

How we help the birds:

A look at bird-friendly actions in the community

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Houston Audubon*



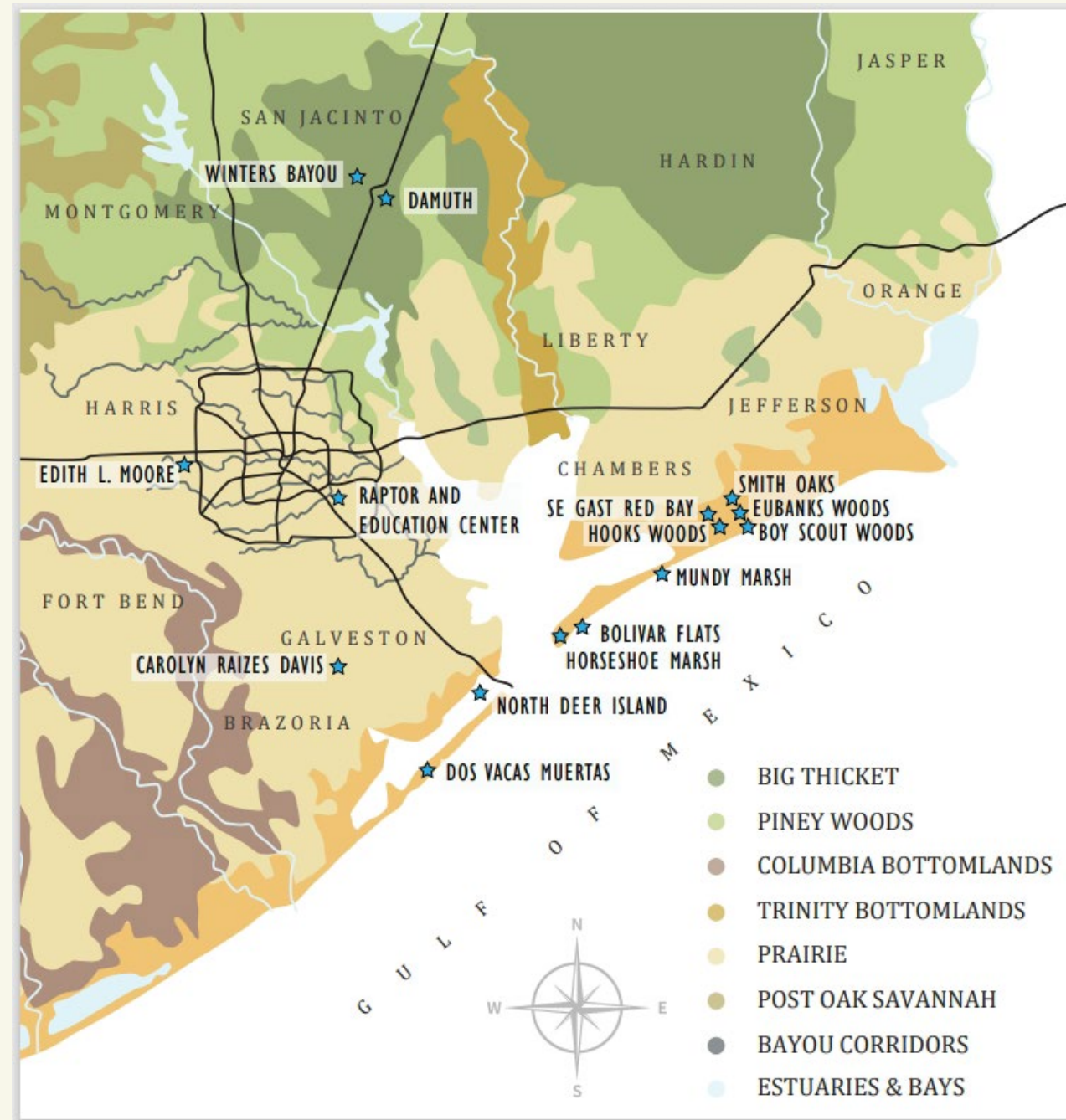
