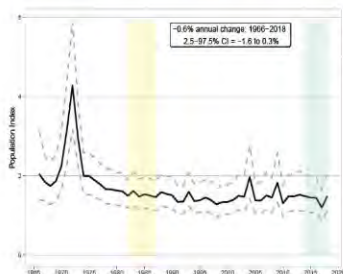


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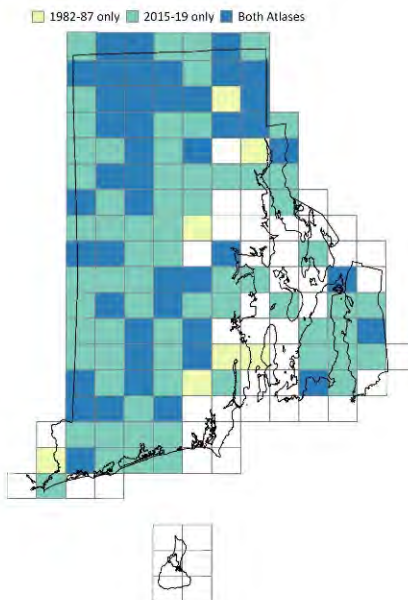
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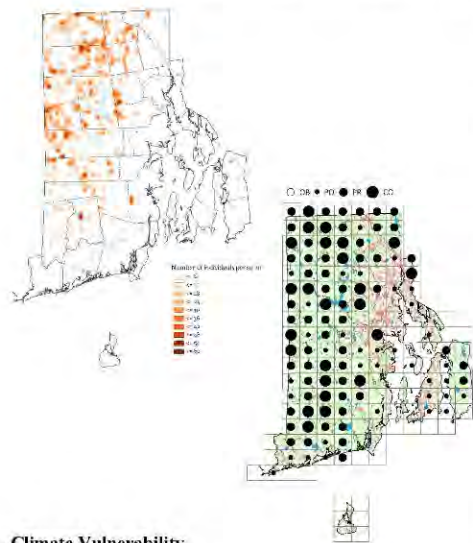
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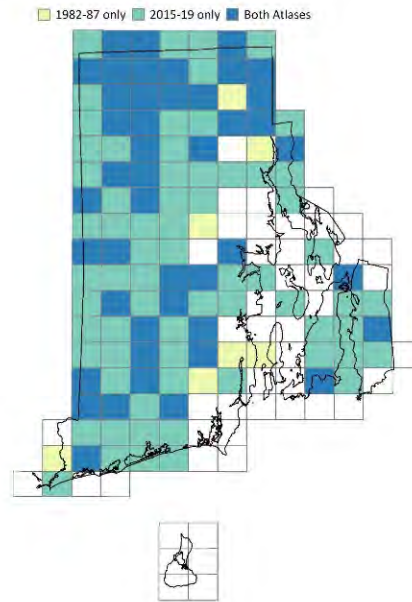
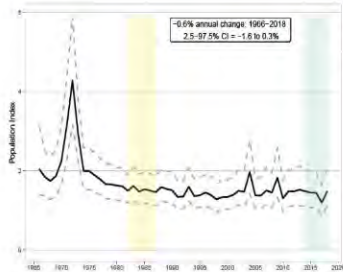


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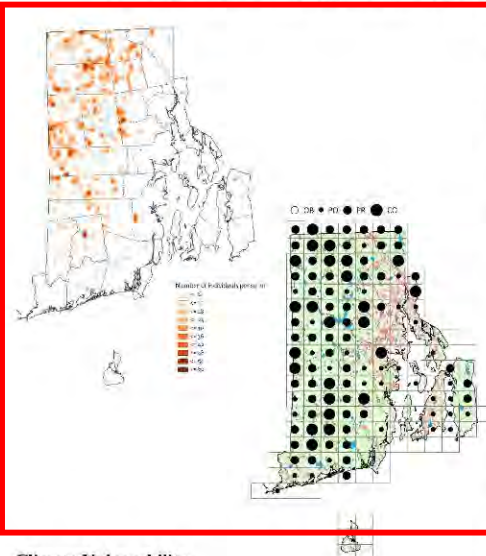
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## Indigo Bunting (*Passerina cyanea*)

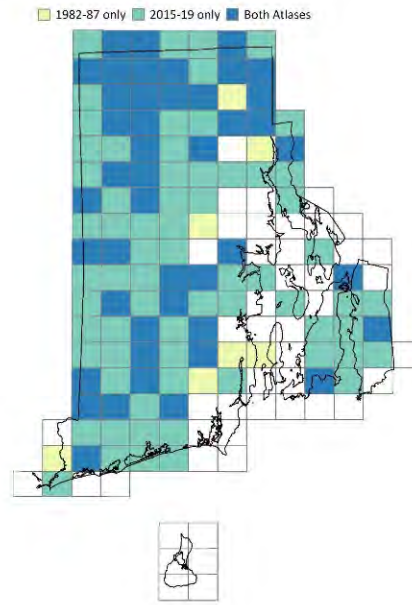
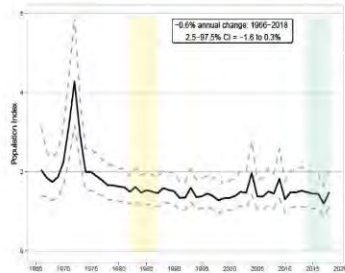


### Life History

One of the most colorful breeding birds that nest in Rhode Island, this widespread species commonly occurs in old fields, power line right-of-ways, and other shrubby or weedy habitats surrounded by woodlands. Indigo Buntings have a distinctive song that they repeat throughout the day at a rate of up to 60 times per hour. They migrate approximately 2,000 km between their breeding and wintering grounds and although they suffer high mortality rates, individuals can live to 11 years old.

