State of the Bay 2026
Concurrent Session V
Historic & Future Bird Trends

Enhancing Habitat for Birdlife on the Bolivar Peninsula

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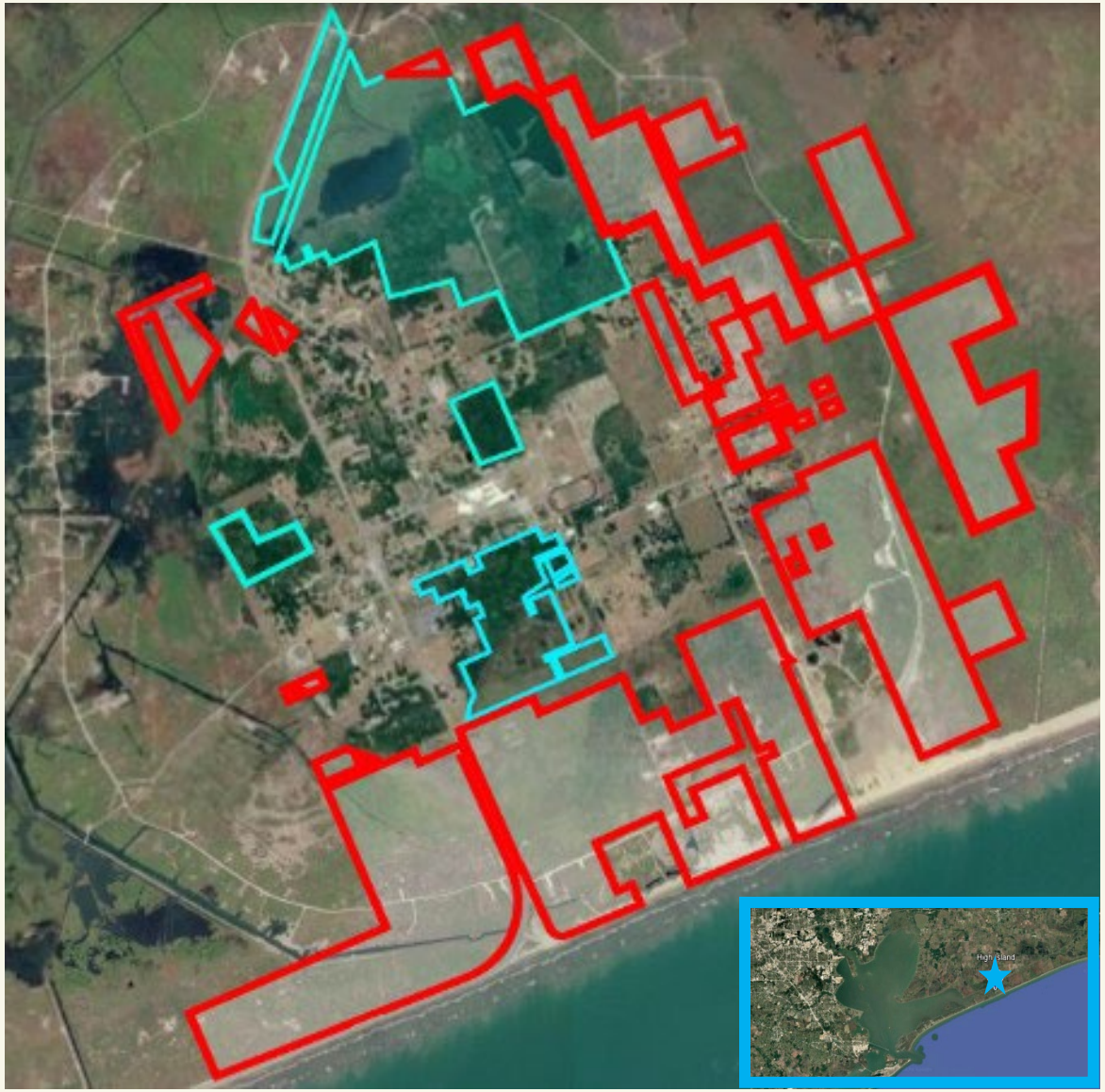
Wyatt Egelhoff
Sanctuary Manager
Houston Audubon

High Island: a place like no other

- ~38ft elevation; highest elevation on the immediate Gulf Coast from Mobile, AL to Yucatan Peninsula MX.
- Nearly 400 species documented
- Most diverse set of habitats on the Bolivar Peninsula: oak motte, freshwater pond/marsh, coastal prairie, salt marsh, etc…
- ~869 ac owned & managed by HAS
  (2313 ac total owned on the Bolivar Peninsula)



Biogeography of High Island

- Salt dome elevation protects against inundation by saltwater. Supports unique forest types, prairies, and freshwater ponds
- Different geology (and ecology) than a Chenier (depositional ridges)
- **Defining floral communities (Live Oaks, Magnolias, etc…) are the product of human influence**
- “Coastal Hiatus” influences birdlife: no resident American Crows, Tufted Titmice, or Pileated Woodpeckers

High Island: 1971

- Pre-settlement, forested habitat consisted primarily of Yaupon and Hackberry

- Post-settlement, much of the land area is dominated by pasture and oil infrastructure

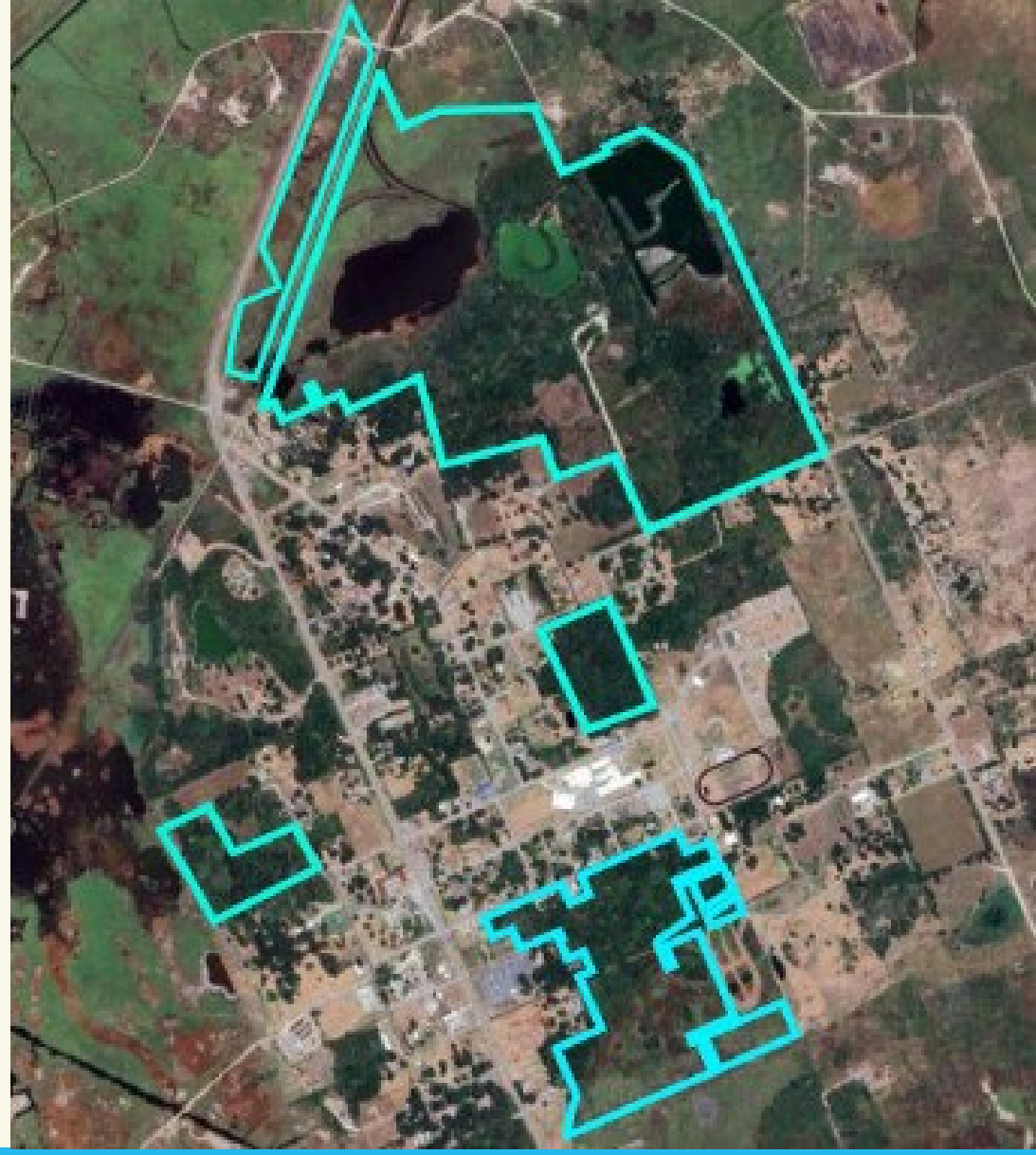
- Regional birders began visiting in the 1960's & 70's, not long after the phenomenon of trans-Gulf migration was being discovered by ornithologists

High Island: 2026

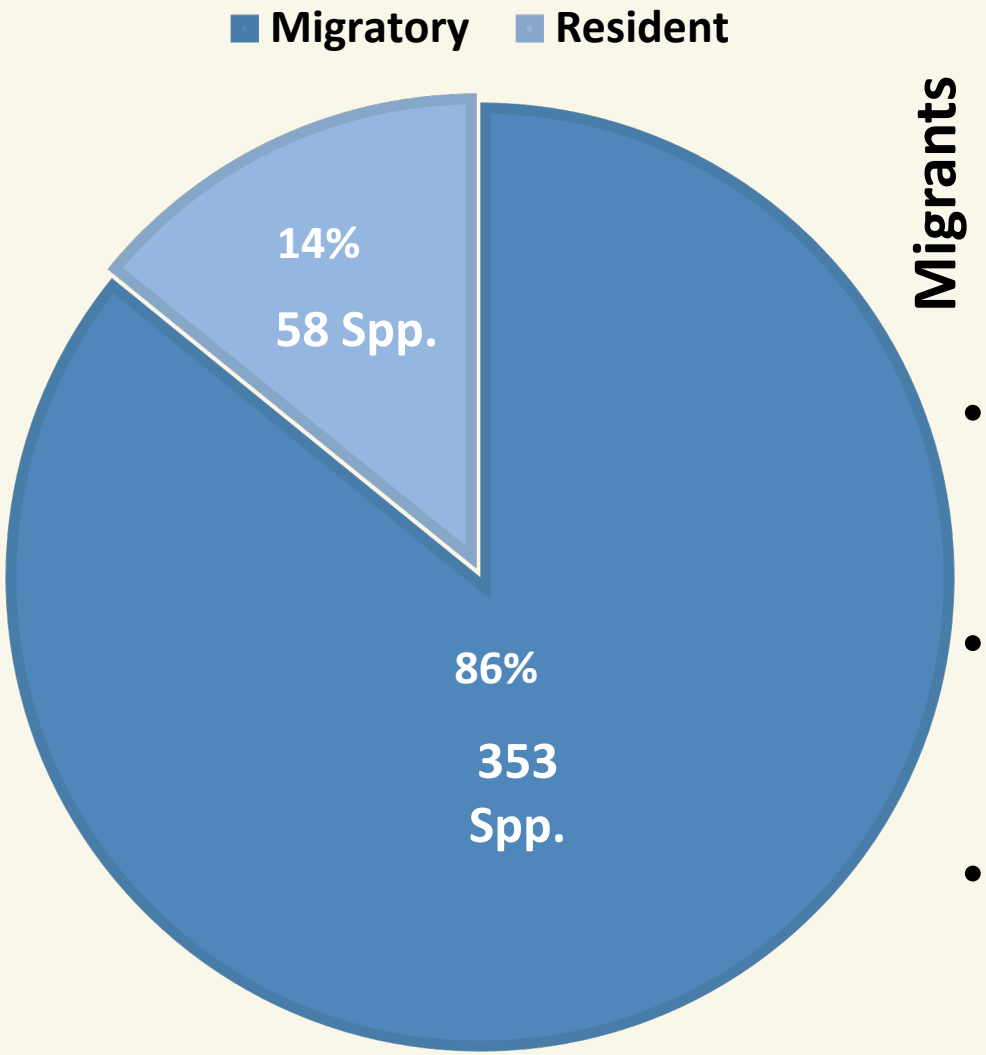
- Forested habitat has increased with HAS management of sanctuaries and new rookery habitat has been created

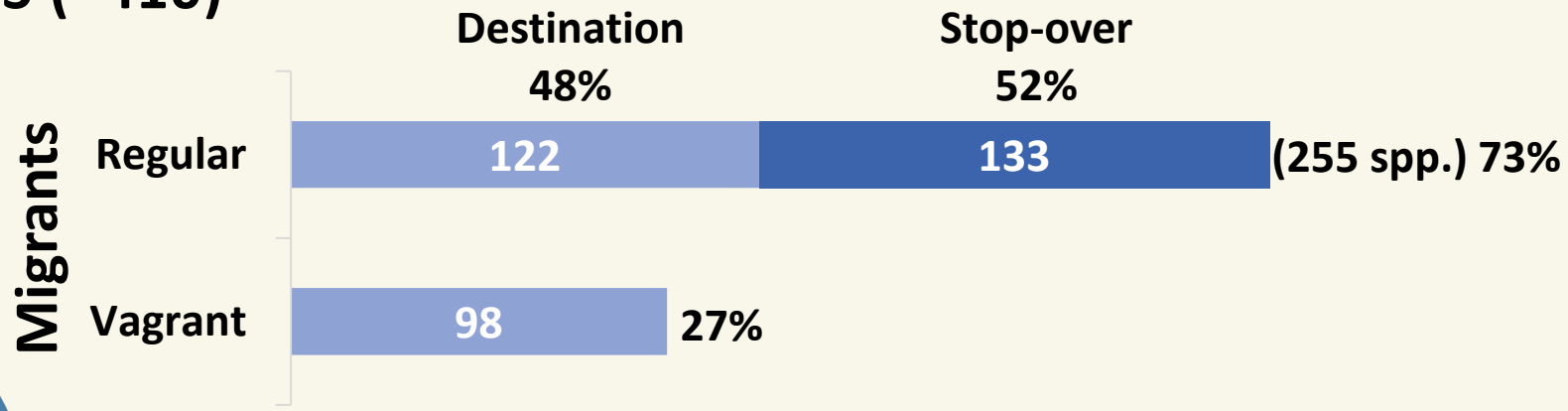
- Six decades of study by birders in spring has solidified the area's reputation as a premier site to study bird migration

- Declining global populations of neotropical migrants means "fallouts" are a thing of the past
  Shifting Baseline Syndrome



TOTAL DOCUMENTED BIRD SPECIES (~410)





- Many individuals of “resident” species are migratory (e.g. colonial nesting birds)
- Destination migrant: individuals spend more than one month (wintering/summering)
- Most individuals of “destination” migrant species only stop-over in any given season (e.g. Yellow-billed Cuckoo)

Threats to Stop-over Habitat Quality

- Proliferation of non-native plants including:
  Chinese Tallow (*Triadica sebifera*)
  Chinese Privet (*Ligustrum sinense*)
  Cherry Laurel (*Prunus laurocerasus)*
  Chinaberry (*Melia azedarach*)

- Support fewer insects than native plants and may change soil characteristics resulting in less food to fuel migrants

- Diversification of flora reduces risk of “Food Desert” as different bird species require different microhabitats to feed


Hooded Warbler
Photo Greg Lavaty

High Island Habitat: A Perpetual Process

- **Diversification** of habitat (not total eradication) is the goal; there is no specific paradigm to restore to.
- Diversity creates resiliency within ecosystems to compete with non-native species and absorb the shock of periodic disturbance (e.g. hurricanes, fires)
- Restoration is easier where (and when) it rains; but the non-native plants will proliferate too
- Non-native plants can provide food/cover at certain times of year, but represent lower quality habitat when neotropical migrants need it most

Why it Matters:
The Best Possible Stop-over Habitat Supports Birds…

Wood Thrush
Photo Greg Lavaty

Cerulean Warbler
Photo Greg Lavaty

Why it Matters:
…And Connects People

Landscape Scale Bird Trends

- Many waterbird populations continue to recover from DDT-driven declines (Brown Pelican); others experience novel range expansion (Neotropic Cormorant)

- “Brushland” species continue to move Northward and Eastward as habitats are opened and drought intensifies (e.g. Crested Caracara, White-tailed Kite)

- Populations of neotropical migrants continue to decline range-wide **3 billion birds lost in 50 years; “Final” High Island Fallout was 1996**

- Many bird species are adapting to human land-use and climate change, but most are being squeezed into ever-narrowing margins

A Case Study in Habitat Enhancement: S.E. Gast Red Bay Sanctuary

- 9.22 acres on the West side of High Island
- Donated to HAS by Amoco Production Company in 1993 along with a later donation of 25% undivided interest in an adjacent lot
- Primarily improved pasture with small woodlot vegetation at time of acquisition

S.E. Gast Red Bay Sanctuary

1971

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S.E. Gast Red Bay Sanctuary

1996

S.E. Gast Red Bay Sanctuary

2004

S.E. Gast Red Bay Sanctuary

2014

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S.E. Gast Red Bay Sanctuary

2023

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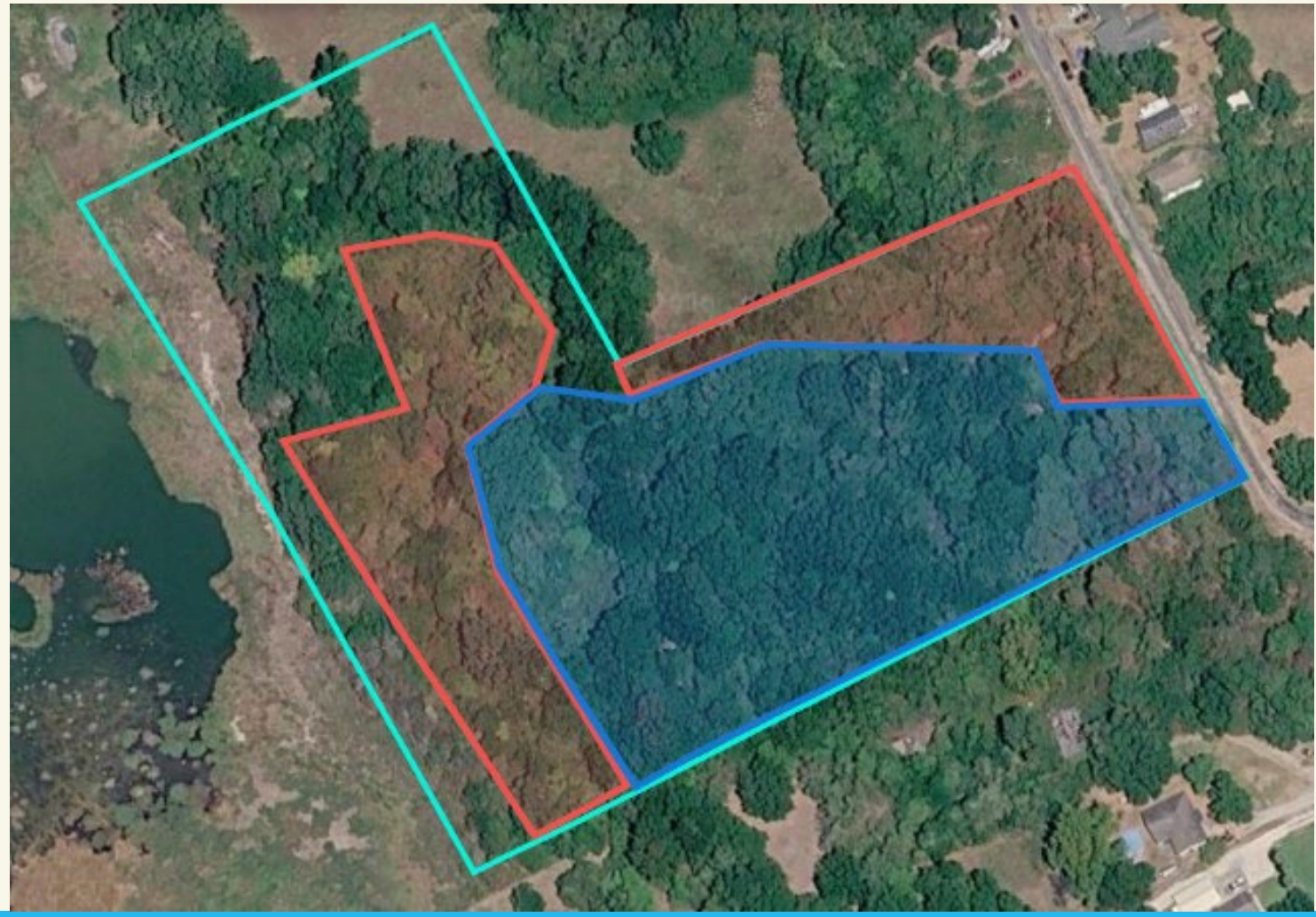
S.E. Gast Red Bay Sanctuary

Treated Area (4.5 acres)

Untreated Privet (2.5 acres)

After initial treatment by staff, annual treatment of resprouts on volunteer workdays maintains suppression

Has created investment among repeat volunteers in retreating areas each year



S.E. Gast Red Bay Sanctuary

Untreated Area

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S.E. Gast Red Bay Sanctuary

0-Year Treatment (2026)

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S.E. Gast Red Bay Sanctuary

1-Year Treatment Area (2024)

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S.E. Gast Red Bay Sanctuary

2-Year Treatment Area (2023)

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S.E. Gast Red Bay Sanctuary

3-Year Treatment Area (2022)

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S.E. Gast Red Bay Sanctuary

3-Year Treatment Area (2022)

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Thank You

Habitat management within our High Island sanctuaries would be possible without the hard work of thousands of volunteers over the past four decades.