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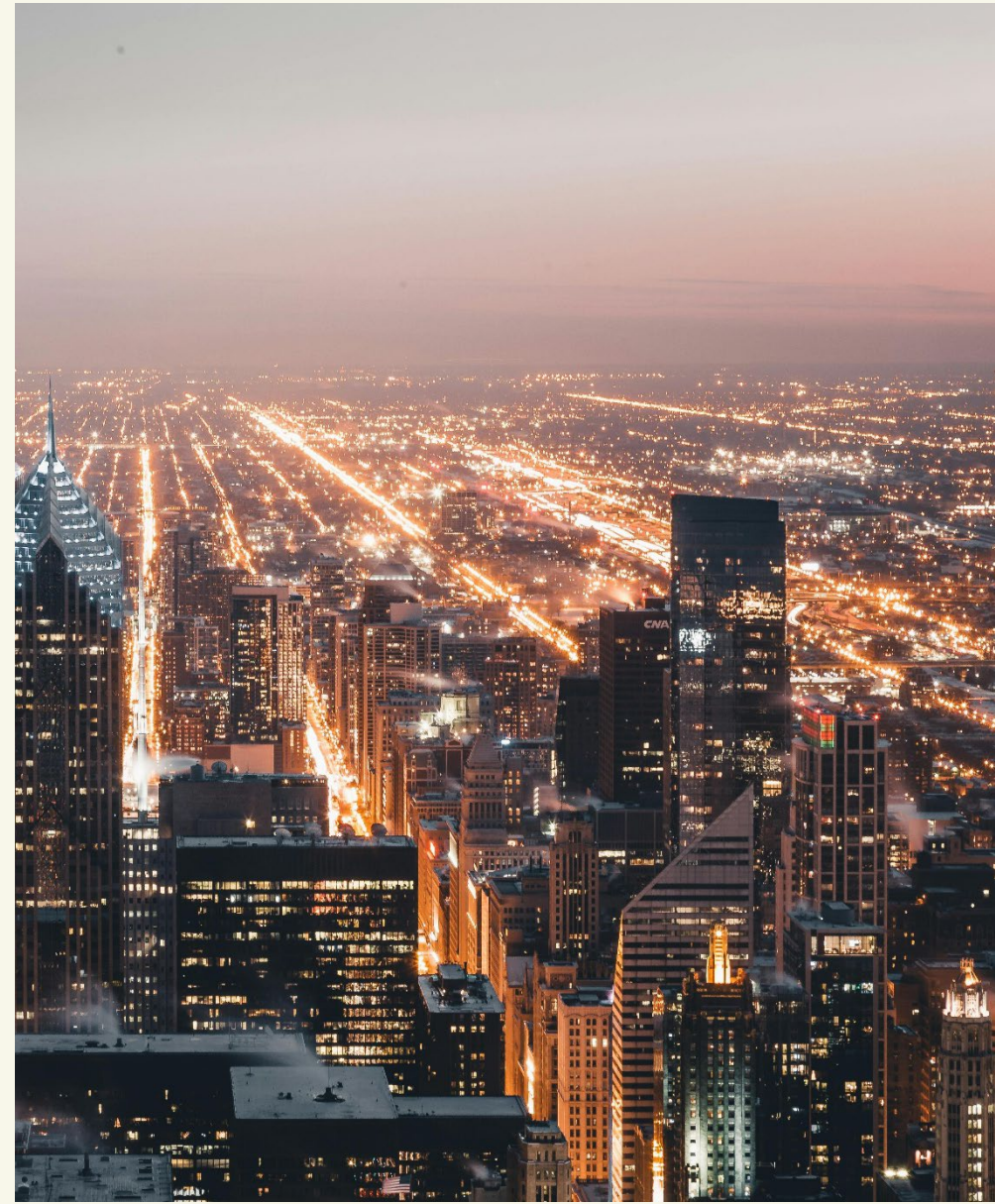
www.HoustonAudubon.org

Advancing the conservation of birds and their habitats since 1969.