**Breeding range:** Eastern US into southern Canada.

**Wintering Range:** Middle America and the Greater Antilles and Bahamas.



### Conservation and Management

A widespread species in eastern North America with no evidence that specific management actions need to be recommended to enhance their populations. However, recent eBird trend analysis suggest widespread declines throughout much of their range. In southern New England, populations appear to be stable or just declining slightly, which might be due in part to recent outbreaks of Gypsy Moths, which appear to have a positive impact on Indigo Bunting populations. The species is commonly used in the pet trade as a cage bird, but unsure what impact this has on their population.

### Breeding ecology and migration phenology

**Spring Arrival:** Late April to late May, females settle into territories 1-2 d after arrival.

**Nest building/characteristics:** Female selects nest site and builds the nest usually <1 m from ground, which takes about 1 week.

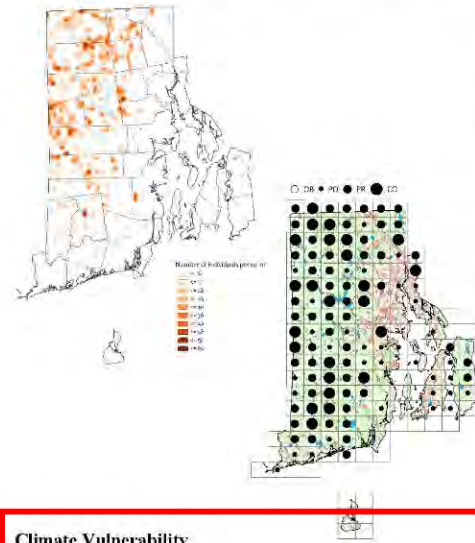
**Clutch initiation dates:** Late May to early July; **Clutch size:** 3-4 eggs.

**Incubation period:** 12-13 d; **Parental duties:** Females incubate and brood chicks, females do most of feeding of chicks, with little assistance from males. Altricial chicks.

**Fledging period:** 9-12 d; **Estimated fledging dates:** Mid-June to late Aug. Recently fledged individuals observed from 11 June to 15 July during the RIBA2.0.

**Parental care after fledging:** Young independent 3-wks after fledging, male occasionally helps to feed 1 fledging from brood, young birds often flock together.

**Fall departure dates:** Late Aug to early Nov, peaking in late Sept.



### Distribution and abundance

**Historical:** Common summer resident in northern and western parts of Rhode Island in late 1800s (H and S 1899).

**RIBA1.0:** Widespread in the state. Detected in 52 blocks (confirmed in 6), rarely detected in coastal regions, instead frequenting the edges of woodlands or old fields surrounded by forests or powerline right-of-ways.

**RIBA2.0:** Increasing since first atlas. Detected in 111 blocks (confirmed in 24). The species has now become much more uniformly distributed in the state where it is found nesting in both coniferous as well as mixed forest types, shrub lands and agricultural habitats. Current estimated population size for the state is 8,820 individuals, with the highest population density in western Rhode Island.

### Climate Vulnerability

**Moderate.** Indigo Buntings are predicted to lose approximately 33% of their current breeding range due to a warming climate. Losses will primarily occur along the western and southern edge and Great Lakes regions of their current range. The portion of their range in southern New England is expected to be maintained and a 24% range expansion is predicted to occur into southern Canada and northern New England.

Climate change predictions

### Status

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## Indigo Bunting (*Passerina cyanea*)

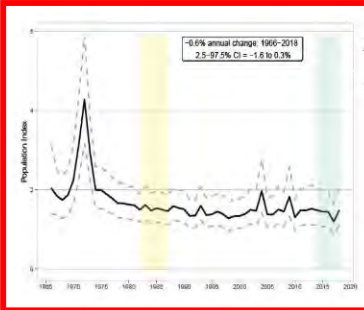


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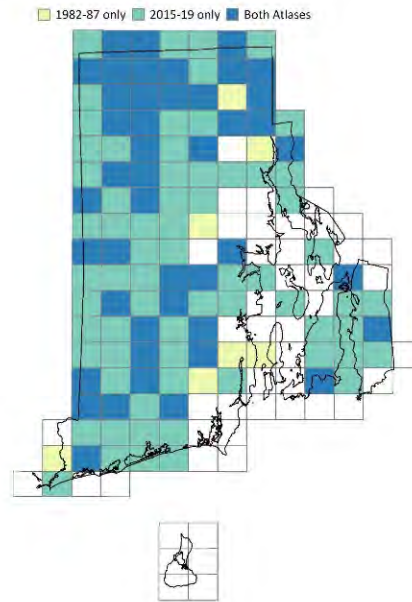
**Breeding range:** Eastern US into southern Canada.

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### Breeding ecology and migration phenology

**Spring Arrival:** Late April to late May, females settle into territories 1-2 d after arrival.

**Nest building/characteristics:** Female selects nest site and builds the nest usually <1 m from ground, which takes about 1 week.