You make a difference for the birds

DEVELOPMENT OF MACHINE LEARNING TOOLS FOR PRECISION SEABIRD COLONY MONITORING

ANNA VALLERY, **RICHARD GIBBONS**, KRISH KABRA, & ARKO BARMAN

THE PROBLEM

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THE PROBLEM

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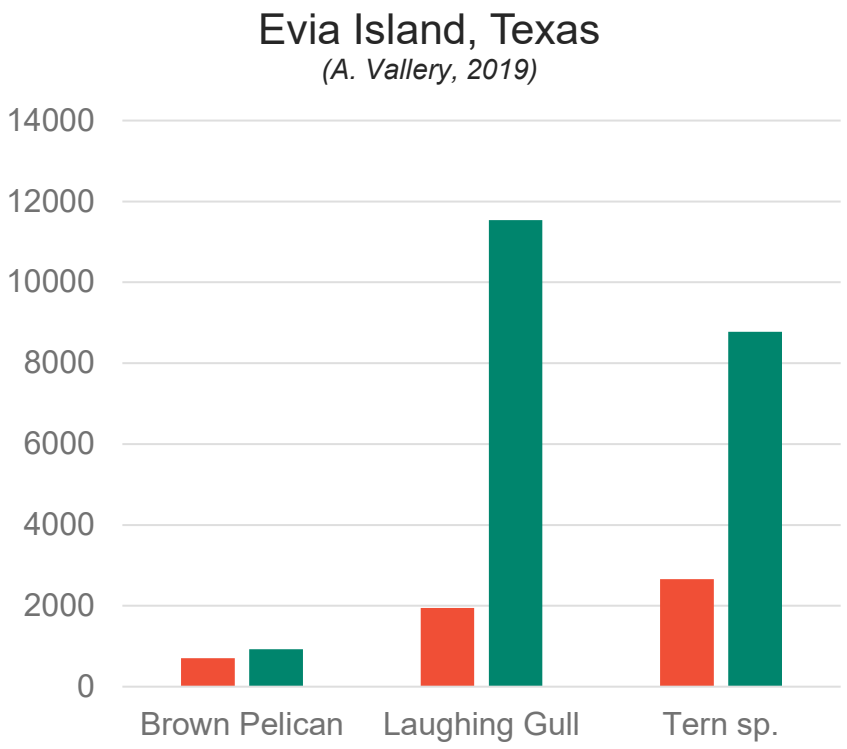

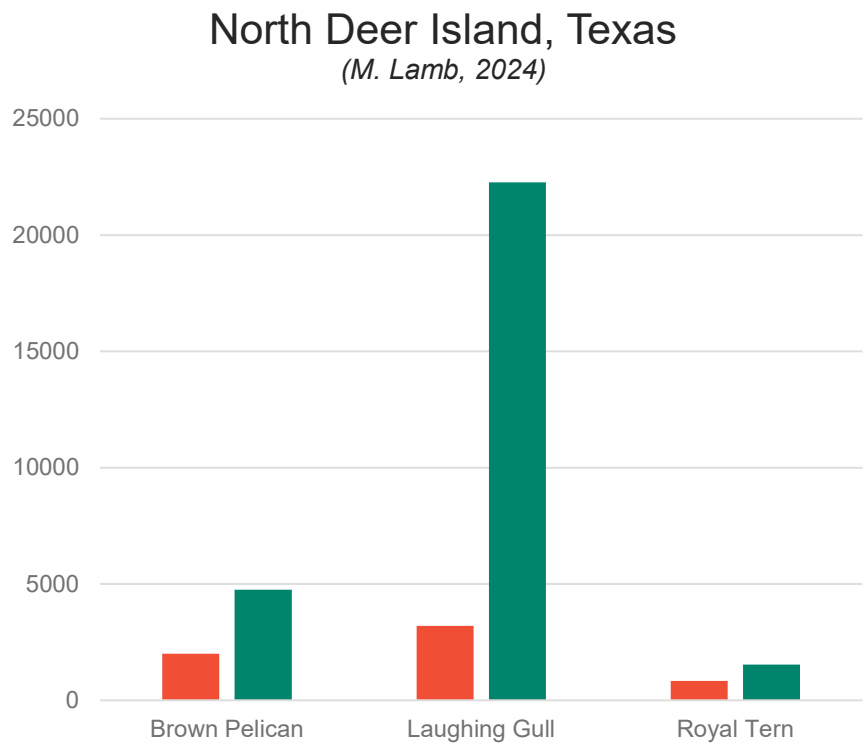

Boat count Drone

THE PROBLEM

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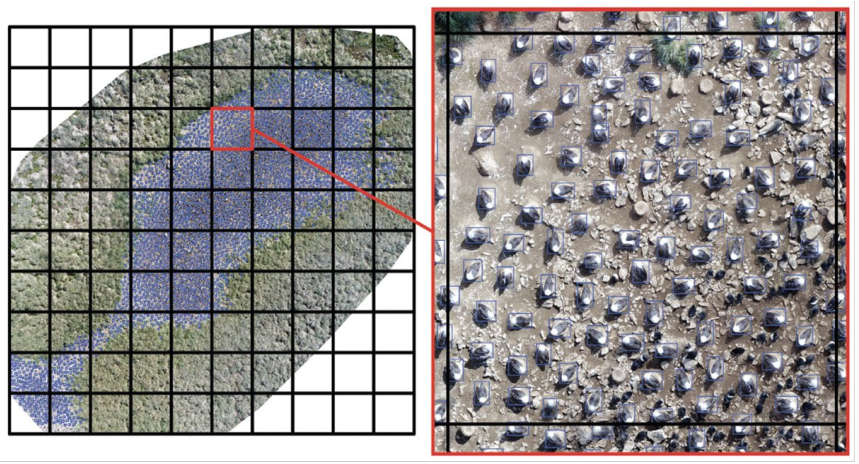
One study found that 21,000 birds took approximately 3 weeks to annotate, a task that took only 4.5 hours to do using trained machine learning algorithms

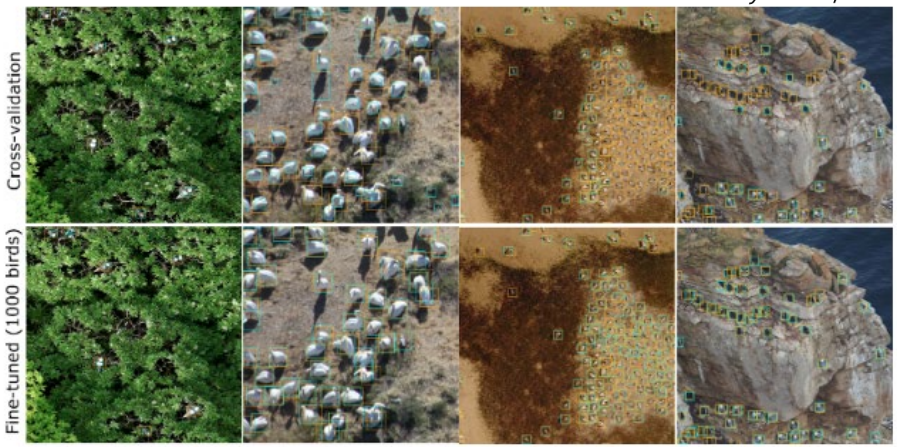
(Kellenberger et al., 2021)

Automation

- Count Adelie Penguins (*Borowicz et al., 2018)*
- Detect and count Albatross and Penguins in the Falkland Islands (*Hayes et al., 2021)*
- DeepForest Bird Detector (*Weinstein et al., 2022)*
- Deep Object Detection for Waterbird Monitoring *(Kabra et al. 2022)*



Hayes et al., 2021



Tool Development

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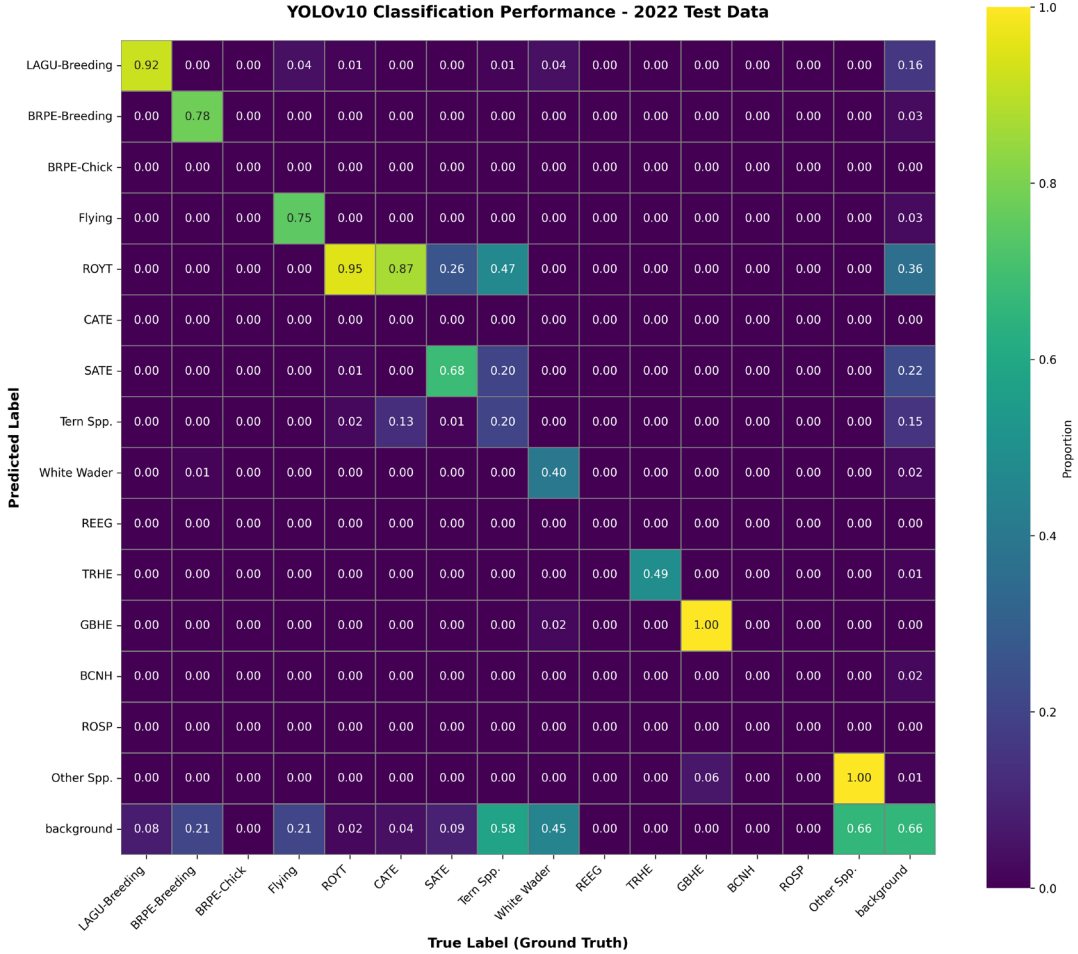
Tool Development



- 16 primary classes based on those species most common on Chester Island, Texas
  - Terns separated
  - White waders grouped
- Better performance on those classes with more annotations (LAGU, BRPE, ROYT, SATE)

One Colony, Four Methods

Objective: Compare four monitoring approaches on the same study area to isolate the independent value of automated detection vs. automated classification.

1

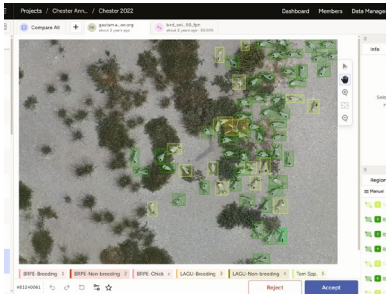
Ground Count

Traditional field survey

2

Manual Drone

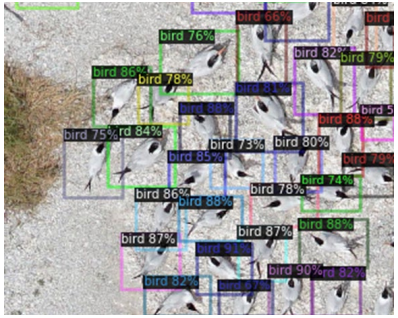
Full manual annotation:
bbox + species ID



3

Human + ML

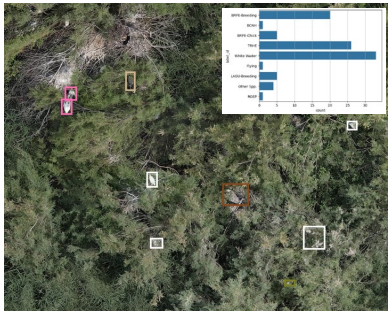
Auto bbox detection
+ manual species ID



4

ML-Only

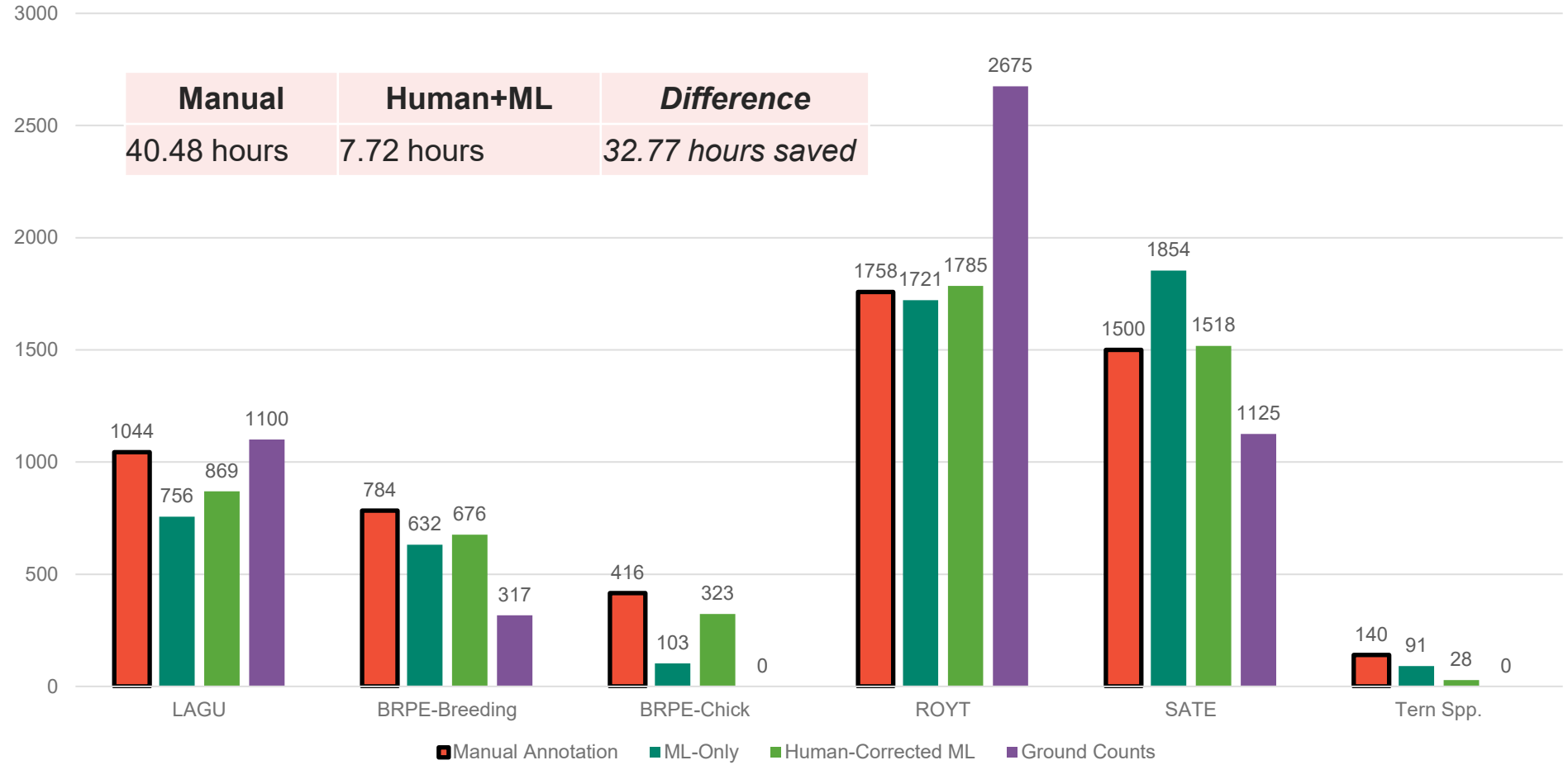
Fully automated
detection + classification



Counts by Survey Method: Ground-Nesters

Audubon

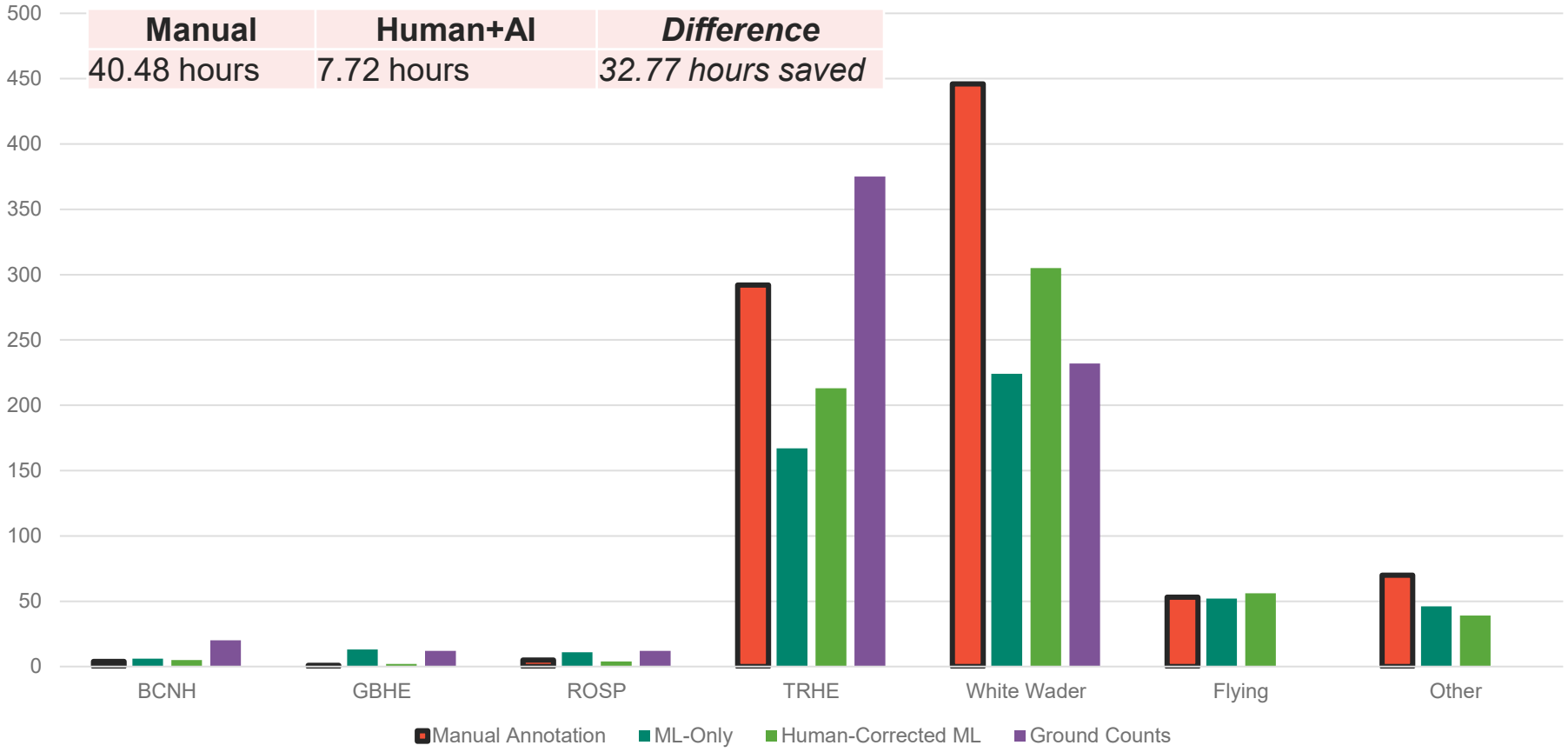
Manual	Human+ML	*Difference*
40.48 hours	7.72 hours	*32.77 hours saved*