Introduction

- Urban and suburban communities are growing rapidly resulting in loss of spaces for birds
- Community actions are a key part of bird conservation in urban areas.



Problem: Knowledge Gap

- Little research on what conservation actions are frequently taken by the community
- Potential for understanding broader implications of community conservation action.
- Can draw inferences from the actions most commonly taken.



Bird-Friendly Communities/Spaces

- Seeing the need for urban conservation, Houston Audubon created the Bird-friendly Communities and Spaces programs.
 - Bird-Friendly Communities: A broader, partner based effort focused on collaboration that enhances urban spaces for birds, while organizations team up to provide resources to each other and the public.
 - Bird-Friendly Spaces: A recognition program designed to encourage the people of Houston-Galveston to create safe spaces for birds and wildlife.
 - Hazard Reduction
 - Creating Habitat
 - Connecting with others

Problem: Knowledge Gap

- Little research on what conservation actions are frequently taken by the community
- Potential for understanding broader implications of community conservation action.
- Can draw inferences from the actions most commonly taken.
- BFS only requires 3 actions from 3 categories be taken in order to gain recognition.
- No exploration of which actions are most common and which are taken least.



Bird-Friendly Communities/Spaces

- How often are actions in each major category (Hazard Reduction, Provide Habitat, Connect with Others) taken as a percentage of possible times an action could have been taken?
- What specific actions are taken most/least frequently?
- What can this tell us about promoting conservation?