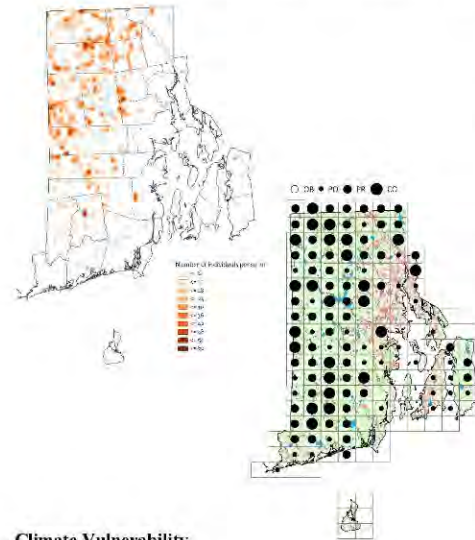
**Clutch initiation dates:** Late May to early July; **Clutch size:** 3-4 eggs.

**Incubation period:** 12-13 d; **Parental duties:** Females incubate and brood chicks, females do most of feeding of chicks, with little assistance from males. Altricial chicks.

**Fledging period:** 9-12 d; **Estimated fledging dates:** Mid-June to late Aug. Recently fledged individuals observed from 11 June to 15 July during the RIBA2.0.

**Parental care after fledging:** Young independent 3-wks after fledging, male occasionally helps to feed 1 fledging from brood, young birds often flock together.

**Fall departure dates:** Late Aug to early Nov, peaking in late Sept.



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### Climate Vulnerability

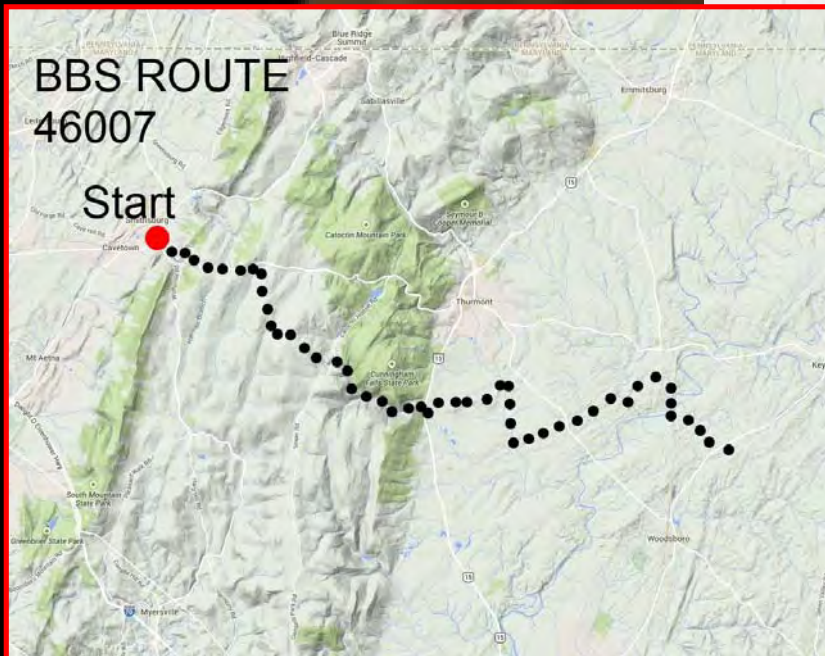
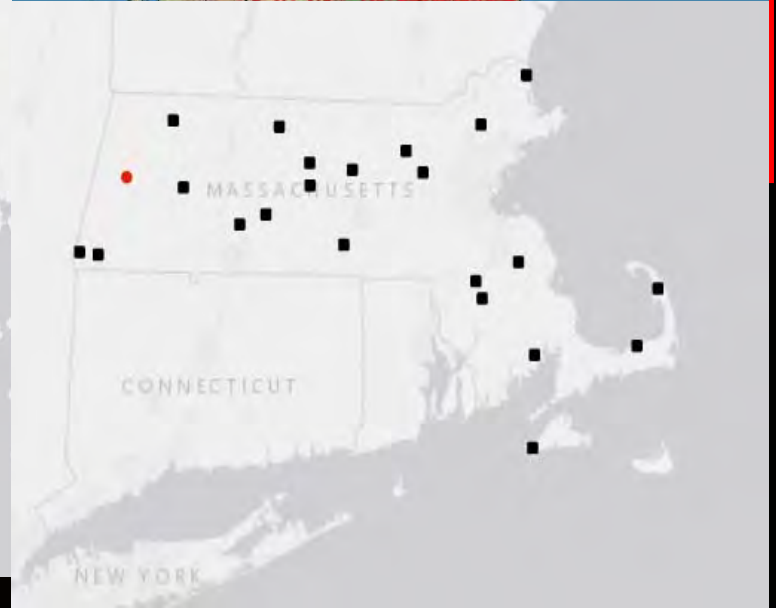
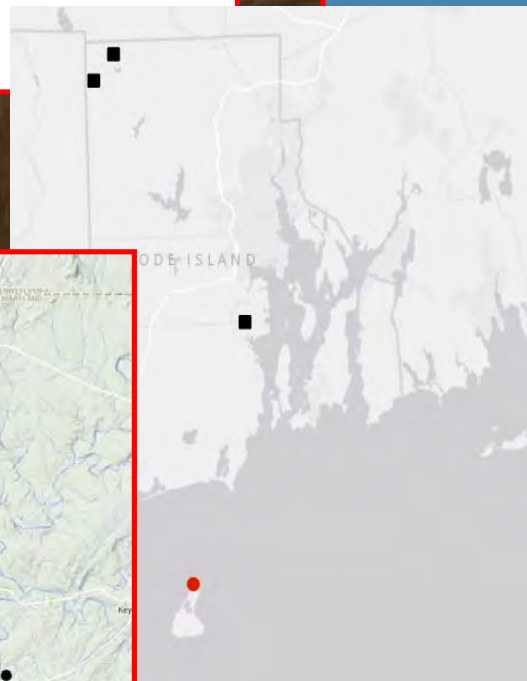
**Moderate.** Indigo Buntings are predicted to lose approximately 33% of their current breeding range due to a warming climate. Losses will primarily occur along the western and southern edge and Great Lakes regions of their current range. The portion of their range in southern New England is expected to be maintained and a 24% range expansion is predicted to occur into southern Canada and northern New England.