Counts by Survey Method: Wading Birds & Others

Audubon

Manual	Human+AI	*Difference*
40.48 hours	7.72 hours	*32.77 hours saved*



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avings vs. Manual		Count Accuracy	
aved	% reduction	Total count (n)	% deviation
	—	6,530	0%
6	80.9%	5,826	-10.8%
5	97.0%	5,679	-13.0%

anual Annotations → Semi-Automated

81% time reduction

40.5 hrs → 7.7 hrs

11% count deviation

6,530 birds → 5,826 birds

Audubon SeeBird IMAGERY TOOLKIT

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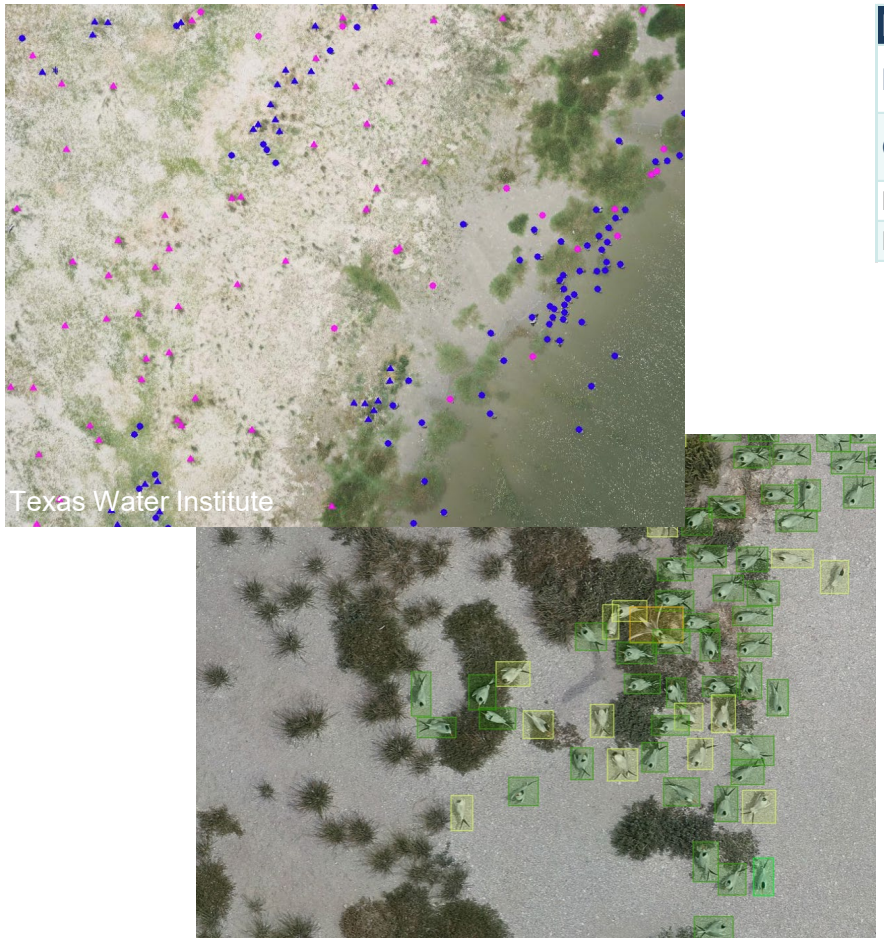
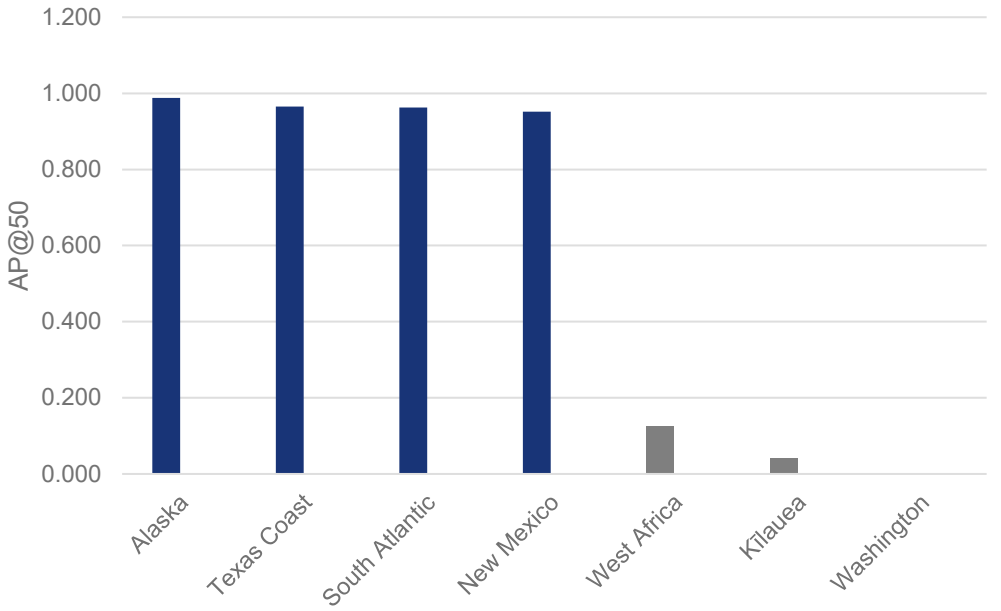


Model	AP@50	Notes
RF-DETR	**0.971**	Top performer; strong detection across all 4 sites
Grounding DINO	**0.949**	Generalizes to novel species via text prompt
RetinaNet (baseline)	0.073	Prior-gen baseline; no site fine-tuning
Faster R-CNN (baseline)	0.324	TX-trained model; no additional fine-tuning



RF-DETR: Robinson et al. 2025; Grounding DINO: Liu et al. 2024

Looking Forward

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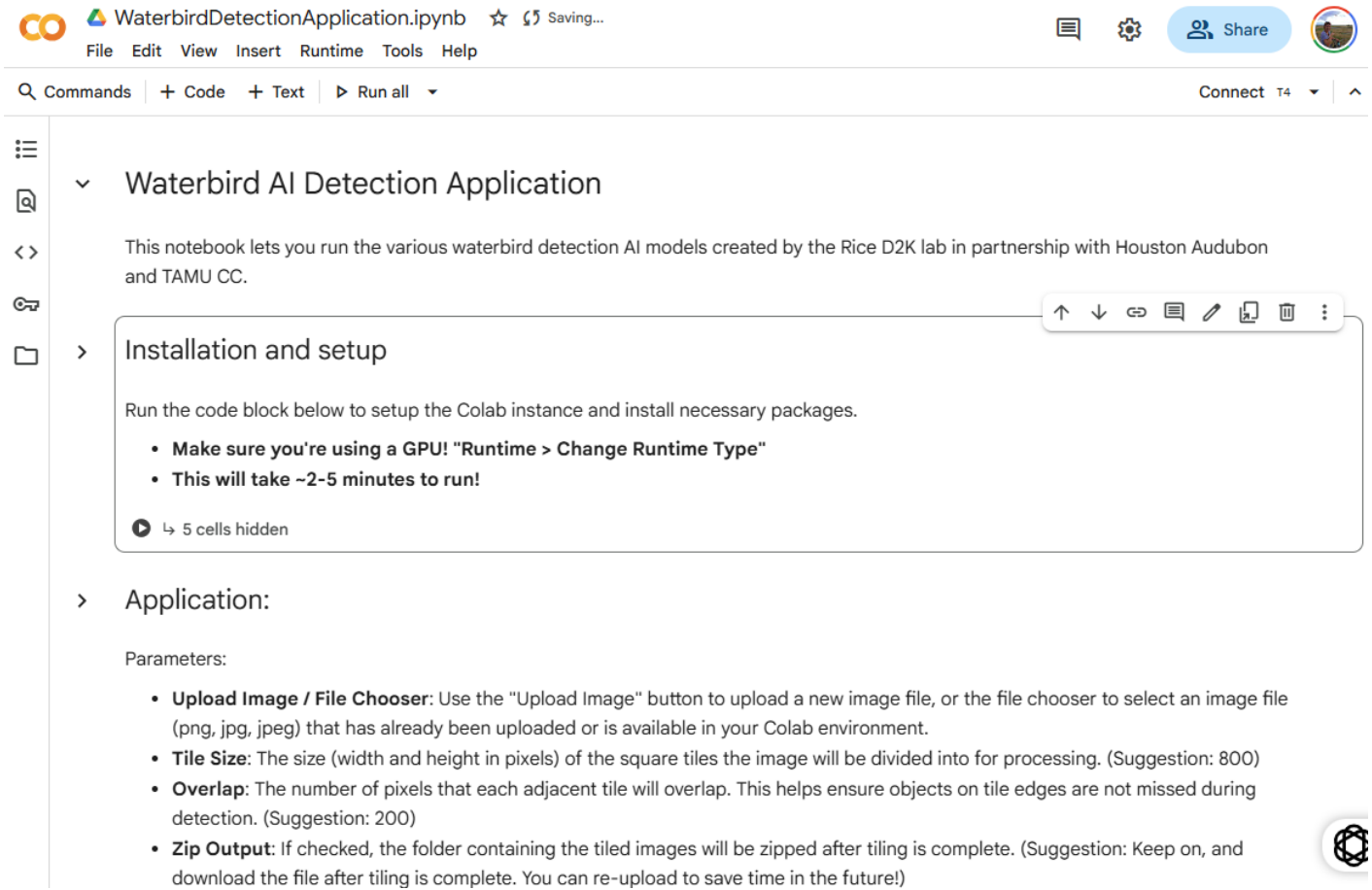

Graphic User Interface with Texas detector and classifier available for use

Thank You!

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Harris County
Public Health
Building a Healthy Community

60 Years of Avian Surveillance in Harris County Mosquito and Vector Control

HCPHTX.ORG

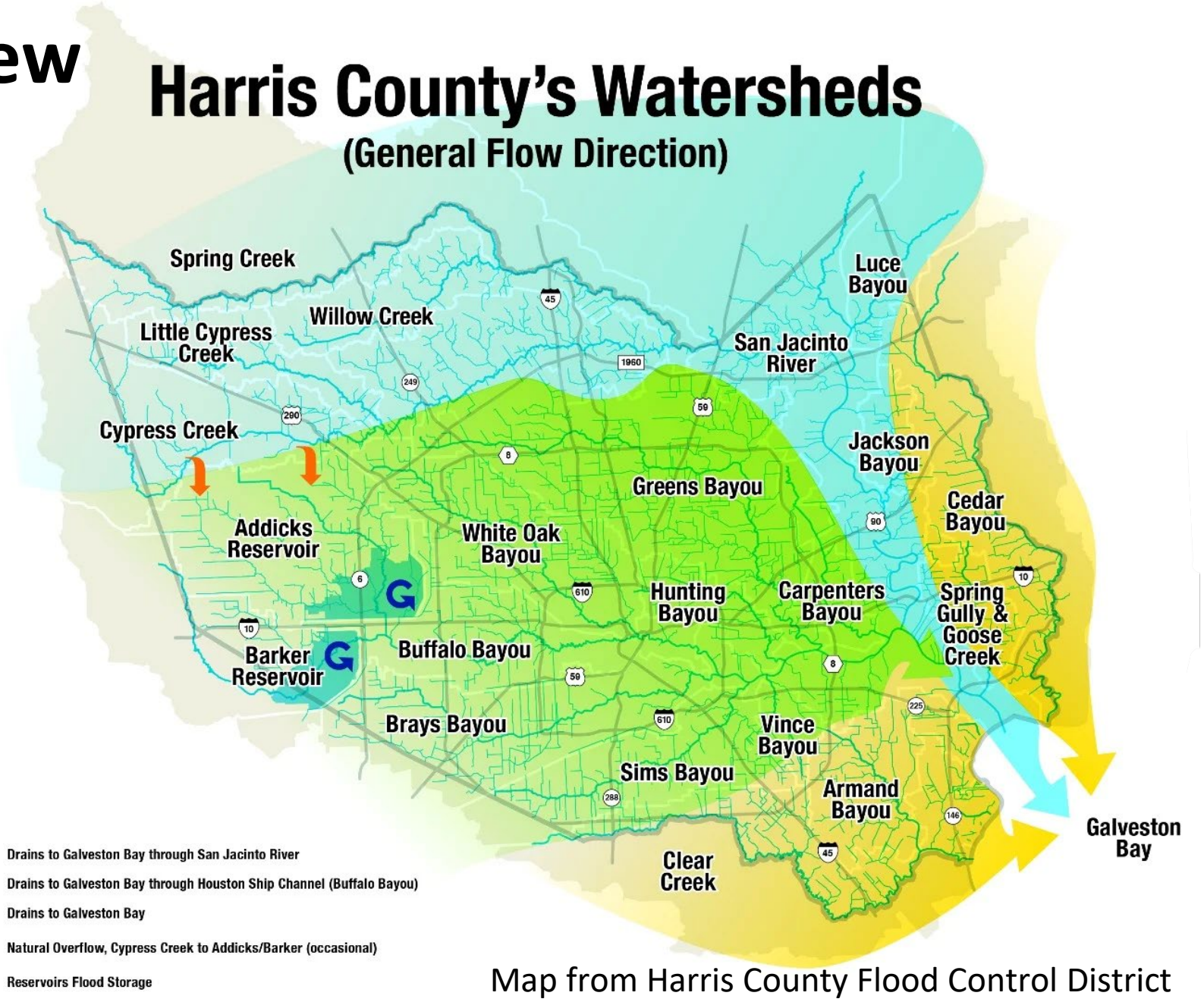
Accredited Health Department · Public Health Accreditation Board · PHAB Advancing public health performance

MISSION

To protect the health and wellbeing of Harris County residents through surveillance, control, education, research, and technology to prevent and control vector-borne diseases

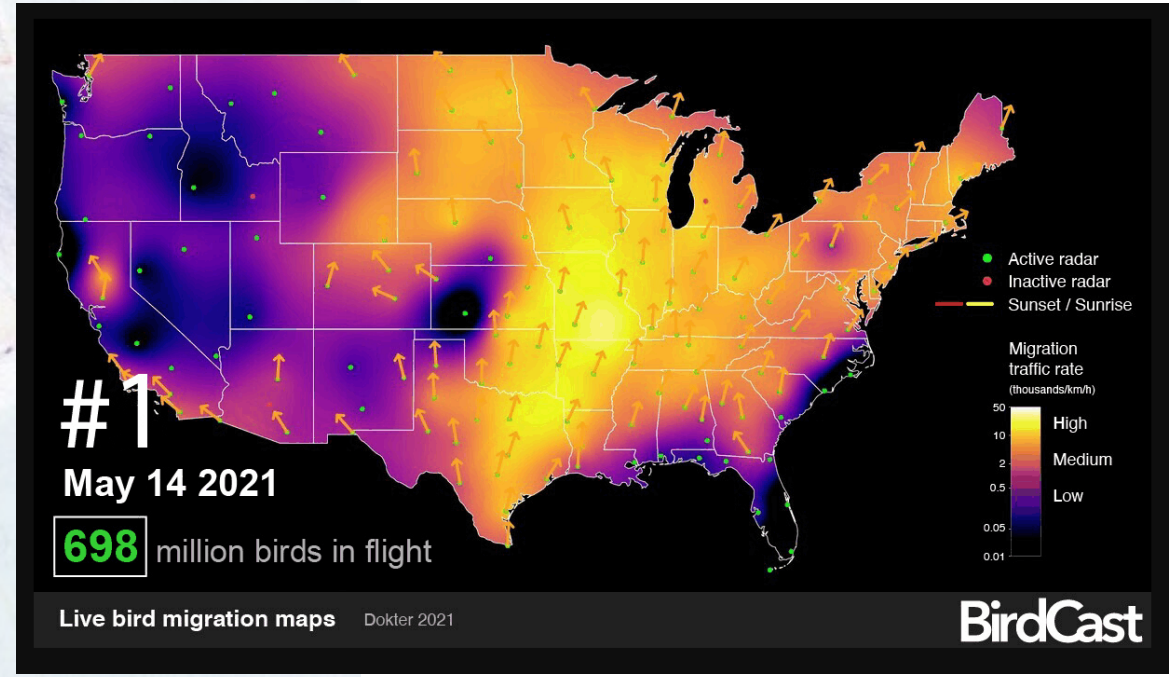
Harris County Overview

- 1,776 square miles
  - Rhode Island: 1,545 square miles
- 2020 Census Population: 4,731,145
  - 2020 Population of Louisiana: 4,657,757
  - 2020 Population of Texas: 29,145,505
- **Galveston Bay is the ultimate destination for all drainage in Harris County**



Map from Harris County Flood Control District

Harris County Public Health
Building a Healthy Community


#1
May 14 2021
698 million birds in flight
Active radar
Inactive radar
Sunset / Sunrise
Migration traffic rate
(thousands/km/h)
50
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2
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Live bird migration maps
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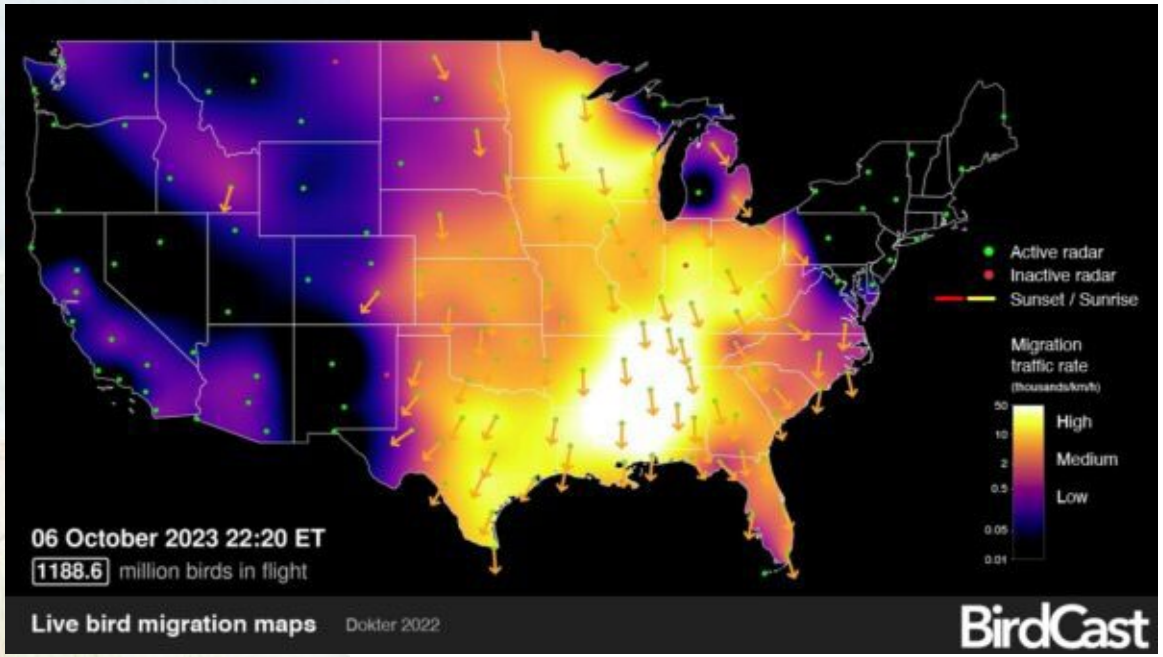
06 October 2023 22:20 ET
1188.6 million birds in flight
Active radar
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Sunset / Sunrise
Migration traffic rate
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Live bird migration maps
Dokter 2022
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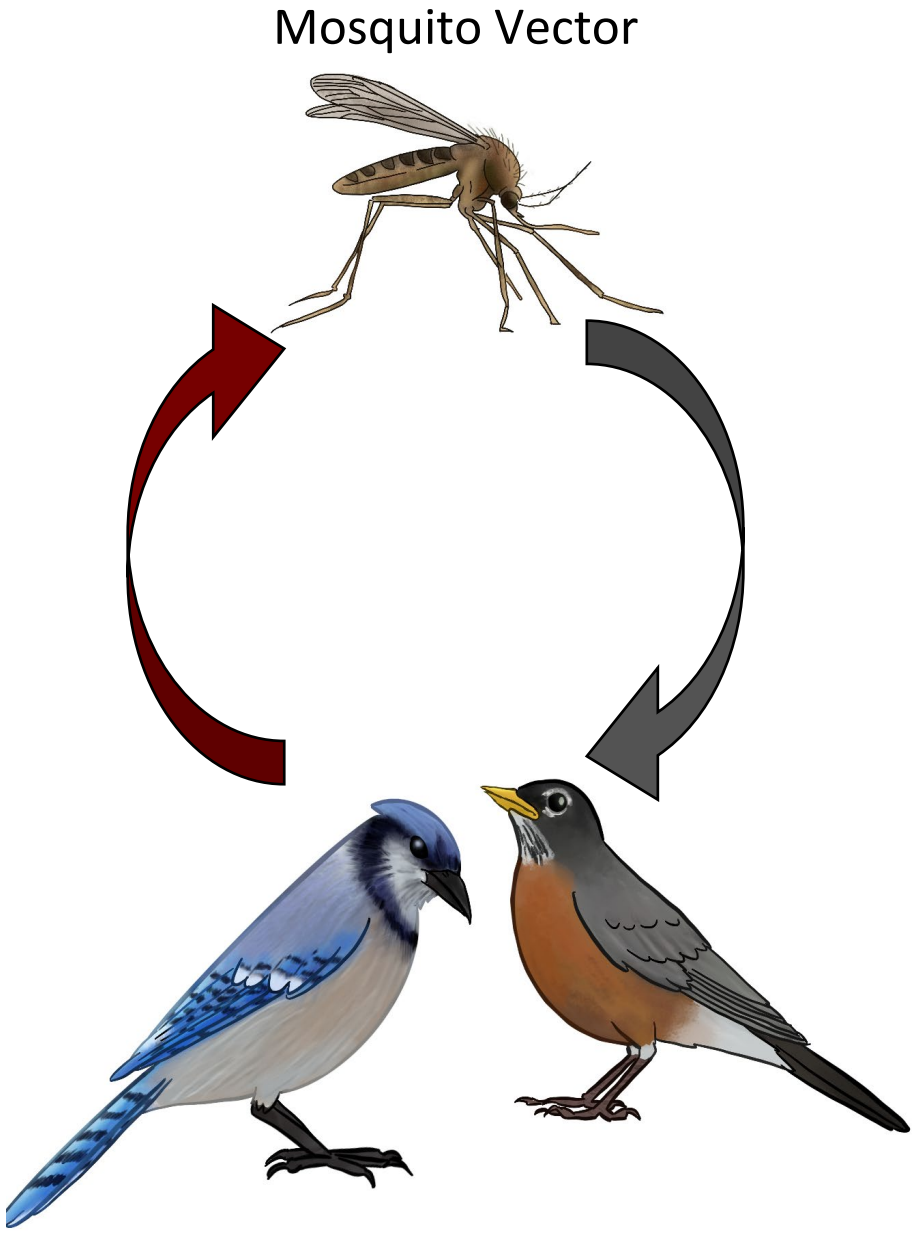
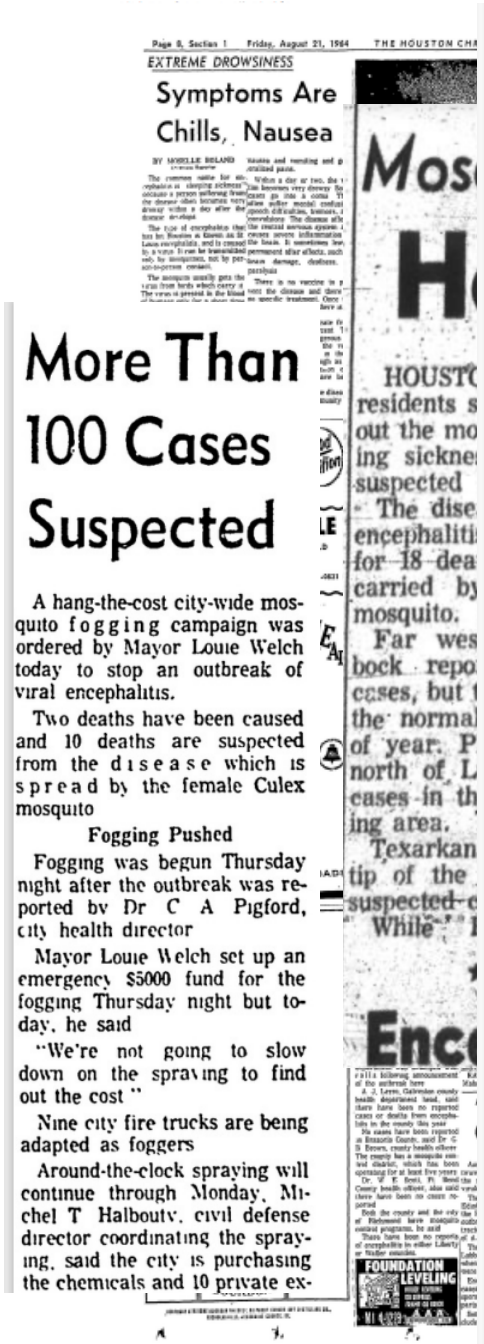
West Nile Virus Transmission Cycle