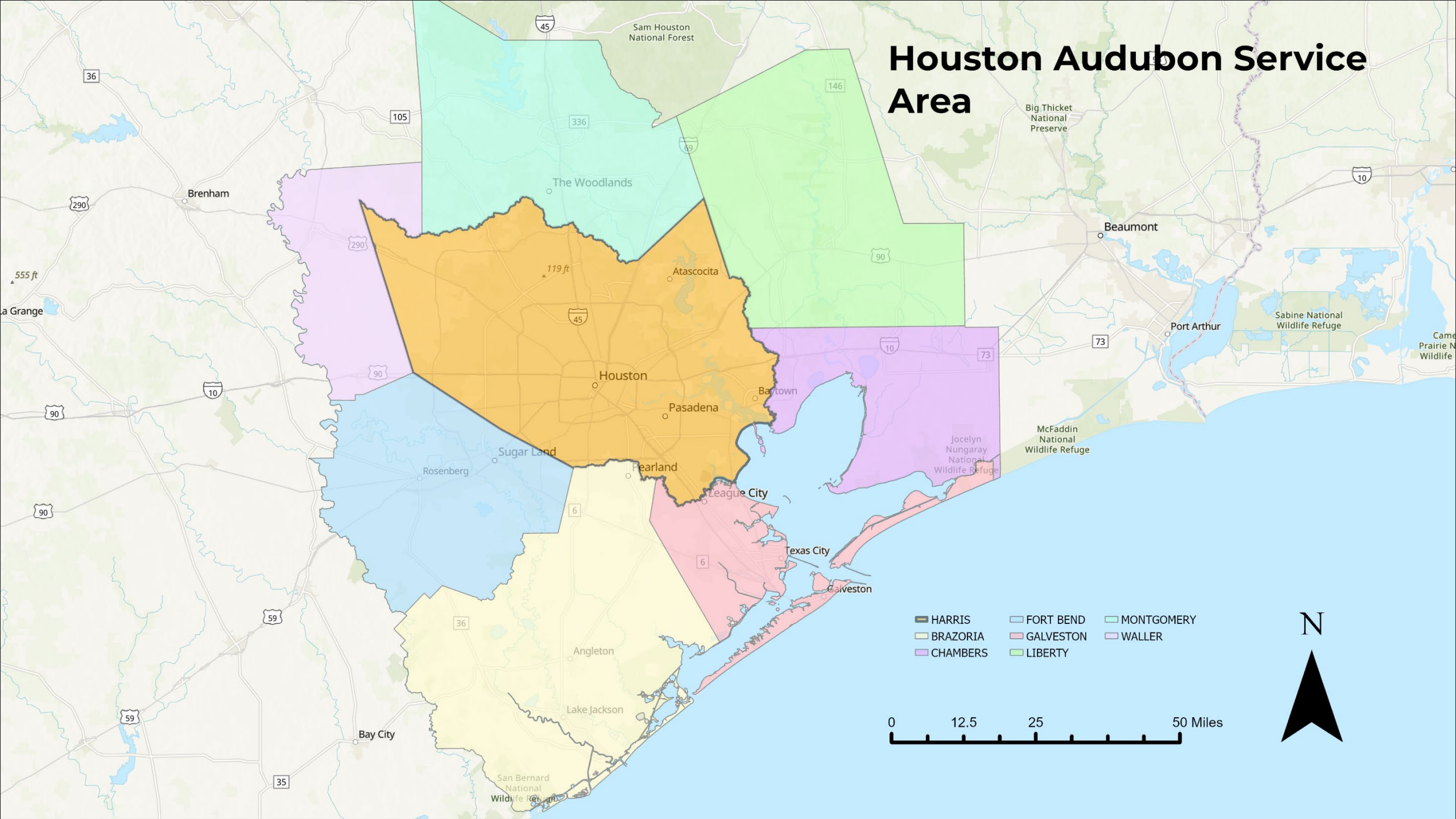


Hypothesis

- From the three main categories (Connect with others, Reduce Hazards, and Provide Habitat), the expectation is that hazard reduction actions would be taken least commonly.
- Hazard reduction could potentially cost more, and act as a barrier or deterrent to entry, and therefore we expect those specific actions to be taken least frequently as well..



Houston Audubon Service Area



Methods: Dataset

- Included 160 accepted Bird-friendly Spaces located within the study area
- 2021 – 2025
- Recorded responses from Google Form in Google Sheet
 - Personal information
 - Information about BFS
 - Actions Taken
 - Pictures
- Data were cleaned, given a unique Identifier, and fields were narrowed to just zip, sq ft, and actions taken (Actions were converted from Yes/No to 1,0 for analysis).



Table of possible Conservation actions

Provide Habitat	Connect With Others	Hazard Reduction
Install Water Feature	Audubon Member	No Pesticides
Plant Native Plants	Educate Others	Buy Bird-friendly
Remove Invasives	Participate in Community Science	Keep Cats Indoors
Put out Feeder	Attend a Class	Pickup Trash in Community
Install Nest Box	Share on Social Media	Limit Plastic Use
	Volunteer	Turn Lights out at Night
		Reduce Collisions (Decals, Paracord, Retrofit Windows, etc.)



Methods: Analysis Across Actions

- How often actions in major categories are taken (to compare across major categories)
- Calculated as percent of total number of times an action could have been taken
- $\% = (\text{Sum of each action in a major category}) / (\text{total possible times an action could have been taken}) * 100$
- Compared results of three categories.



Methods: Analysis within Actions

- Simply calculated the sum total of each action taken.