Regional BBS Trend Data

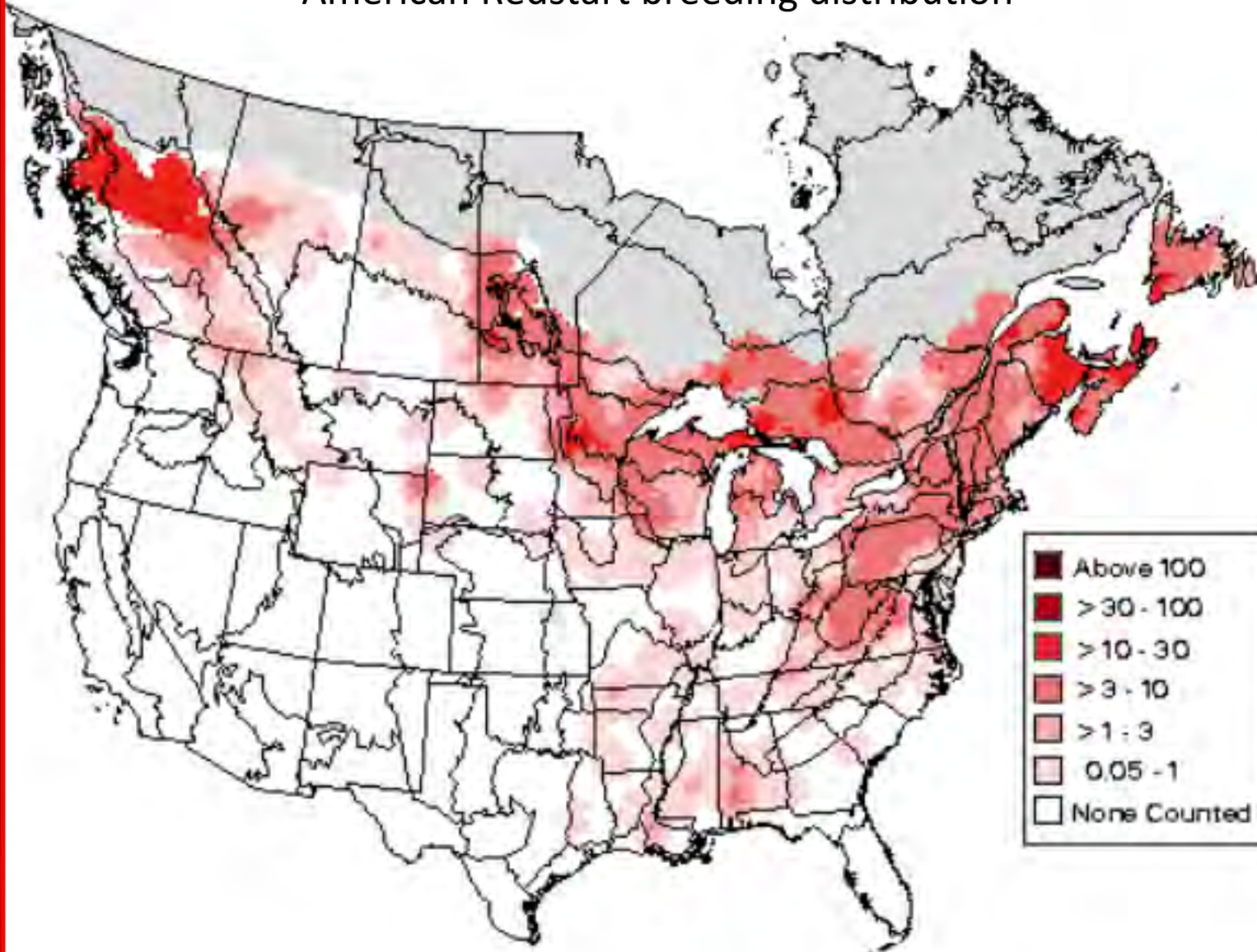


# BBS Data

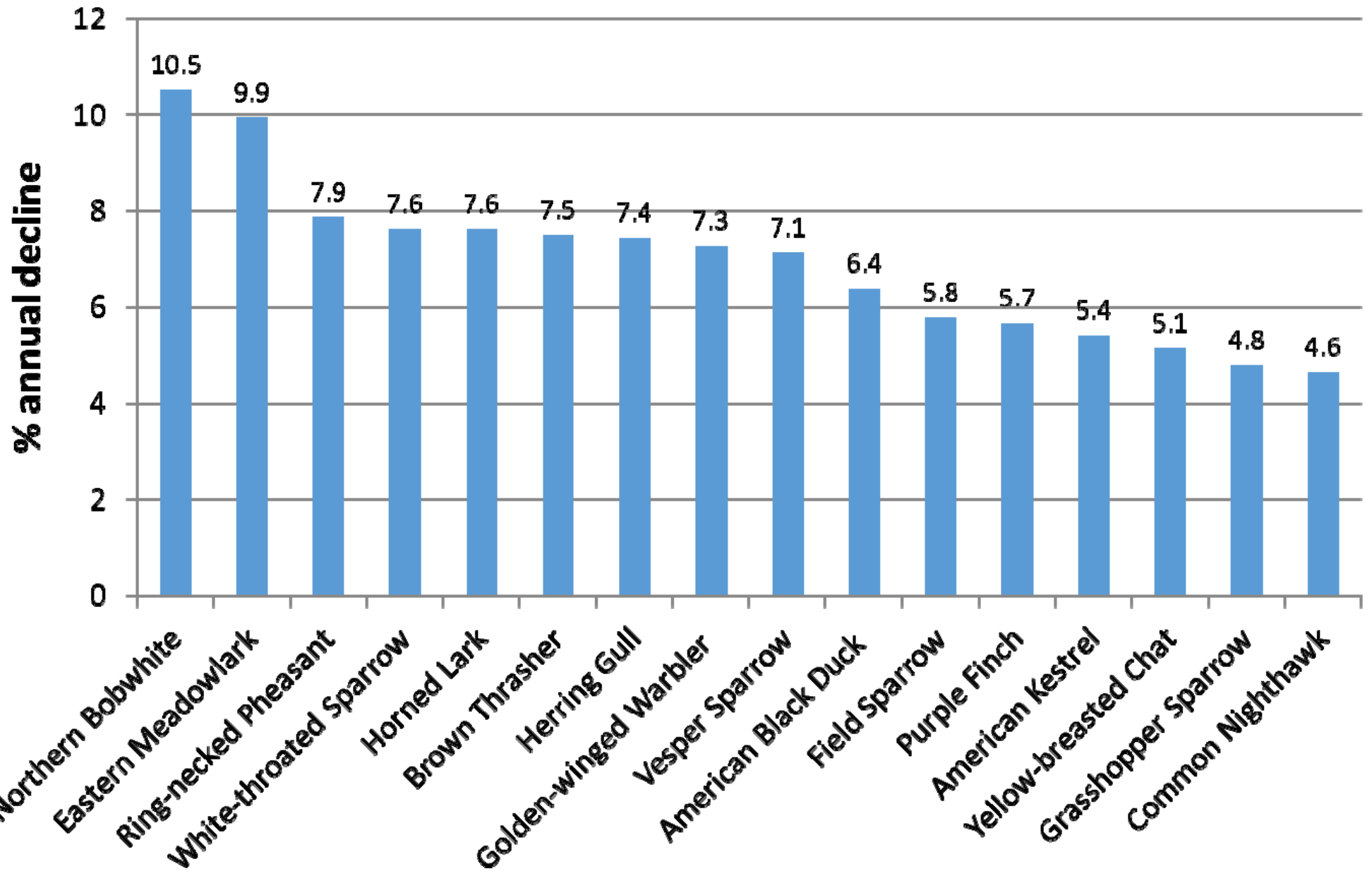
North American Breeding Bird Survey  
USGS – volunteer effort  
1966-present  