Harris County Mosquito and Vector Control: A Brief History



Page 8, Section 1 Friday, August 21, 1964 THE HOUSTON CHR

EXTREME DROWSINESS

Symptoms Are Chills, Nausea

BY MORELLE ROLAND

More Than 100 Cases Suspected

A hang-the-cost city-wide mosquito fogging campaign was ordered by Mayor Louie Welch today to stop an outbreak of viral encephalitis.

Two deaths have been caused and 10 deaths are suspected from the disease which is spread by the female Culex mosquito

Fogging Pushed

Fogging was begun Thursday night after the outbreak was reported by Dr C A Pigford, city health director

Mayor Louie Welch set up an emergency $5000 fund for the fogging Thursday night but today, he said

"We're not going to slow down on the spraying to find out the cost"

Nine city fire trucks are being adapted as foggers

Around-the-clock spraying will continue through Monday. Michel T Halbouty, civil defense director coordinating the spraying, said the city is purchasing the chemicals and 10 private ex-

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FOUNDATION LEVELING

Mosquito control program pays off

In this day of continual crises and mounting civic problems, it's a pleasure to call attention to at least one example of successful community action.

Two years ago the Houston area was in the grips of a frightful encephalitis epidemic. The mosquito-borne disease claimed the lives of 33 persons before the epidemic was over. Another 812 were thought to have been infected.

Emergency measures costing $1 million were vigorously undertaken to control the epidemic. But it became obvious that, if a recurrence of the disease was to be averted, a long-range program of area mosquito control would have to be undertaken.

Encephalitis is transmitted by culex mosquitoes which bite infected birds and then bite human beings. There are many ways of countering the disease, but the most effective is by controlling the mosquitoes by such things as extensive fogging and killing larvae in undrained ditches and other breeding places.

There was a great deal of debate over what should be done but it was ultimately resolved when Harris County voters approved the establishment of a county mosquito control district with five cents from every $100 in county tax money earmarked to finance the program.

Robert Barnett accepted the job of director of the district in May, 1965, and the surveillance and control program got under way about a year ago.

Encephalitis epidemics struck Dallas and Corpus Christi this summer. By the end of August 11 persons had died of the disease in the state. There were 128 confirmed cases in those two cities and in Fort Worth.

Emergency measures were undertaken. Airplanes sprayed the cities. But in Harris County, the only encephalitis death reported was not a local case.

The danger of an epidemic has passed for this season although isolated cases of transmission are still possible. Harris County's surveillance program continues, of course, but tests on birds and other small mammals have failed to show any significant signs of the disease.

Dr. Joseph L. Melnick, the famed virologist, says there is no doubt that the program here protected Houston. It should be gratifying to Harris Countians, who voted three to one to set up the mosquito control district, that the effort and the money expended have paid off.

20, SECTION 1 THE HOUSTON POST

THURSDAY, NOVEMBER 4, 196

DY BY BUDGET TIME

Plans Afoot For Mosquito District

NEST BAILEY

Post Reporter

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Judge Elliott said the county will have to practice "definite economies" in next year's operating expenses to provide the estimated $500,000 to $1 million a year cost of the mosquito control district.

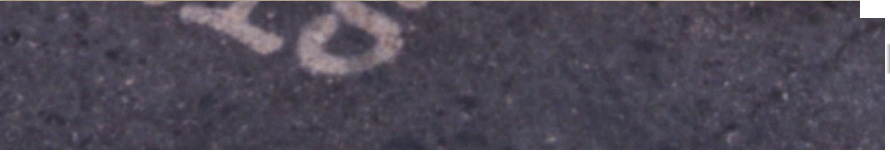
"THE COURT will meet shortly to discuss what action can be taken before the new budget is drawn," Elliott said.

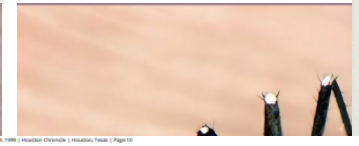
"I expect the court will hire an engineer for the control district, as the law provides, who is a qualified etomologist.

"We can have experts tell us before January what we will need to do about setting up a mosquito control district here, and tell us how much it is likely to cost."

JUDGE ELLIOTT said the

The 80s and 90s





CENTERS FOR DISEASE CONTROL

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

September 7, 1990/Vol. 39/No. 35

Birds could carry virus south

Rare encephalitis has killed 4 in N.Y.

NEW YORK (AP) — A rare African strain of encephalitis that has already killed four people around New York City could spread to other parts of the country as infected birds fly south for the winter, health officials said Tuesday.

The virus is transmitted to humans by mosquitoes that have bitten infected birds. New York City, New Jersey and Connecticut have been spraying pesticides to kill mosquitoes, and dead birds in southern states are being tested for the virus.

The African strain has never before been seen in the Western Hemisphere, and so far, there is no evidence that it has spread outside the New York City area.

But "it's possible that it could be seen in other parts of the country," said Dr. Ned Hayes, an epidemiologist with the federal Centers for Disease Control and Prevention.

Thirty-seven people, including the four who died, have tested positive for the West Nile-like virus in the New York metropolitan area since August. The cause of their ailments was reclassified Tuesday by the CDC, which originally blamed the similar St. Louis strain.

Encephalitis is an inflammation of the brain. The symptoms of West Nile encephalitis — fever and a headache — are similar to those of St. Louis encephalitis but are generally milder. In rare cases, the virus can cause neurological disorders and death. The elderly, the young and those with weakened immune systems are most vulnerable.

The disease is not transmitted from person to person or from birds to people.

As of Tuesday, the virus had not appeared in any dead birds — mostly crows — being tested in areas from Maryland to Florida, said Roger Nasci, a CDC entomologist.

New York State Health Commissioner Dr. Antonia Novello said 520 dead birds — most of them crows — have turned up from Connecticut to Suffolk County on Long Island. In Suffolk, officials also are investigating the deaths of nine horses.

Scores of dead birds in New Jersey have also been sent for testing.

The West Nile strain probably entered the United States in infected birds, officials said. But exactly how isn't clear.

A mosquito-borne virus persists

The West Nile strain of encephalitis (originally classified as the St. Louis strain) has killed four people and sickened dozens in New York and could potentially spread to other regions as infected birds begin their seasonal migrations. Encephalitis is an inflammation of the brain. Mild infections may result in fever, headache and body ache. More severe infections are marked by high fever, stupor, tremors and paralysis.

Transmission

1 A primary host, often a migratory bird, carries the virus in its blood. Some die, but many birds recover from the infection and develop an immunity

2 Mosquitoes (primarily the Culex species) feed on the infected bird and in turn pass the virus back to other birds and creatures.

3 Humans are an accidental, dead-end host for the virus. Only mosquitoes transmit the West Nile virus; transmission does not occur between humans.

Source. Center for Disease Control and Prevention

Associated Press

Rain expected to worsen dengue fever outbreak

Laredo health official urges precautions

By JAMES PINKERTON
Houston Chronicle Rio Grande Valley Bureau

A raging outbreak of mosquito-borne dengue fever that has sickened more than 3,000 Nuevo Laredo residents will likely be prolonged by Wednesday's rains, a Laredo health official predicts.

On the U.S. side of the border in Laredo, where 16 cases of the painful viral fever have now been confirmed, city health officials are bracing for more despite daily fogging with anti-mosquito pesticides and an intensive public education campaign.

"Well, it's raining again over here, so we'll have more moisture and water, so it's bad for this problem," said Dr. Jose Antu, of the Laredo health department. "We will probably see more cases for the next four weeks, or longer, on both sides of the river.

"Of course, our numbers are very low" in comparison to Mexico, he said, "and we are advising our people to take all precautions if they want to go to Nuevo Laredo to go shopping, see relatives or whatever."

The outbreak of dengue fever — also known as "breakbone fever" because of the severe muscle pain it causes — has proven to be a serious cross-border health problem.

Most of Laredo's 16 confirmed cases were contracted by residents who crossed the Rio Grande to Nuevo Laredo, where 25 to 30 new cases are reported each day, Antu said.

"The number of suspected cases are probably more than 3,000, and right now they probably have confirmed more than 500 cases and they have had a few hemorrhagic cases, also," Antu said, referring to a severe strain of the disease that causes internal bleeding and sometimes death.

In 1995, when a large dengue outbreak strained Mexican healthcare facilities in Reynosa, Texas health officials on the other side of the border confirmed 29 cases in the two southernmost Texas counties, Hidalgo and Cameron.

Compounding this year's outbreak on the Mexican side of the border is a dire lack of equipment to control the mosquitoes that carry the disease, Antu said.

Because of mechanical breakdowns and dengue outbreaks in surrounding towns, Tamaulipas state health authorities have only two truck-mounted fogging machines — including one on loan

See FEVER on Page 26A.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES / PUBLIC HEALTH SERVICE

Houston Chronicle

www.houstonchronicle.com WEDNESDAY, JUNE 19, 2002 Vol. 101 No. 249 50 Cents ★★★•

West Nile virus shows up here

West Nile virus has been found in one blue jay in nort
The disease killed
people who contra
last year in the Un

Transmission

Texas' first West Nile case

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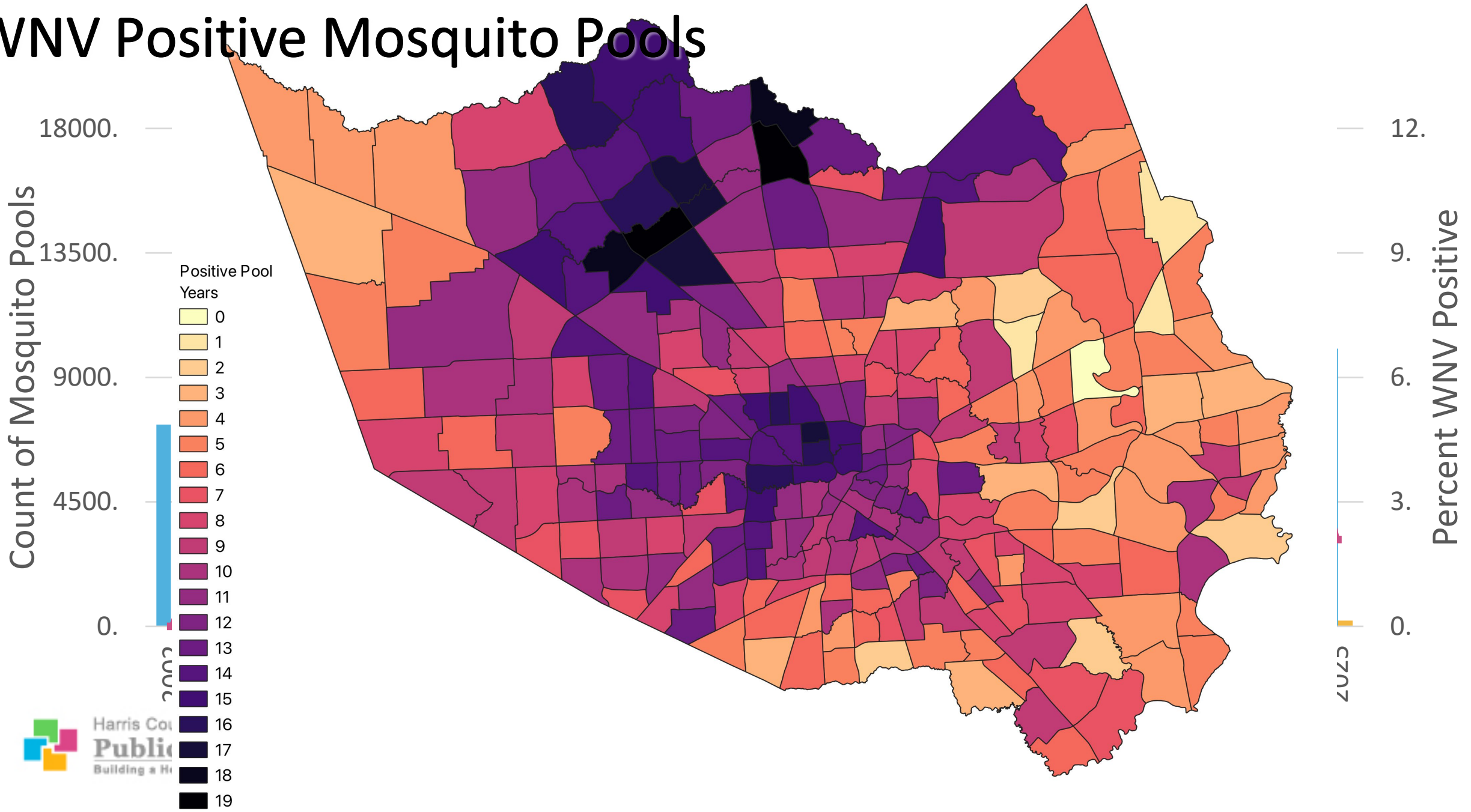
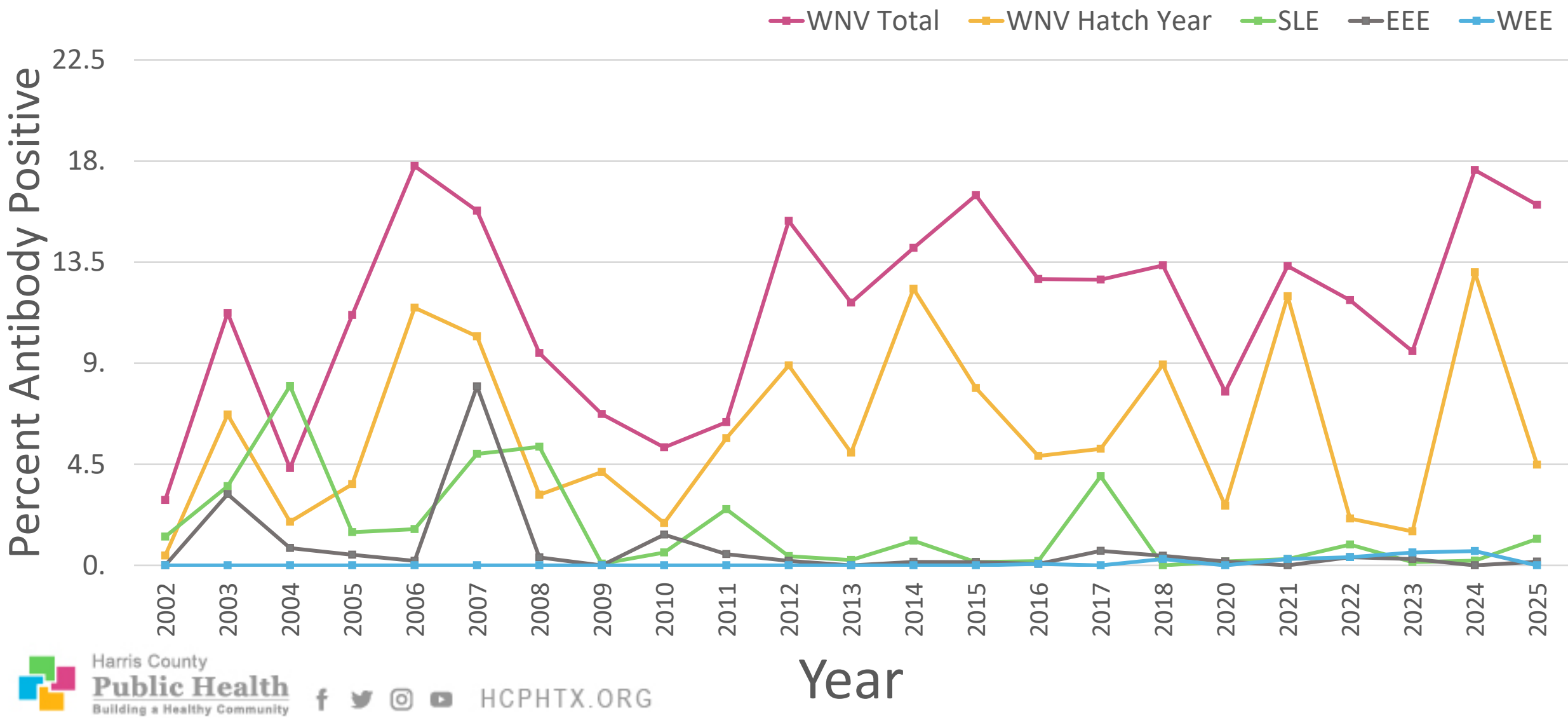
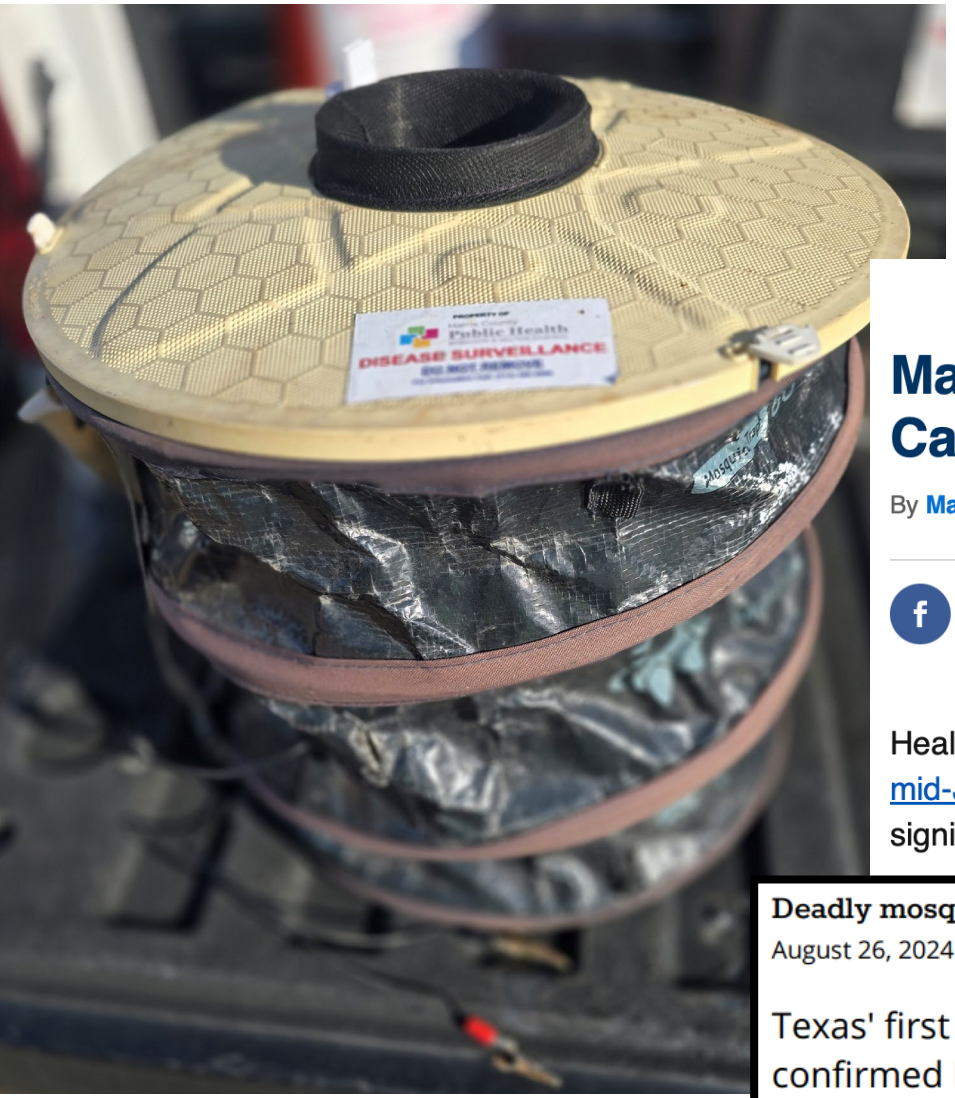
WNV Positive Mosquito Pools



Arbovirus Antibody Detection in Birds since 2002





Zika virus arrives in area

Malaria Resurfaces in the US After 20 Years: Local Transmission Cases Detected in Florida and Texas Raise Concerns

By **Margaret Davis** Published: Jun 26 2023, 08:58 AM EDT

Health officials in Sarasota County, Florida, confirmed two cases of locally transmitted malaria in late May and mid-June, respectively. Later, on June 23, Texas announced a confirmed case in Cameron County. This is significant as the United States has not reported locally acquired malaria in the past two decades.