Results

- We had 160 bird-friendly spaces participants
- Total area of bird-friendly space: 10,794,279 Sq Ft or about 247 Acres
- Average area: 67,464 Sq Ft or about 1.5 Acres

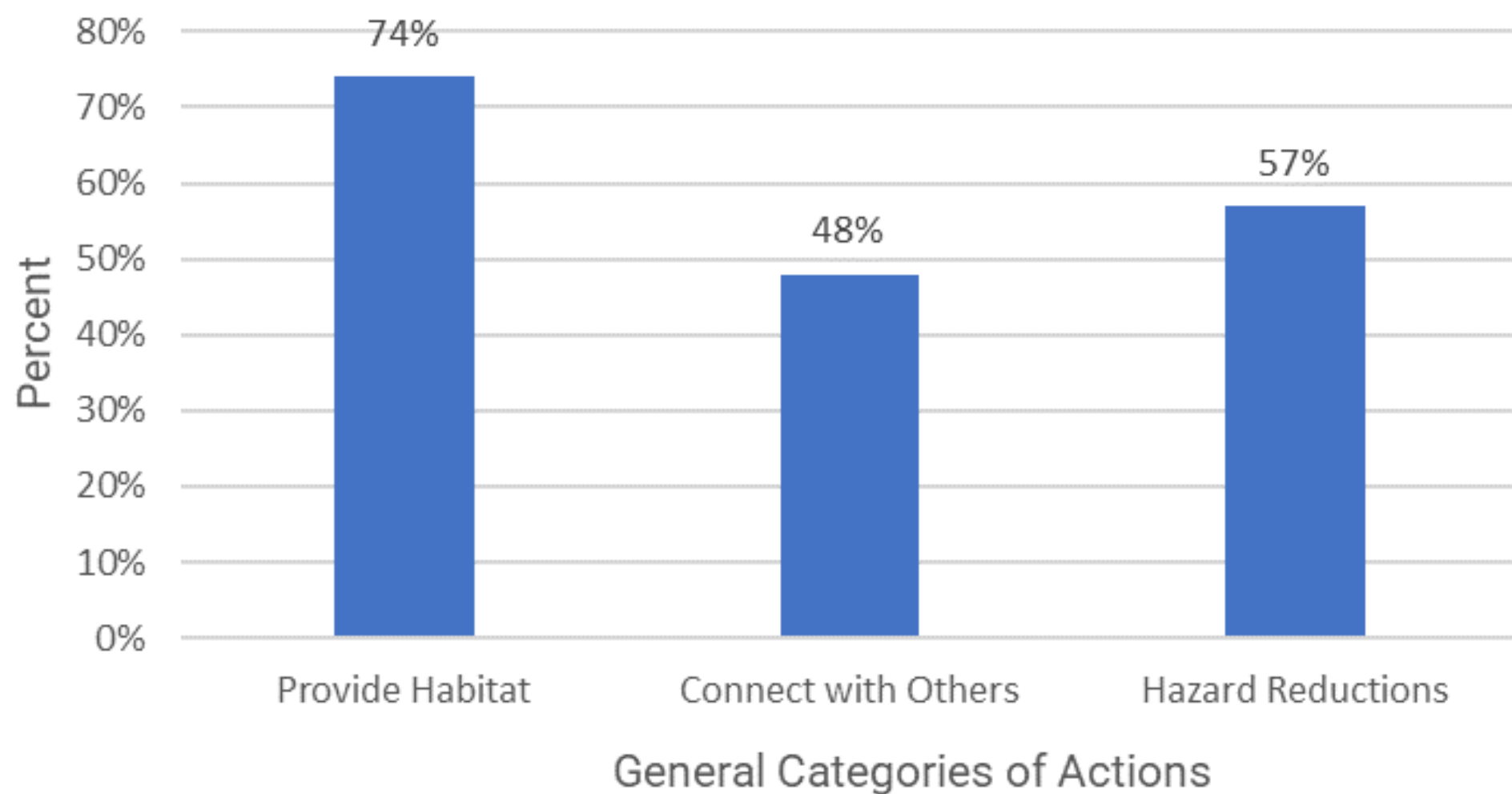