~4,100 routes each year  
Routes 24.5 miles long  
50 stations,  
3-min per station  
All birds within 0.25 miles



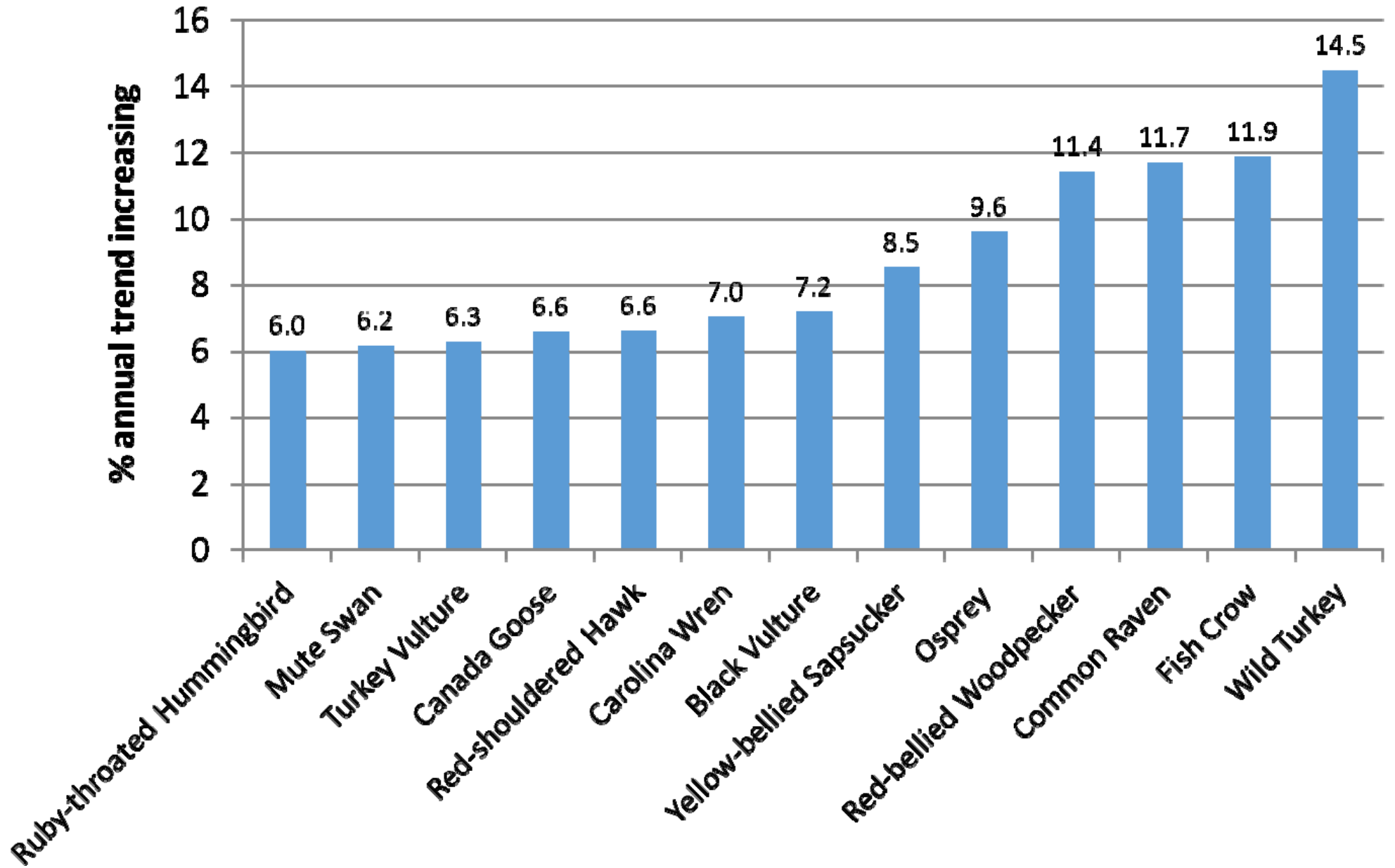
## American Redstart breeding distribution