Deadly mosquito-transmitted virus found in Houston - Houston Chronicle: Web Edition Articles (TX) - August 26, 2024 - page 1

August 26, 2024 | Houston Chronicle: Web Edition Articles (TX) | Octavia Johnson; Staff writer

Texas' first reported cases of the deadly mosquito-borne **virus** known as **eastern equine encephalitis** were confirmed Monday in Houston County, which is more than 100 miles north of the city of Houston.

Neither Harris County nor the city of Houston had reported cases as of Monday.

The Texas Animal Health Commission found the **virus** in two Houston County horses.

Harris County Public Health
Building a Healthy Community

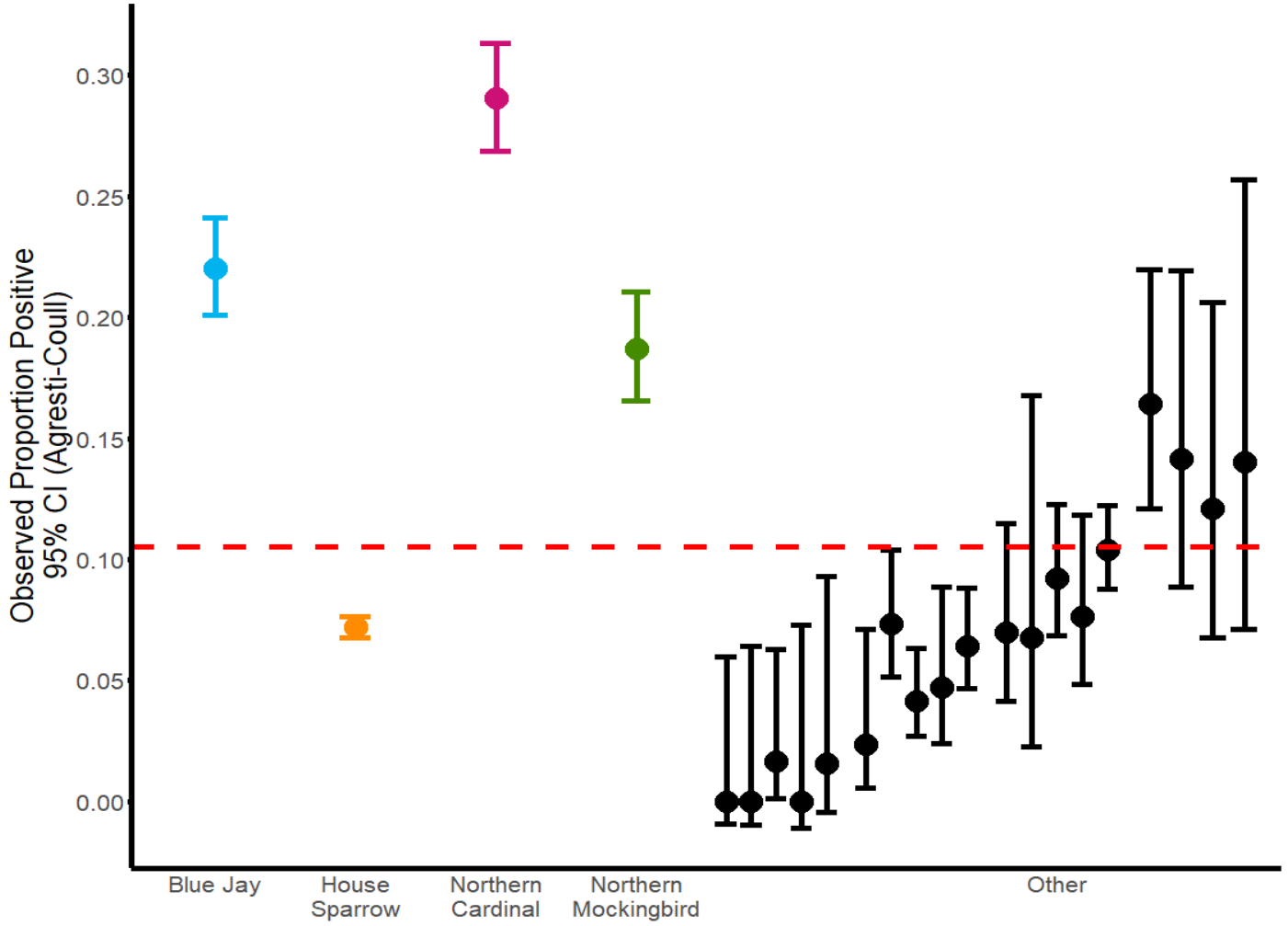
Harris County Mosquito and Vector Control: The Avian Surveillance Section

Birds Marked and Recaptured

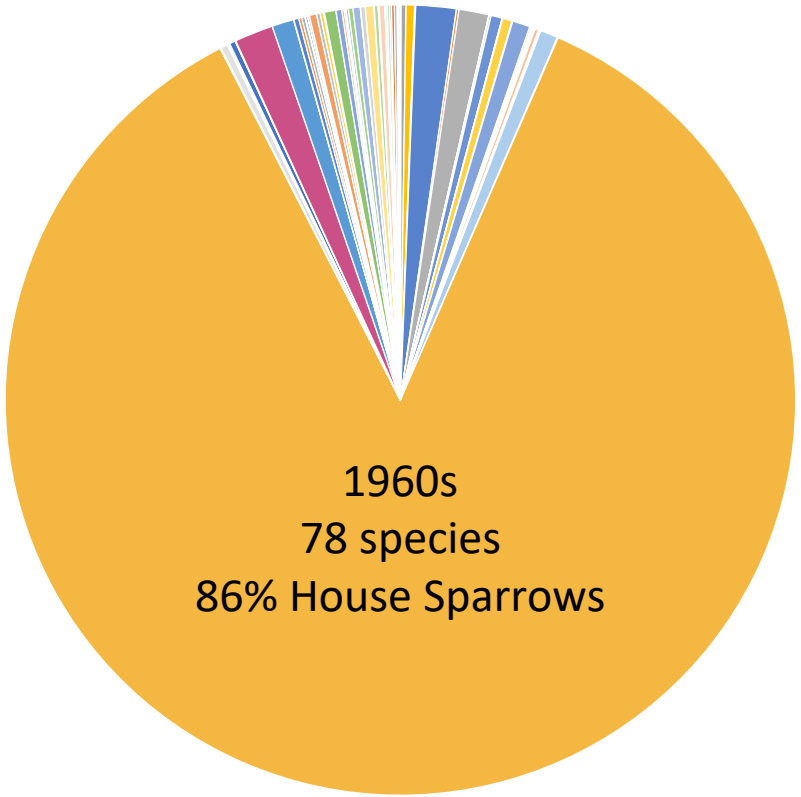
- **151,065** birds from **160** species reported banded to the USGS Bird Banding Lab since 1966
  - **23,934** individuals banded and tested for West Nile virus since 2002
- **427** external encounters of our birds reported
  - Our birds have been found in Kansas, Louisiana, Michigan, South Carolina, Tennessee, and Mexico
  - **1288** individual birds from **29** species recaptured and retested for West Nile virus exposure since 2002

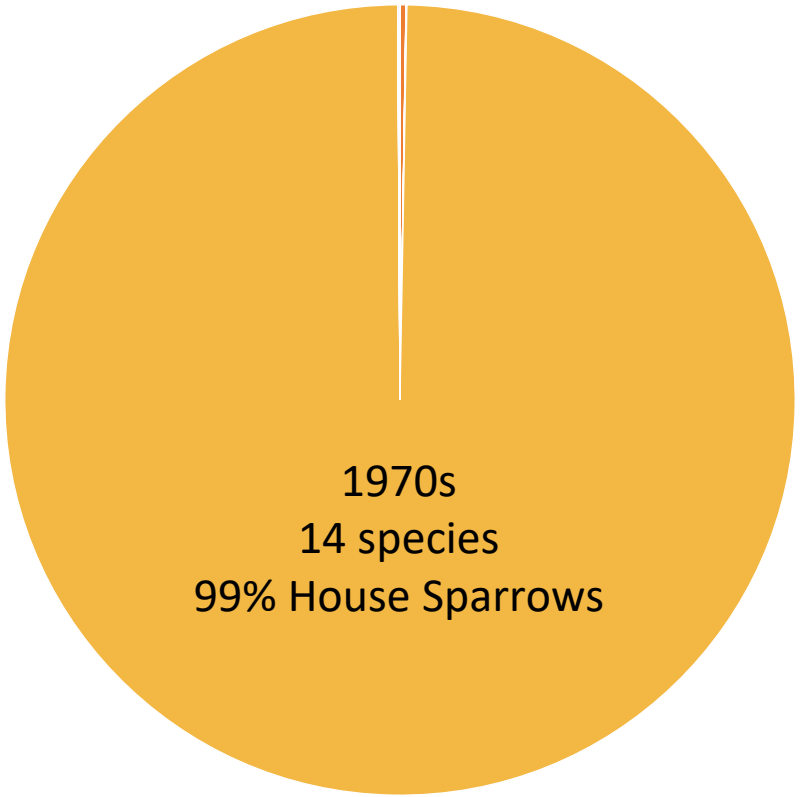
Bird Species of Interest in Harris County

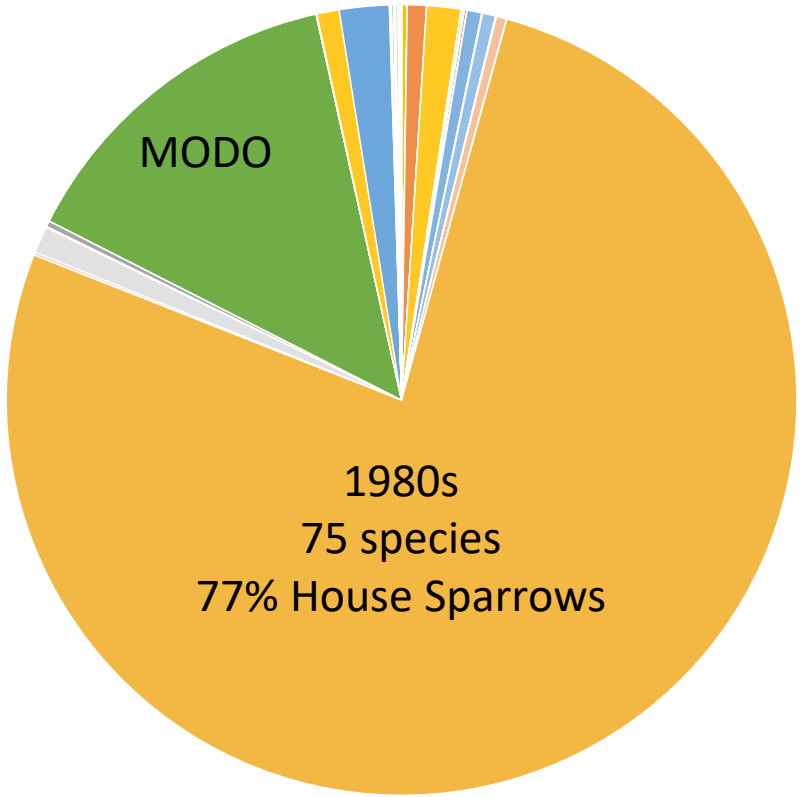
- 10.9% of samples tested since 2002 had WNV antibodies present
  - Over a quarter of the samples collected from Northern Cardinals had antibodies to WNV present
    - Blue Jays, Northern Mockingbirds, and American Robins were also antibody-positive more often than average
      - House Sparrows were less likely to be WNV antibody positive than the other common resident species