# Top 15 declining species BCR 30: RI, MA, CT: 1966-2018



**Top 12 Increasing species: Trend(%/yr)**  
**BCR 30: CT, MA,RI, 1966-2018**



# Summary



- Timely tool
  - FAC Models
  - Cumulative Effects
    - Climate change
    - Habitat Loss
    - Predation





# Summary



- Timely tool
  - FAC Models
  - Cumulative Effects
    - Climate change
    - Habitat Loss
    - Predation
- Baseline Data

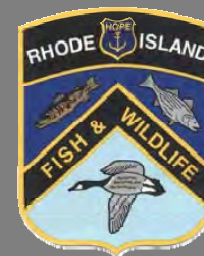


# Acknowledgements

**244 Volunteers!**



# QUESTIONS?



# Prairie Warbler (*Setophaga discolor*)



## Status

**Rhode Island:** Common migrant, found in 66.7% of blocks (+6 blocks [5.8% increase] since first atlas).

**Southern New England:** 3% annual decline (-4.1 to -1.9%); n = 45 routes.

## Life History

The Prairie Warbler is a long-distance migrant that nests throughout most of the southeastern United States, and as far north as southern Maine. The wintering range extends from the east coast of Central America through Florida and the Caribbean. In Rhode Island, the Prairie Warbler is a declining breeding species that nests in early successional habitats dominated by a sparse shrub understory with no forest canopy or rough old fields, although they also utilize open forest of fire-tolerant pines and oaks (Hanberry and Thompson 2019).

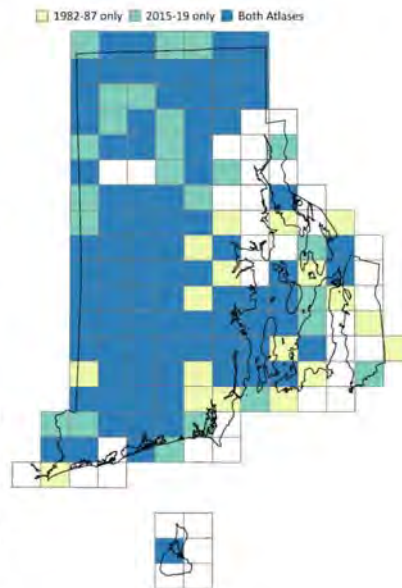
**Breeding range:** Much of eastern North America.

**Wintering Range:** Southern Florida and the Caribbean and east coast of



## Conservation and Management

This is a management-sensitive species that will require habitat manipulations to create early successional habitat or open forested habitats to retain local populations (Hanberry and Thompson 2019). Prior to the Euro-American settlement era (~1620-1900), less than 5% of the forested habitat was early successional (Lorimer 2001). In managed forests, Prairie Warblers typically occupy managed stands 1-2 yrs after harvest, reach peak densities 4-8 years after harvest and no longer occupy the area 10-15 yrs after harvest (Schlossberg and King 2009). The amount of scrub-shrub habitat, where Prairie Warblers nest, had declined from approx. 27% of Rhode Island in the 1950s to <5% in 2000. In the mid-2000s, Schlossberg and King (2006) estimated there were 2500 Prairie Warblers in Rhode Island and ~38,000 in all of New England. This species is rarely encountered during migration, but occurs in fall in coastal thickets used by many other neotropical migrant birds.



## Breeding ecology and migration phenology

**Spring Arrival:** One of the earlier migrants, late April to first week of May, females arrive about 2-6 d after males.

**Nest building/characteristics:** Early to mid-May, take 3-5 d to construct, can have 2<sup>nd</sup> brood in parts of range, female builds nest.