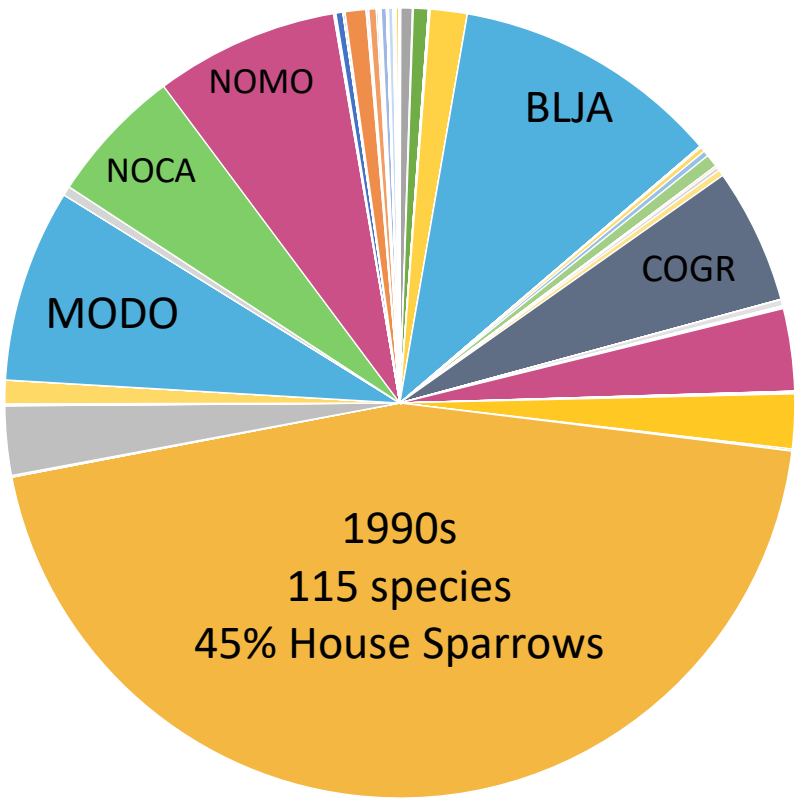
Bird Species Banded: 1960s to 1980s

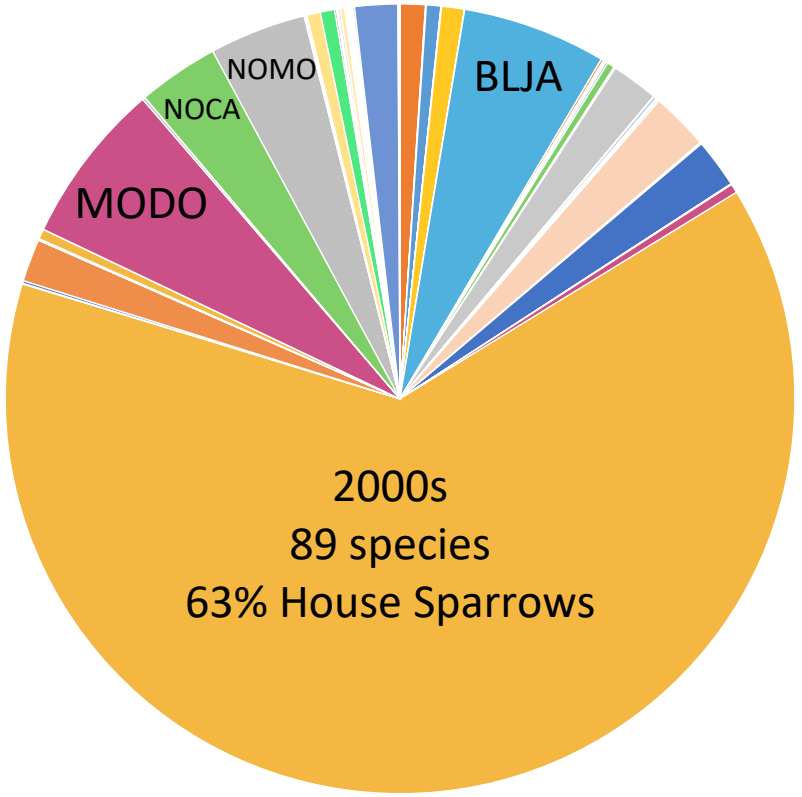


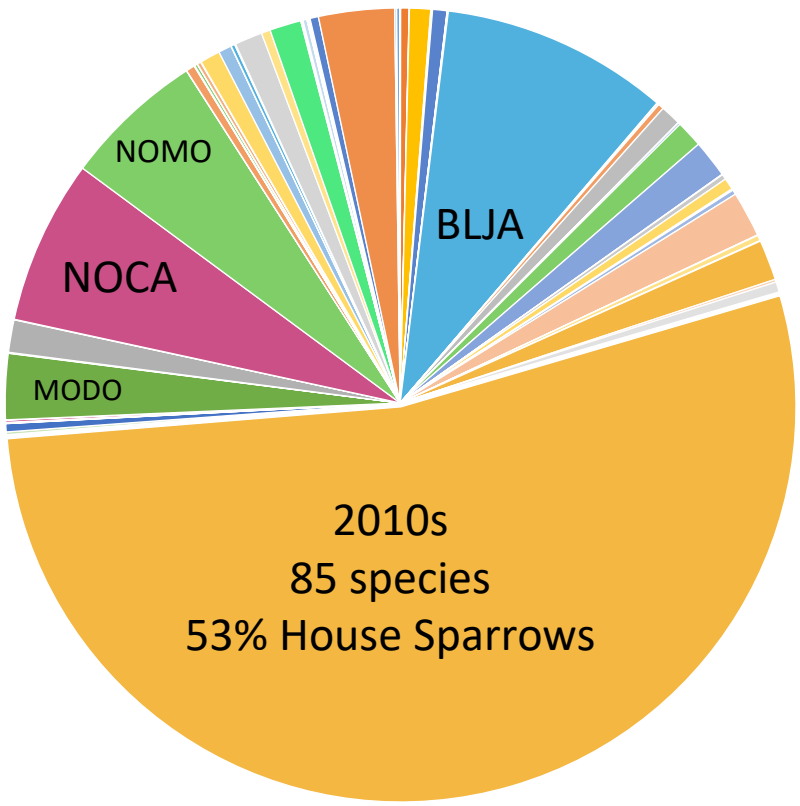




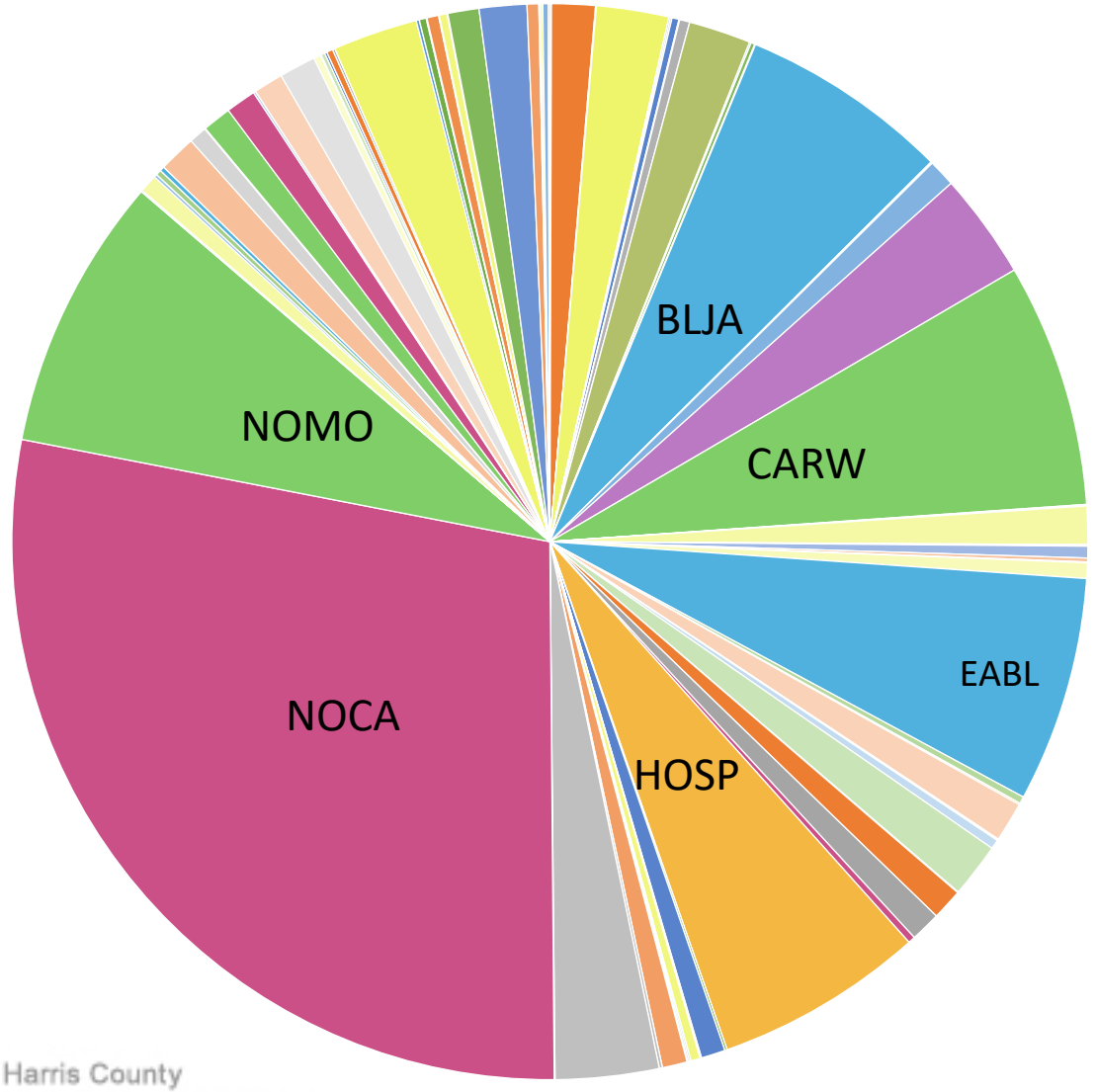
Bird Species Banded: 1990s to 2010s





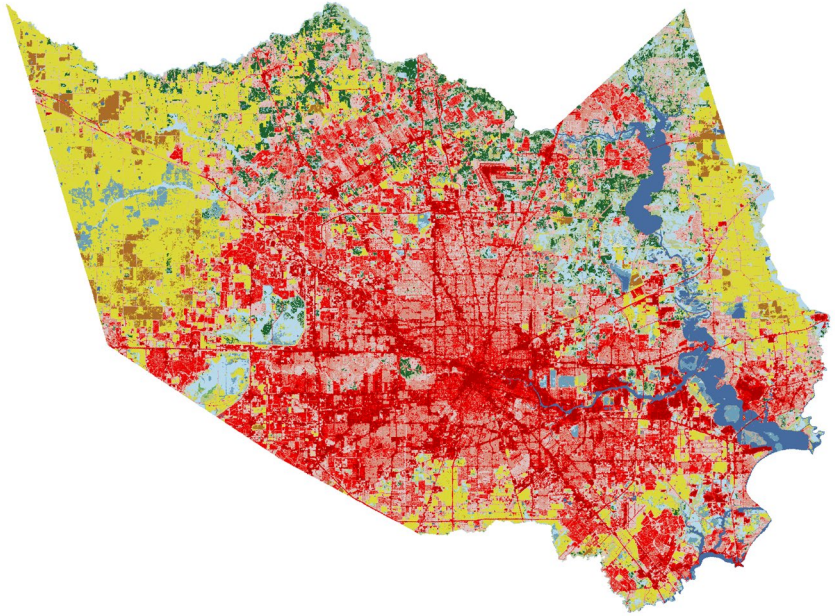


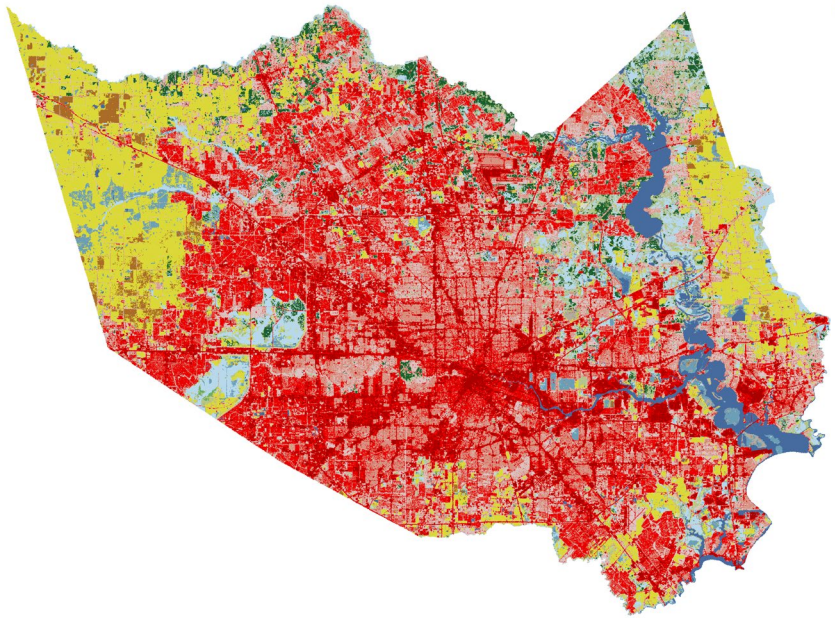
Bird Species Banded: 2020s

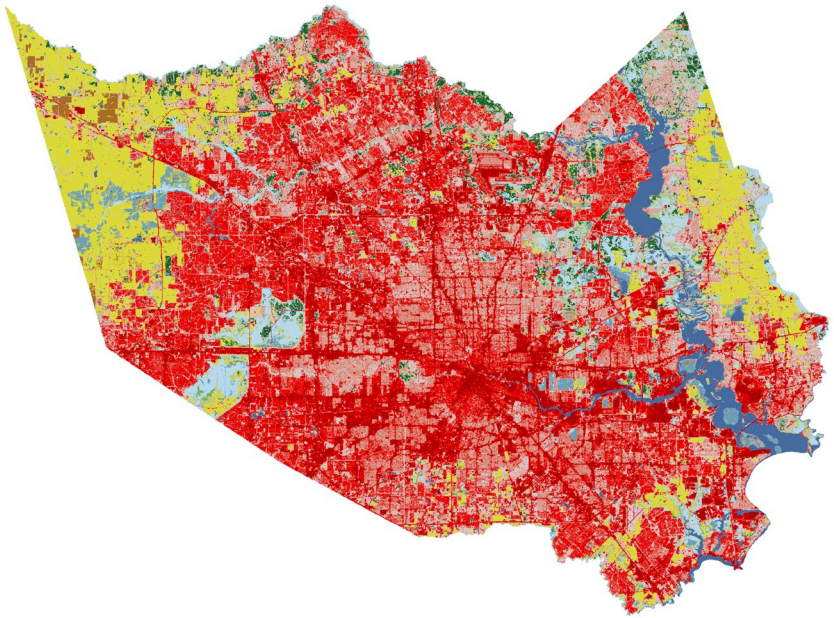


- We have banded 90 species since 2020
  - Species, such as Northern Cardinals, in which a higher proportion of individuals had antibodies against WNV from 2002 to 2019 are now targeted for serosurveillance
    - House Sparrows, which were less likely to be exposed to WNV, comprise 6.2% of birds sampled and banded

Landcover Change and Human Population Growth







- Open Water
- Perennial Ice/Snow
- Developed,Open Space
- Developed,Low Intensity
- Developed,Medium Intensity
- Developed,High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

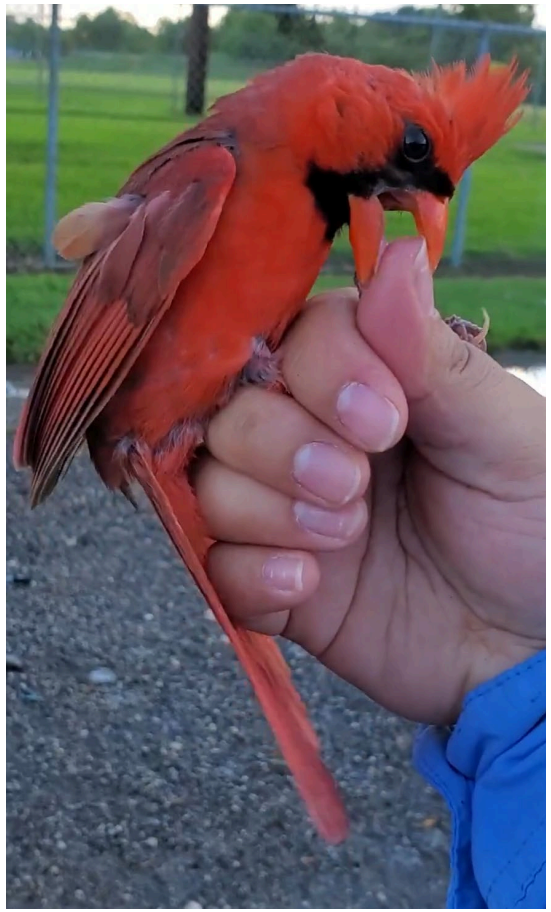
2000 Population: 3.4 Million
57% of the county “Developed”

2010 Population: 4.1 Million
65% of the county “Developed”

2020 Population: 4.7 Million
70% of the county “Developed”

Acknowledgements









Harris County Public Health
Building a Healthy Community

HCPHTX.ORG


QUESTIONS?

Roseate Spoonbill in Galveston Bay

50 Years of Apparent Breeding Trends

Photo Greg Lavaty

HoustonAudubon.org

Wyatt Egelhoff
Sanctuary Manager
Houston Audubon

A Brief History of Roseate Spoonbills in Texas

- **1890**- Extirpated as a breeding species from Texas (not pursued for millinery trade; disturbed at colonies and hunted for food)

- **1920's**- Groups of summering birds become more common and breeding begins by the end of the decade

- **1941**- Seven major breeding colonies documented in the state with a mid-summer population reaching 5000 (**particularly Vingt et un Islands**)

"This has been one of the most remarkable recoveries in the history of wildlife protection in this country, and the establishment of Audubon sanctuaries on the Texas coast since 1931 has been a major factor."
-Robert Porter Allen, 1942

A Brief History of Roseate Spoonbills in Texas

- **1970's**- DDT banned in US **1972**; Roseate Spoonbills seemingly less impacted by bioaccumulation than other waterbird populations. **Texas Waterbird Census (TWC) begins 1973**.

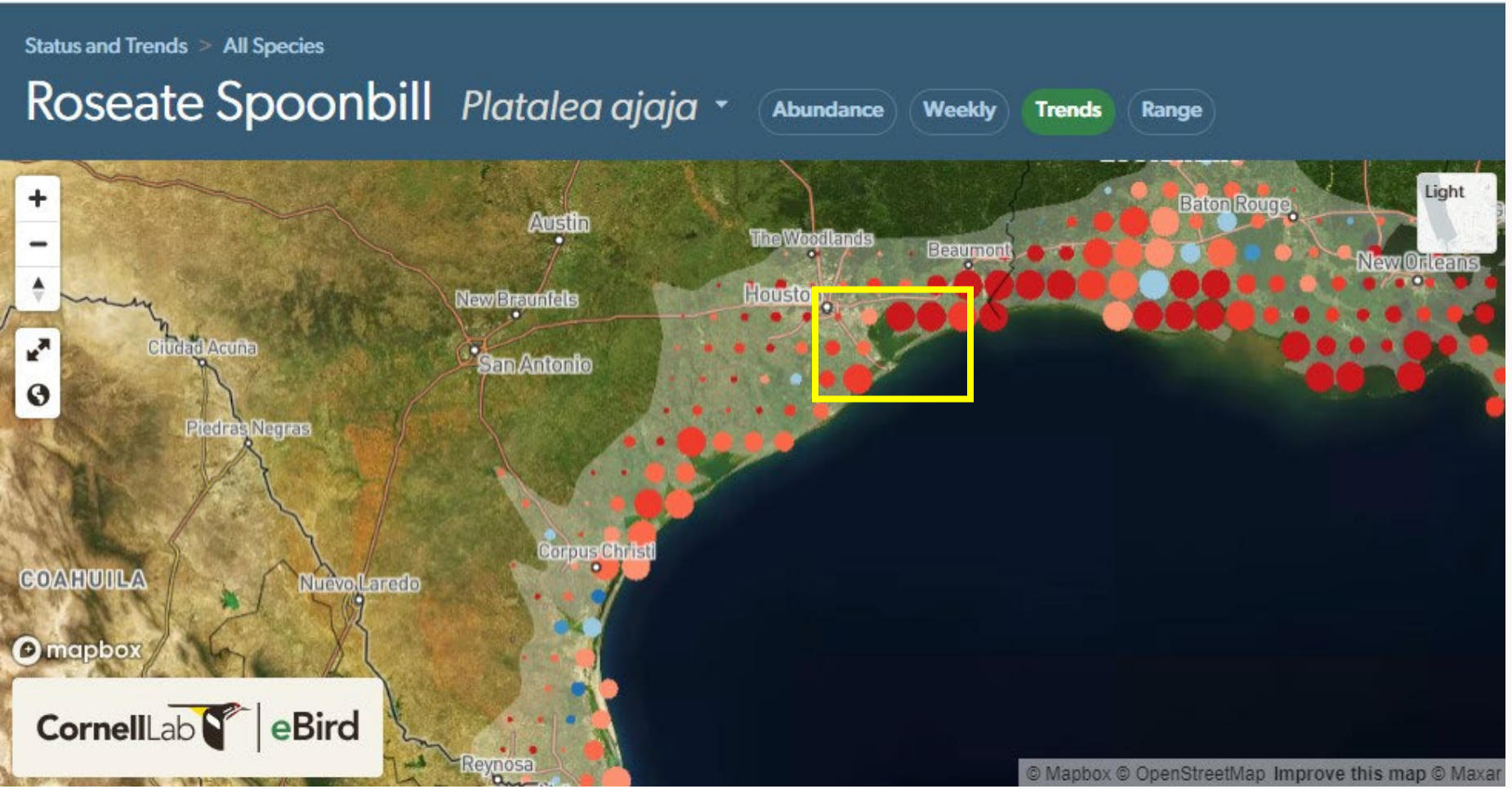
- **1980's**- Waterbird populations negatively impacted by DDT bioaccumulation begin to shows signs of rebound

- **2020's**- Texas continues to support the largest surveyed population of US-breeding ROSP. Louisiana now supports a summer/breeding population. Connectivity throughout Gulf of Mexico unresolved.

Roseate Spoonbill Breeding Ecology

- Sexual maturity reached after 3 years (limited breeding behaviors exhibited at younger ages, but no egg-laying documented)
- Display/Nest-building begins in in earnest the third week in March; nests are built in structure 3’-10’ above the ground
- Egg laying and incubation throughout April/May
- Chick-rearing throughout May, June, and July
- Fledging occurs in July/August
- Most depart the Upper Texas Coast in winter; lingering birds dependent on water levels and severity of weather

Trends and Scope



Roseate Spoonbill *Platalea ajaja*

Trends 2012-2022

Breeding Season, 12 Apr - 17 May

This map depicts the cumulative change in estimated relative abundance from 2012 through 2022 with circles representing 27km x 27km regions. Red indicates decline and blue indicates increase. The darker the color, the stronger the trend. White circles represent locations where the trend estimate is not significantly different from zero (i.e., the 80% confidence interval contains zero). Circle sizes are scaled by the estimated relative abundance at the middle of the time period.

Abundance Trend Pct. Change, 2012-2022

-30% -20 -10 Uncertain +10 +20 +30

Relative Abundance Middle Year of Range, 2017

Lower Higher

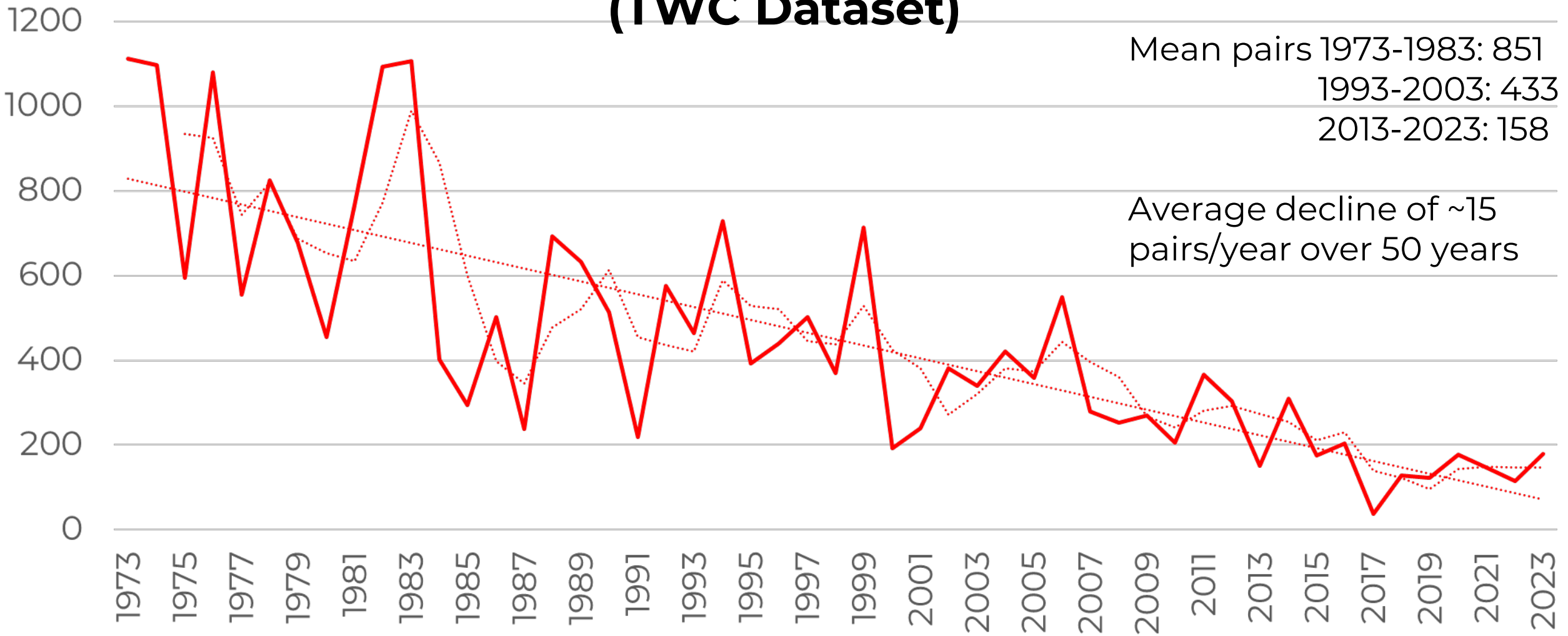
Range-wide Trend (Confidence Intervals)

-7.2%	Upper
↓ -12.1%	Median
-16.3%	Lower

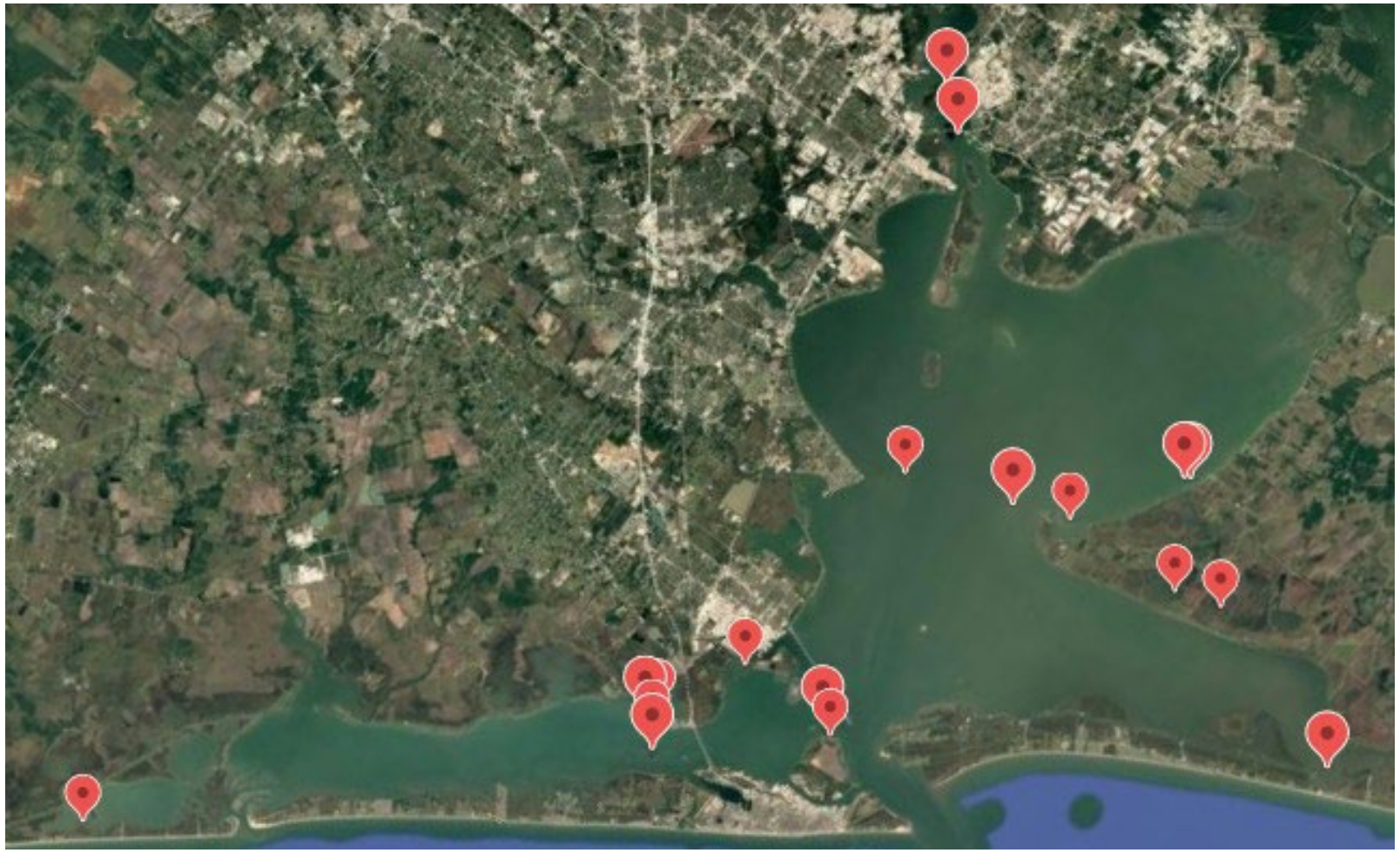
Inside Modeled Seasonal Range
Outside Modeled Seasonal Range

Fink, D., T. Auer, A. Johnston, M. Strimas-Mackey, S. Ligocki, O. Robinson, W. Hochachka, L. Jaromczyk, C. Crowley, K. Dunham, A. Stillman, I. Davies, A. Rodewald, V. Ruiz-Gutierrez, C. Wood. 2023. eBird Status and Trends, Data Version: 2022; Released: 2023. Cornell Lab of Ornithology, Ithaca, New York. https://doi.org/10.2173/ebirdst.2022

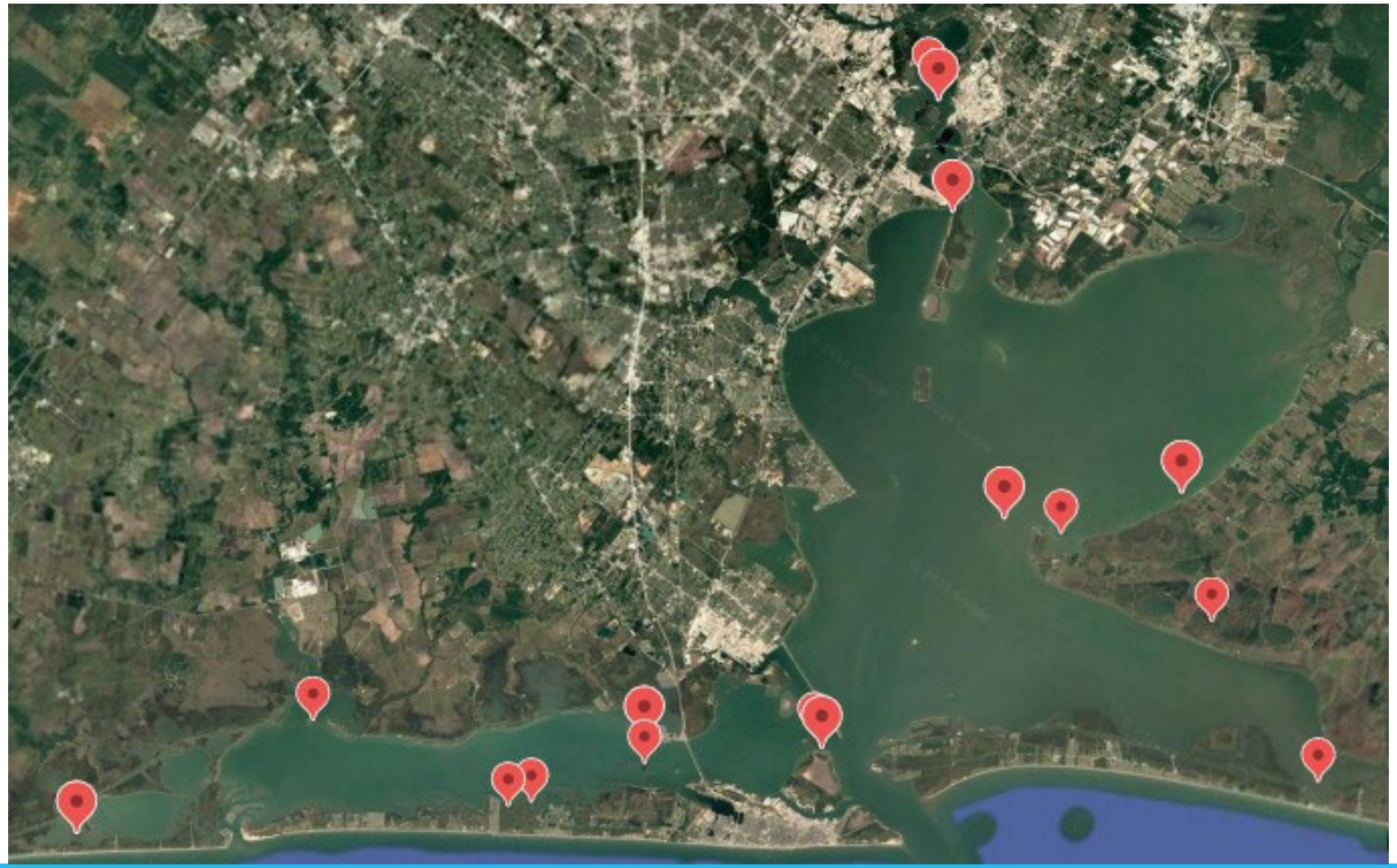
Trends: Total Pairs Surveyed (Galveston Bay)
(TWC Dataset)



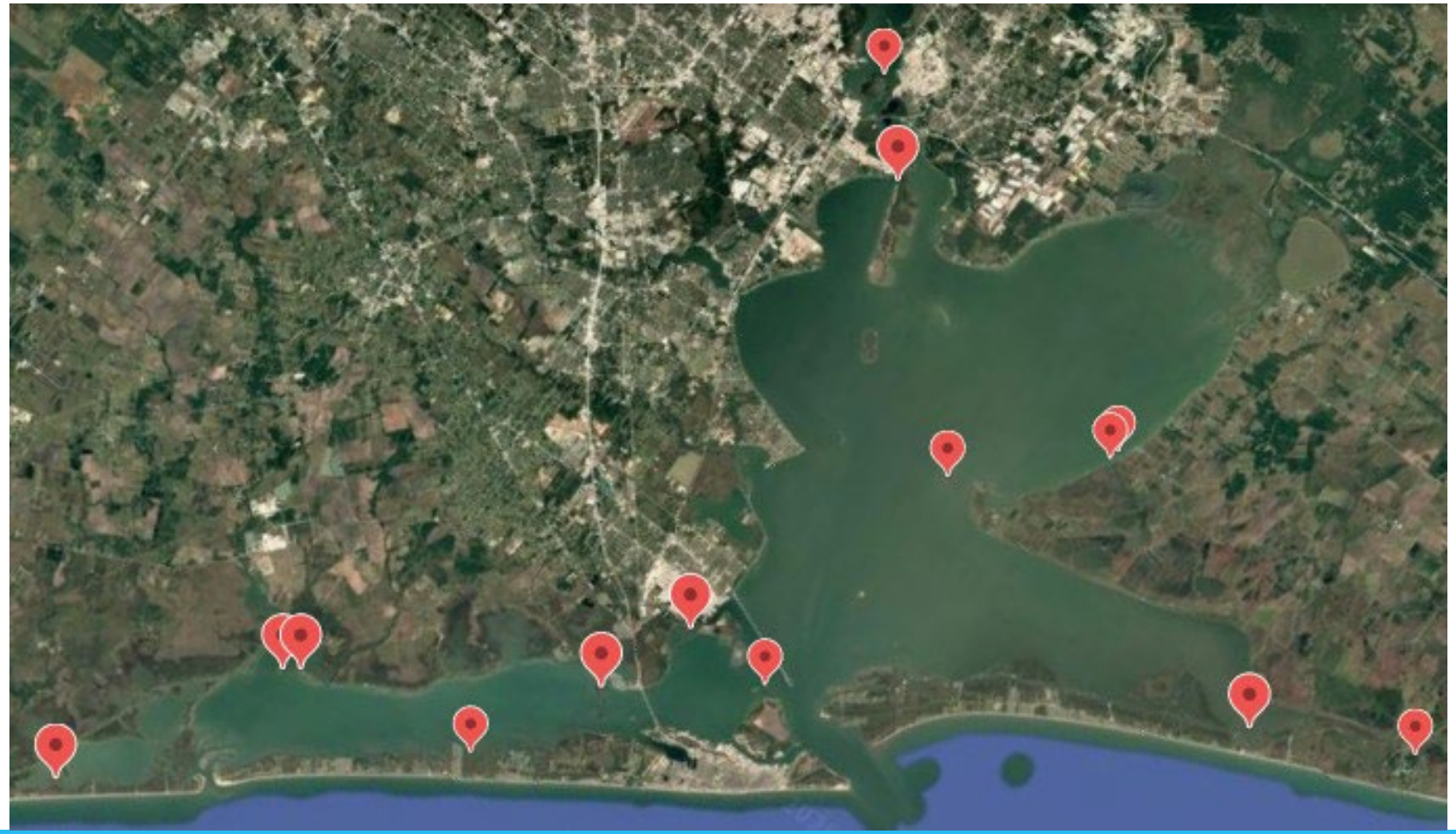
Galveston Bay Colonies (1973-1983)
Mean Pairs/Year: 851



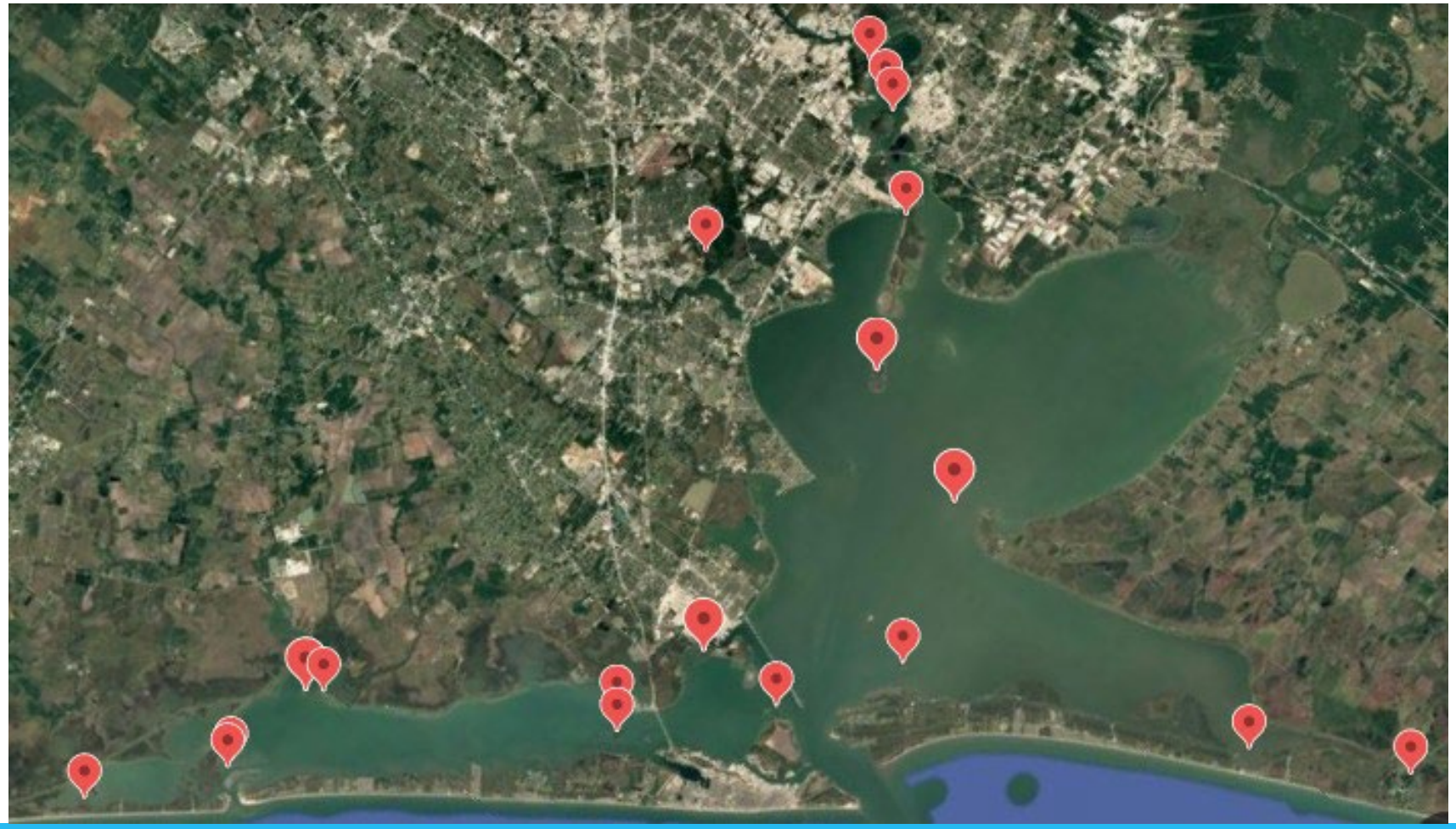
Galveston Bay Colonies (1983-1993)
Mean Pairs/Year: 513



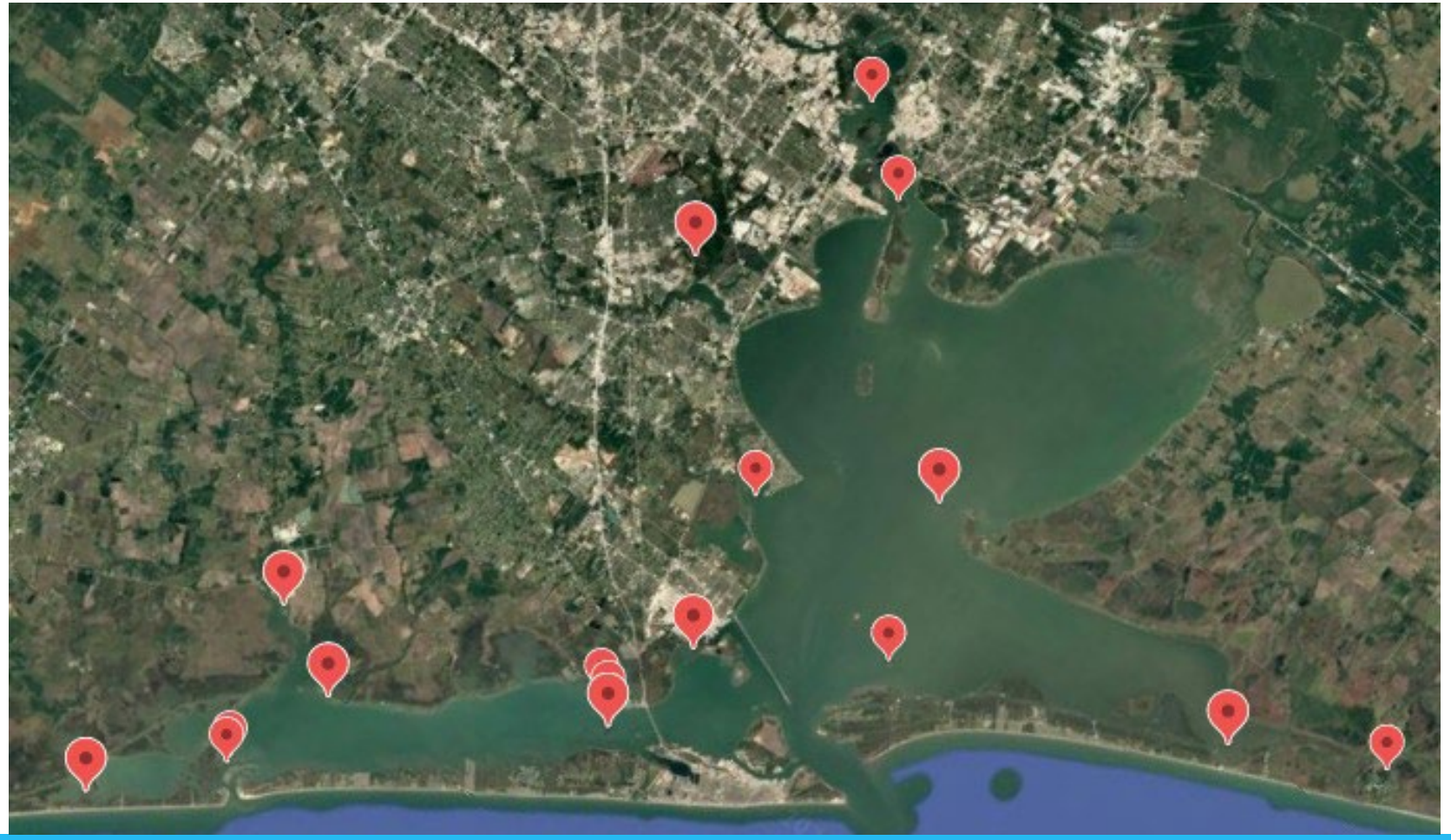
Galveston Bay Colonies (1993-2003)
Mean Pairs/Year: 433



Galveston Bay Colonies (2003-2013)
Mean Pairs/Year: 318



Galveston Bay Colonies (2013-2023)
Mean Pairs/Year: 159



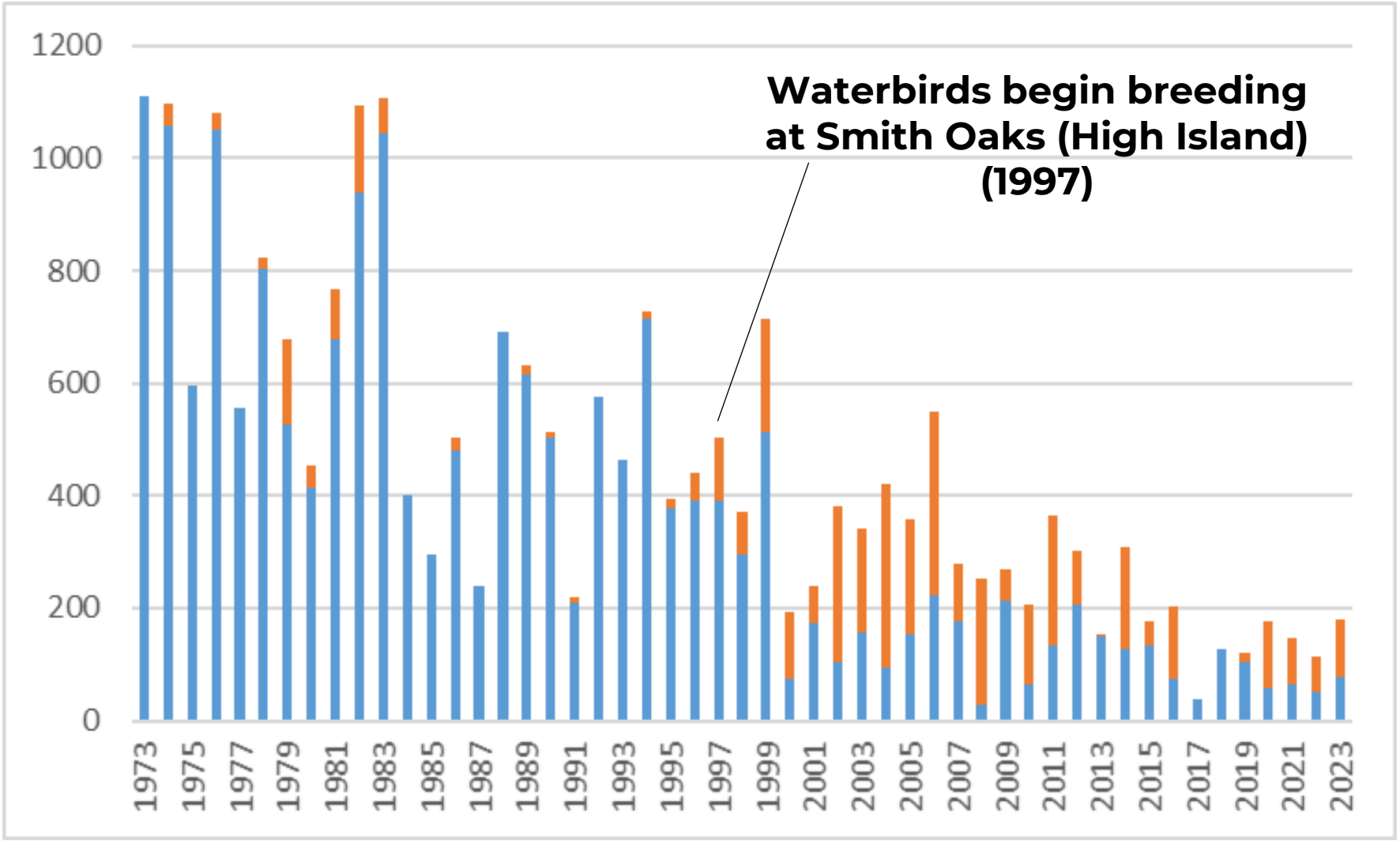
Trends: Nesting Pairs (Bay vs “Inland” Sites)