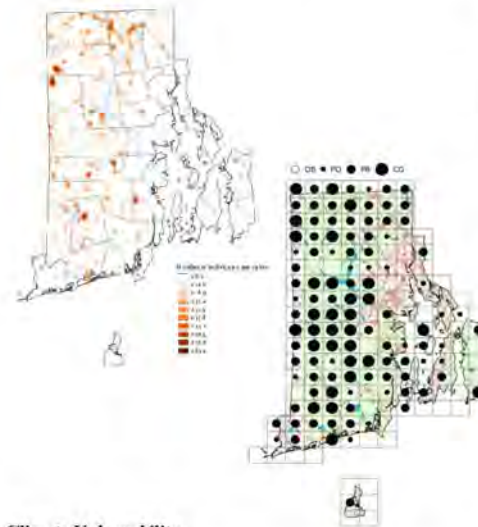
**Clutch initiation dates:** Late May to mid-June; **Clutch size:** 3-5 eggs.

**Incubation period:** 12 d; **Parental duties:** Only female incubates and broods, both males and females feed chicks.

**Fledging period:** 8-11 d; **Estimated fledging dates:** Late June to mid-July.

**Parental care after fledging:** Young independent 34-55 d after hatching.

**Fall departure dates:** Early Aug to mid-Oct, peaking between late Aug to mid-Sept.



## Distribution and abundance

**Historical:** Common local summer resident in late 1800s, mainly in areas with bayberry (H and S 1899).

**RIBA1.0:** Widespread. Detected in 104 blocks (17 confirmed). Most common in the interior of state in pitch pine/scrub oak barrens, but also along power line corridors, old fields and the edge of woodlands.

**RIBA2.0:** Detected in 110 blocks (30 confirmed). Analysis of point count data show a strong association with oak and mixed forest types, scrub-shrub habitats and even arid vacant land, such as the along the shrub-dominated edges of gravel mines. There are an estimated 11,154 individuals in the state.

## Climate Vulnerability

**Moderate.** Prairie Warblers are expected to lose 40% of their current breeding range due to a warming climate. This range retraction will take place along the western edge of their current breeding range and in localized areas throughout their range (including parts of Rhode Island and southern New England). A range expansion of 27% is expected into northern New England, Quebec and Newfoundland.

## Red-shouldered Hawk (*Buteo lineatus*)



### Status

*Rhode Island: Common resident, found in 58.8% of blocks (+71 blocks [273.1% increase] since first atlas).*

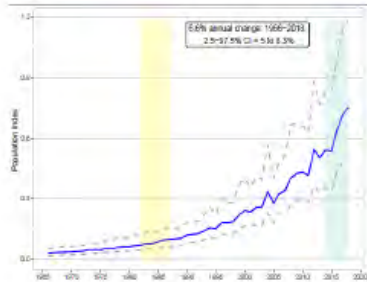
*Southern New England: 6.6% annual increase (5 to 8.3%); n = 45 routes.*

### Life History

This relative common hawk is a year-round resident in riparian areas along major rivers in Rhode Island. Found in both deciduous and mixed deciduous-coniferous woodlands, they feed on a variety of small mammals, amphibians and reptiles, but also will feed on birds. Red-shouldered Hawks always hunt from a perch and dive on their prey. Breeding season is about 150 d long from first eggs to chicks fledging so they will only produce one brood per year.

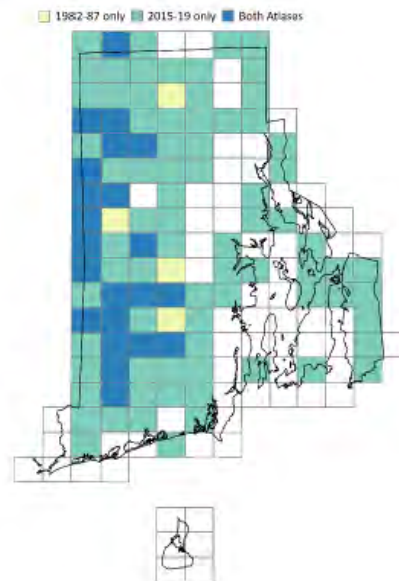
*Breeding range:* Eastern United States.

*Wintering Range:* Birds breeding in northern US migrate to southern areas, some birds winter in northeastern Mexico.



### Conservation and Management

Shooting of raptors in the early 20<sup>th</sup> century was once a threat to this species, but no longer a conservation issue as this practice as ceased and numbers have increased. DDT appeared to have impacted populations in the mid-20<sup>th</sup> century, but their populations have slowly rebounded with the ban of DDT. Forest fragmentation can create more suitable habitat for Great Horned Owls and Red-tailed Hawks, which can impact Red-shouldered Hawk populations.



### Breeding ecology and migration phenology

*Spring Arrival:* Influx of birds is less obvious in the spring, as most adults appear to be year-round residents.

*Nest building/characteristics:* Both parents help construct or refurbish nest which can take 4-5 weeks.

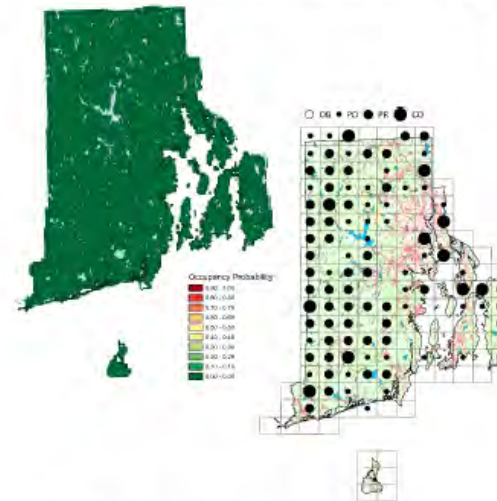
*Clutch initiation dates:* Mid-April to early May; *Clutch size:* 3-4 eggs.

*Incubation period:* 35 d; *Parental duties:* Both sexes incubate, male delivers prey to female, only female broods chicks, which are semialtricial, both parents feed chicks.