Bay Island Pairs

Inland Pairs

Of total surveyed ROSP pairs

“Inland” referring to colonies within 12 miles of Galveston Bay but not within it

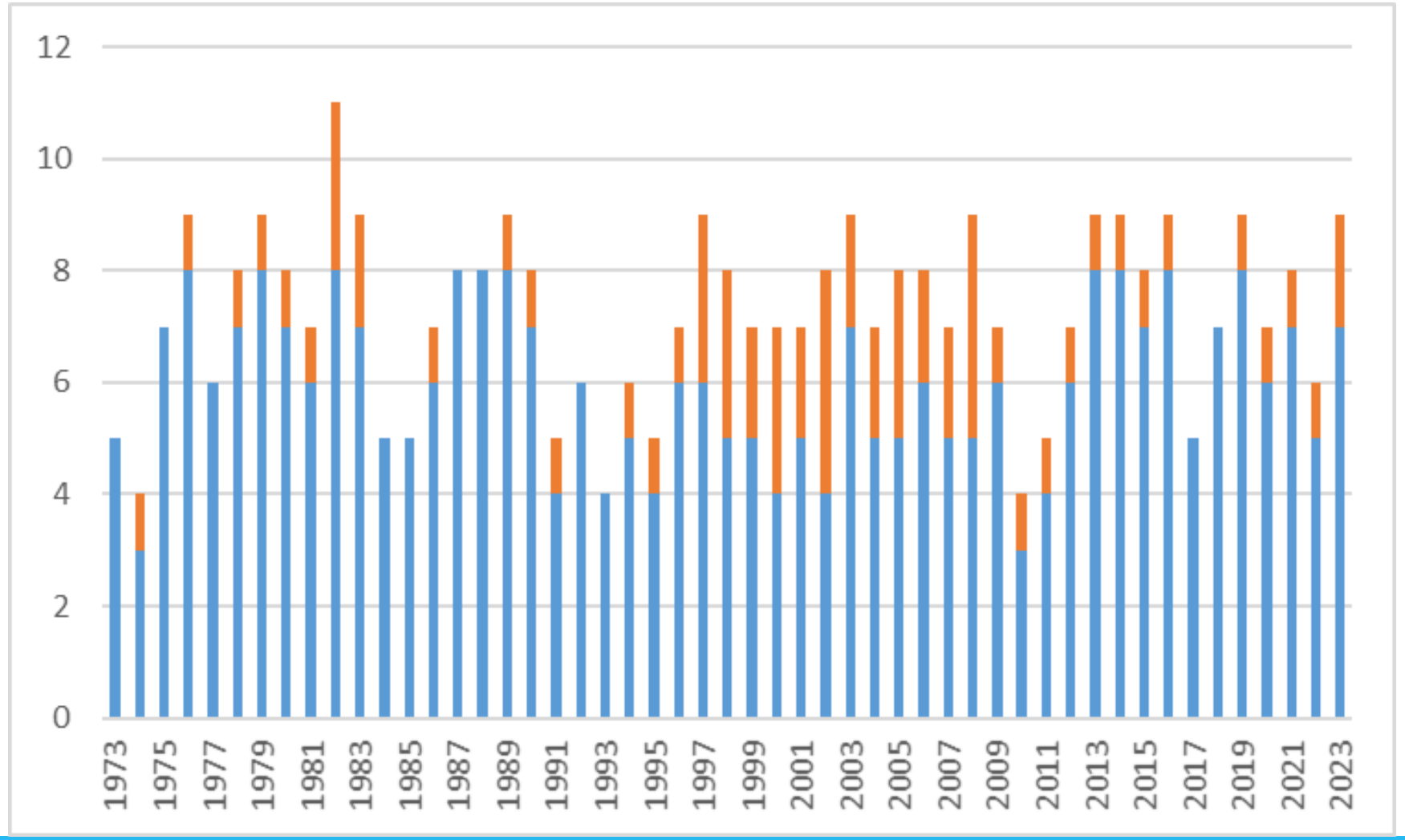


Trends: Occupied Sites (Bay vs “Inland” Sites)

Bay Island Sites

Inland Sites

Of total sites surveyed reporting occupancy by ROSP



Discussion

- Inland sites are becoming more frequently used by ROSP as bay islands become more crowded and erode away

- Inland sites tend to support shorter-lived ROSP colonies than bay sites (with notable exceptions, such as in High Island)

- While many colonial waterbird populations have rebounded within Galveston Bay (Brown Pelican) or experience novel expansions (Neotropic Cormorants) this may be partly driving Roseate Spoonbill declines

- Lack of secure contemporary nesting sites is a limiting factor for colonial waterbirds compared with historic distribution of suitable sites

Thank You

Amanda Hackney- TWC Upper Coast Compiler

Brent Ortego- TWC Mid Coast Compiler; Texas CBC & BBS Compiler

Jonathan Moczygemba- TWC Lower Coast Compiler

Texas Colonial Waterbird Surveyors of Past and Present

February 2026

CONSERVATION IN ACTION:

THE ATTWATER'S PRAIRIE CHICKEN RECOVERY EFFORT

By: Ric Urban, Curator of Birds

Houston Zoo

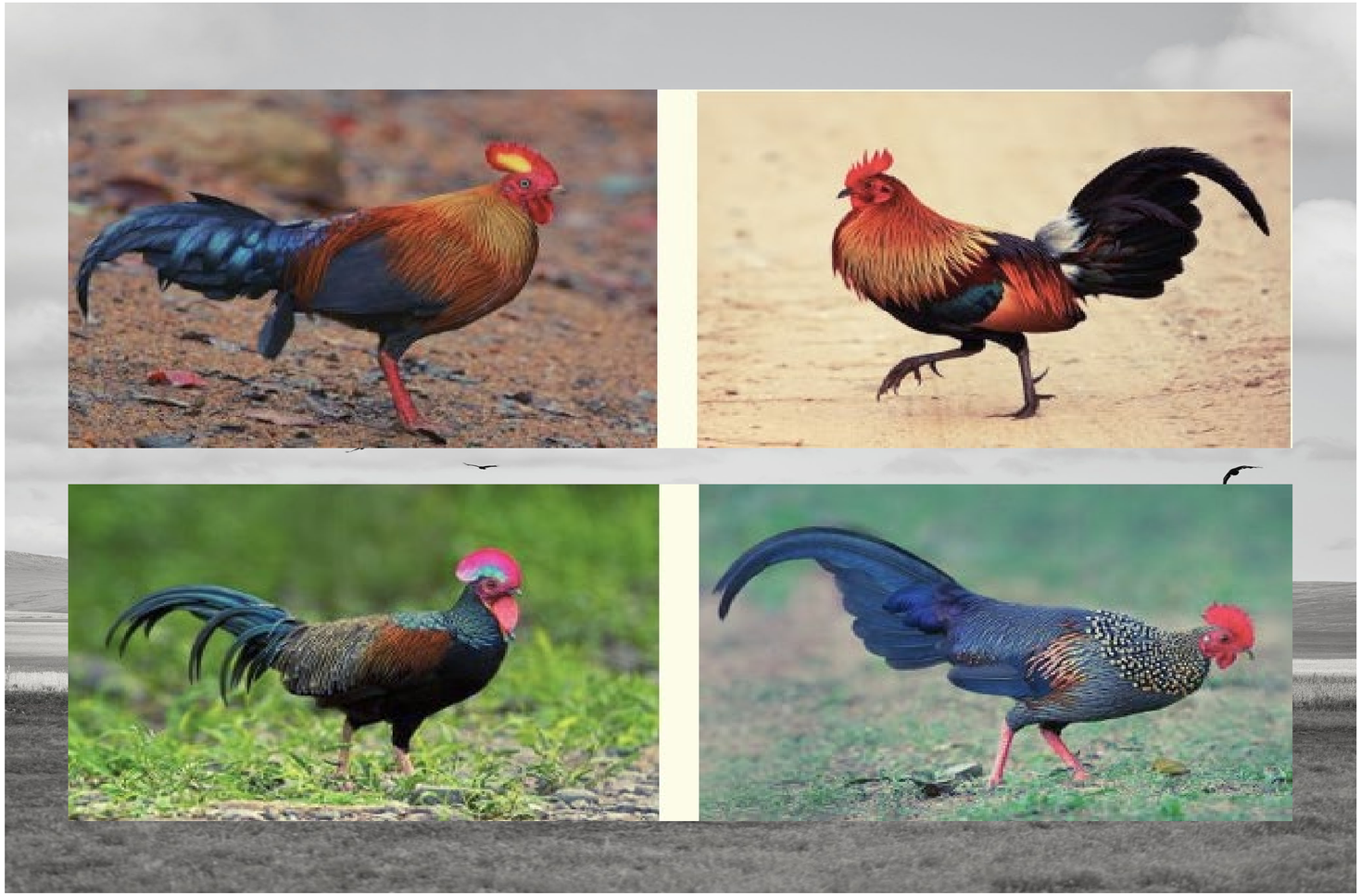
What is a Prairie Chicken?

Houston Zoo

A CHICKEN YOU SAY?

- The domestic chicken is descendent from 4 junglefowl species in the pheasant family that occur in South-east Asia.

- The Prairie Chicken is a species of grouse and is not a domesticated species. A grouse is not a chicken.



What is a Prairie Chicken?

NEAR THREATENED NT

Tympanuchus cupido

Wild population: ~360,000 (IUNC, 2020)

The Greater Prairie Chicken has three described subspecies.

- The Heath Hen *Tympanuchus c. cupido* which was found on the East Coast and went extinct in 1932.

- **The Attwater's Prairie Chicken *Tympanuchus cupido attwateri*.**

- The rest of the species is considered *Tympanuchus c. pinnatus*.

Attwater's Prairie Chicken

Tympanuchus cupido attwateri

Wild population: ~178 (2021)

CHICK

ADULT MALE

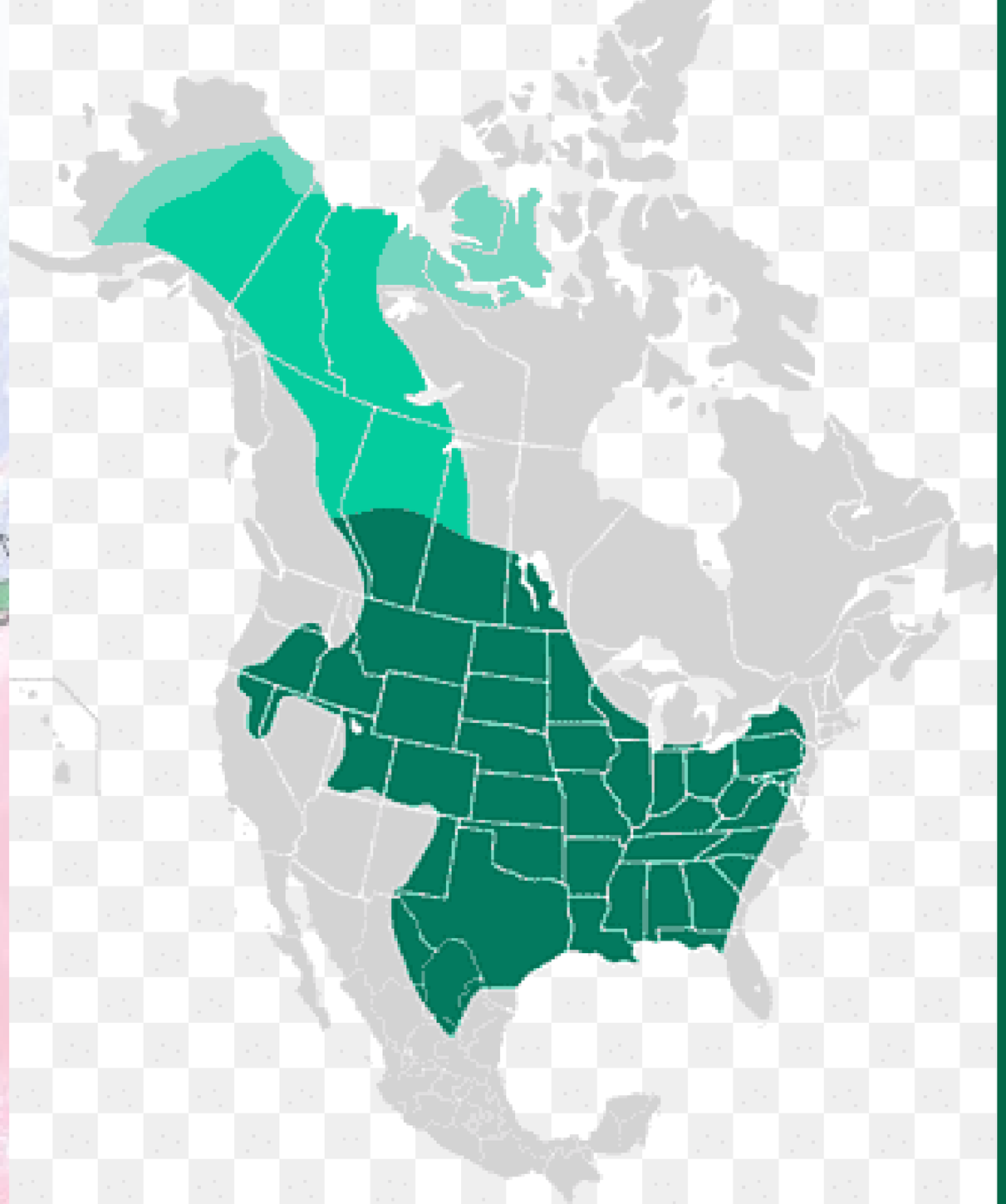
ADULT FEMALE

Also an Endanger Biome...

Houston Zoo

1% remaining.

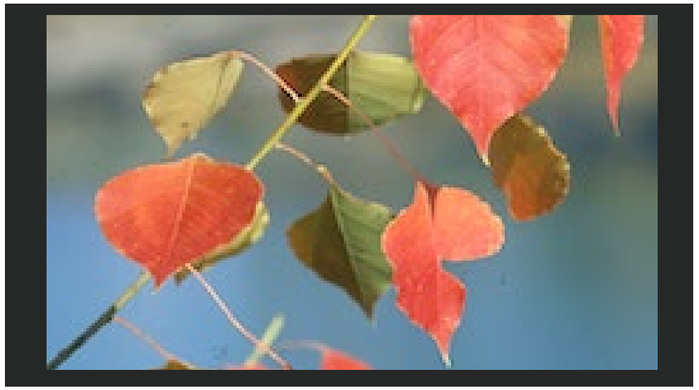

CANADA
MÉXICO



Invasive Species

FIRE ANTS

Brazilian Red Fire Ants arrive in Texas in the 1950's. This is also a species that is found in the Pantanal.



TALLOW TREE

The Tallow Tree is planted along the Texas Gulf Coast in the 1900s as an experimental oil crop. Gains popularity as an ornamental tree because of its fall color.

Why are Prairie Chickens Important?

PREY SPECIES

Prairie chickens are an important prey species for a diversity of prairie predators. Medium-sized carnivores like foxes, coyotes, raccoons, and raptors all consume prairie chickens, especially eggs and chicks. Juveniles and adults also fall prey. Though challenging to quantify, the ecological services provided by prairie chickens as a food source likely have high value.

INFLUENCE ON VEGETATION

Prairie chickens influence prairie vegetation through their grazing, foraging, and behaviors. Through their food habits and digestions, prairie chickens also disperse native plant seeds. Areas with prairie chickens tend to have higher diversity and heterogeneity of native prairie plants.

NUTRIENT CYCLING

As prey and through their droppings, prairie chickens help cycle nutrients through prairie systems. Predators that consume prairie chickens spread those nutrients across the landscape. Grazing and foraging by prairie chickens also shifts nutrients from plants to the soil.

ECOSYSTEM ENGINEERING

Through their scratching and dusting behaviors, they may help incorporate litter into soils, shift microbial communities, and influence water infiltration rates. More study is needed, but prairie chickens may provide important disturbance that contributes to prairie ecosystem function.

Houston Zoo

Houston Zoo's Recovery Efforts

Houston Zoo

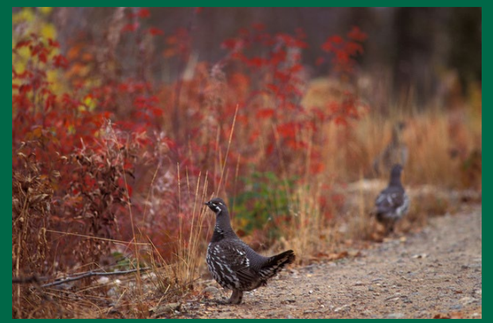
Recovery Team History

1972

APC National Wildlife Refuge Created in Eagle Lake, Texas to safeguard habitat of the remaining wild population. This reserve is 10,528 acres.

1993

Captive breeding began with Texas A & M and Fossil Rim. Houston Zoo joined in 1994. Prediction was birds would be extinct by 2000 without intervention.



2005

In 2004-2005 NASA offered space at the Johnson Space Center grounds.

This has also allowed us to provide better welfare for the birds and to increase the number of breeding pairs and increase the number of chicks that we release into the wild.

2021

Recently we have added to this facility by building a dedicated chick rearing facility used for the first time last year.

First year the Houston Zoo focused on parent rearing.

Houston Zoo

Attwater Timeline

FEB/MARCH

Males begin booming. These birds lek meaning males congregate together in large flocks and display for the females. The birds do not form a pair bond and after copulation the hen takes care of incubation and chick rearing by herself. Some historic leks were reported as many as 200 males.

MARCH/APRIL

Late March/early April birds will begin laying eggs. They do not nest outside of the March-May window which makes this bird particularly vulnerable to climate change and climate patterns.

MAY

Chicks begin to hatch and are raised by the hen.

AUGUST

Birds are released at the wildlife refuge.

Houston Zoo

Egg Management

MARCH-MAY

Houston Zoo

- Hens do most of the incubation for us now 10-13 days.
- Tier system APC Hen > Domestic Chicken > Artificial Incubator
- Logging every single egg and checking fertility.
- Weather impact on eggs

Chick Rearing

Houston Zoo

Parent-Rearing

(AND APC FOSTER)

- Hens raise chicks like they would once released
- Natural grasses- foraging opportunities
- Chicks learn from hen
- Healthier more robust birds
- Better survival

Foster-Rearing

DOMESTIC CHICKENS

Houston Zoo

- A flock of broody hens who act as foster parents to APCs.
- When hen begins sitting it is tracked and eventually the dummy eggs under her are switched out with APC eggs
- Emerging data shows these chicks may have great survival post-release.

Hand-Rearing

Houston Zoo

- A flock of broody hens who act as foster parents to APCs.
- When hen begins sitting it is tracked and eventually the dummy eggs under her are switched out with APC eggs
- Emerging data shows these chicks may have the best survival post-release.

New Chick Facility Use

More space for chicks

Foster-rearing on site

Introduce to grass setting sooner

Release and continued efforts

PROGRAM PARTNERS

- Houston is currently partnered with USFWS, Sutton Avian Research Center, Fossil Rim Wildlife Center, and Caldwell zoo.
- We also currently oversee the APC studbook and run the SAFE through AZA.

RELEASE SO FAR

- 1500+ birds released by Houston so far
- Population surveyed in wild is highest it's ever been.

LOOKING AHEAD

- Continued growth of program and more chicks
- New release sites
- New program partners
- Advancing husbandry
- Research studies ongoing

Houston Zoo


QUESTIONS?
Houston
Zoo