*Fledging period:* 42-49 d; *Estimated fledging dates:* Early July. Recently fledged birds observed from 7 June to 20 July during the RIBA2.0.

*Parental care after fledging:* Chicks independent of parents 14-16 weeks after hatching and able to capture mobile vertebrate prey when 10-13 weeks old.

*Fall departure dates:* Early Aug to early Nov, peaking mid-Sept.



### Distribution and abundance

*Historical:* Common in Rhode Island in early 1900s. Populations declined in mid-20<sup>th</sup> century due to DDT.

*RIBA1.0:* Detected in 26 blocks (5 confirmed) in bottomlands and deciduous forests, and throughout coastal lowlands. Thought to be increasing from 1950s to 1980s.

*RIBA2.0:* Detected in 97 blocks (11 confirmed). A very obvious eastward expansion within the state occurred between the two atlas periods. Analysis of point count data show an affiliation with all forest types and forested wetlands.

### Climate Vulnerability

*Stable.* Red-shouldered Hawks are expected to lose only 1% of their current range due to a warming climate. The species will undergo a range expansion of 63% into the central US, the Pacific Northwest to Alaska and eastern Canada.

## Black-crowned Night Heron (*Nycticorax nycticorax*)



### Status

*Rhode Island:* Common resident, found in 58.8% of blocks (+71 blocks [273.1% increase] since first atlas).

*Southern New England:* -1.9% annual decline (-4.6 to 0.8%); n = 45 routes.

### Life History

The Black-crowned Night-Heron is the most cosmopolitan heron in the world. Ferren and Myers (1998) provided an excellent summary of the history of this species in Rhode Island. In contrast to all other breeding waterbirds in the state, Black-crowned Night-Heron populations peaked twice, the late 1800s and the early 1980s. During much of the 1700 and 1800s, nesting islands in Narragansett Bay lacked shrubs or trees as nesting habitat, due the presence of grazing farm animals.

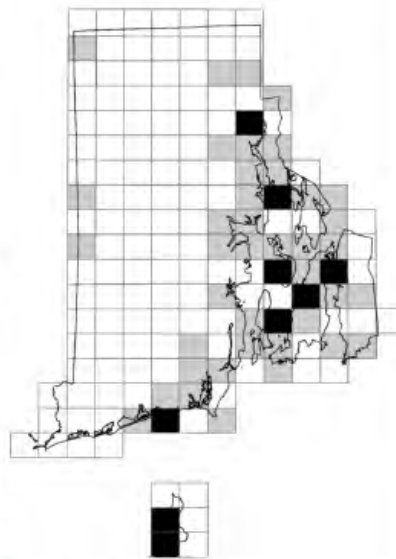
**Breeding Range:** This widespread species nests throughout much of the United States into central Canada.

**Wintering Range:** Overwinters in southern coastal regions of North America, and throughout Central and South America.



### Conservation and Management

The North American Waterbird Plan (2007) considered this species to be a moderate conservation concern nationwide. As with other colonial waterbirds, conservation concerns include keeping mammals off nesting islands, monitoring nesting populations, and minimizing human disturbance to nesting islands. This species is solitary in their nocturnal foraging behavior, and uses a wide variety of coastal habitat for foraging. Black-crowned Night-Herons can congregate in coastal areas during spring and fall migration. They can be management concerns for biologists protecting offshore tern colonies, where they can be a significant predator (Hunter and Morris 1976), although they primarily forage on fish (Hall and Kress 2008). Black-crowned Night-Herons are sensitive to human disturbance and will abandon a colony if visited early in the egg laying stages (Tremblay and Ellison 1979).



### Breeding ecology and migration phenology

**Spring Arrival:** Arrive in Rhode Island starting in late March, with most adults arriving at colonies in Rhode Island by mid-April.

**Nest building/characteristics:** Believed to begin nesting earlier than diurnal heron species; likely building nests in early April;

**Clutch initiation dates:** Tends to initiate clutches earlier than other species of wading birds in Rhode Island, 25 April to early June; **Clutch size:** 3-4 eggs.

**Incubation period:** 24-26 d (1 record of nest with young for RIBA2.0 on June 2); **Parental duties:** Both adults brood and feed developing chicks.

**Fledging period:** Chicks are semi-altricial and capable of walking out of the nest after 2 weeks and often remain far from the nest after 3 weeks, with chicks able to fly after 6 weeks and emigrate from the colony after about 58 days (by early Aug) (Erwin et al. 1996); **Estimated fledging dates:** 1 record from RIBA2.0 of a fledged bird on June 23.

**Fall departure dates:** Most individuals depart Rhode Island in September and into October, with sightings rare after the middle of October. Some stragglers occasionally spend the winter in coastal New England.

### Distribution and Abundance

**Historical:** Historically, a common summer resident in 1890s in Rhode Island, with nesting colonies near Mt Hope and on Prudence Island, but the birds were slaughtered to 'feed the pigs' (H and S 1899).

**RIBA1.0:** Distribution maps for Black-crowned Night-Herons in the state during both atlases were created primarily based on RI DEM data collected during annual standardized surveys. Found and confirmed in 6 blocks during the first atlas.

**RIBA2.0:** Confirmed as a breeder in 9 atlas blocks, with individuals observed in a total of 49 blocks, suggesting wide use of Rhode Island habitats for foraging.



### Climate Vulnerability

**Stable.** A very small loss of breeding range (3%) is predicted to be outweighed by much larger gains (58%) in this widespread species.