Results: Actions taken compared to possible actions taken

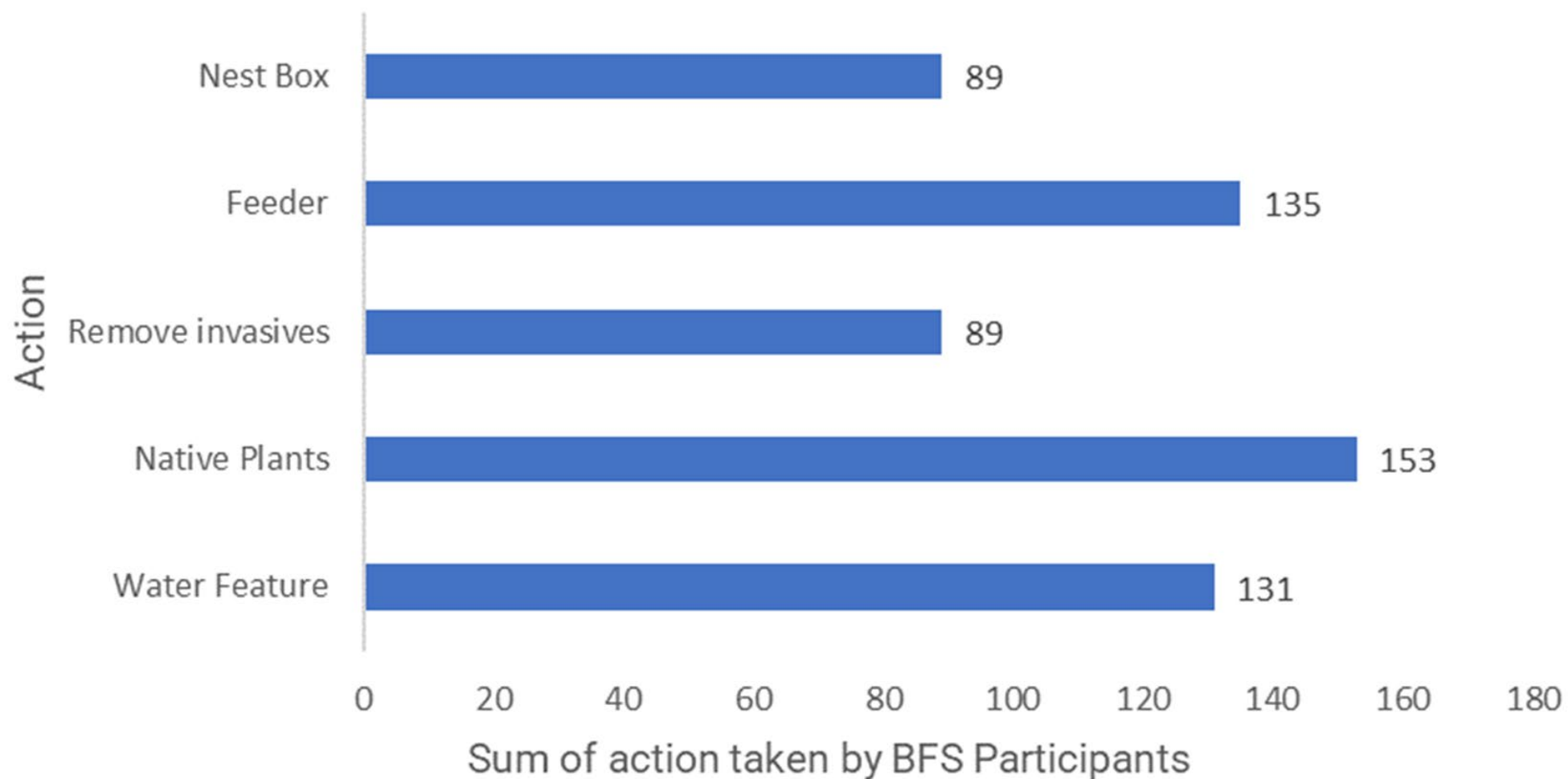
Provide Habitat	Connect with Others	Hazard Reduction
597/800	457/960	636/1120



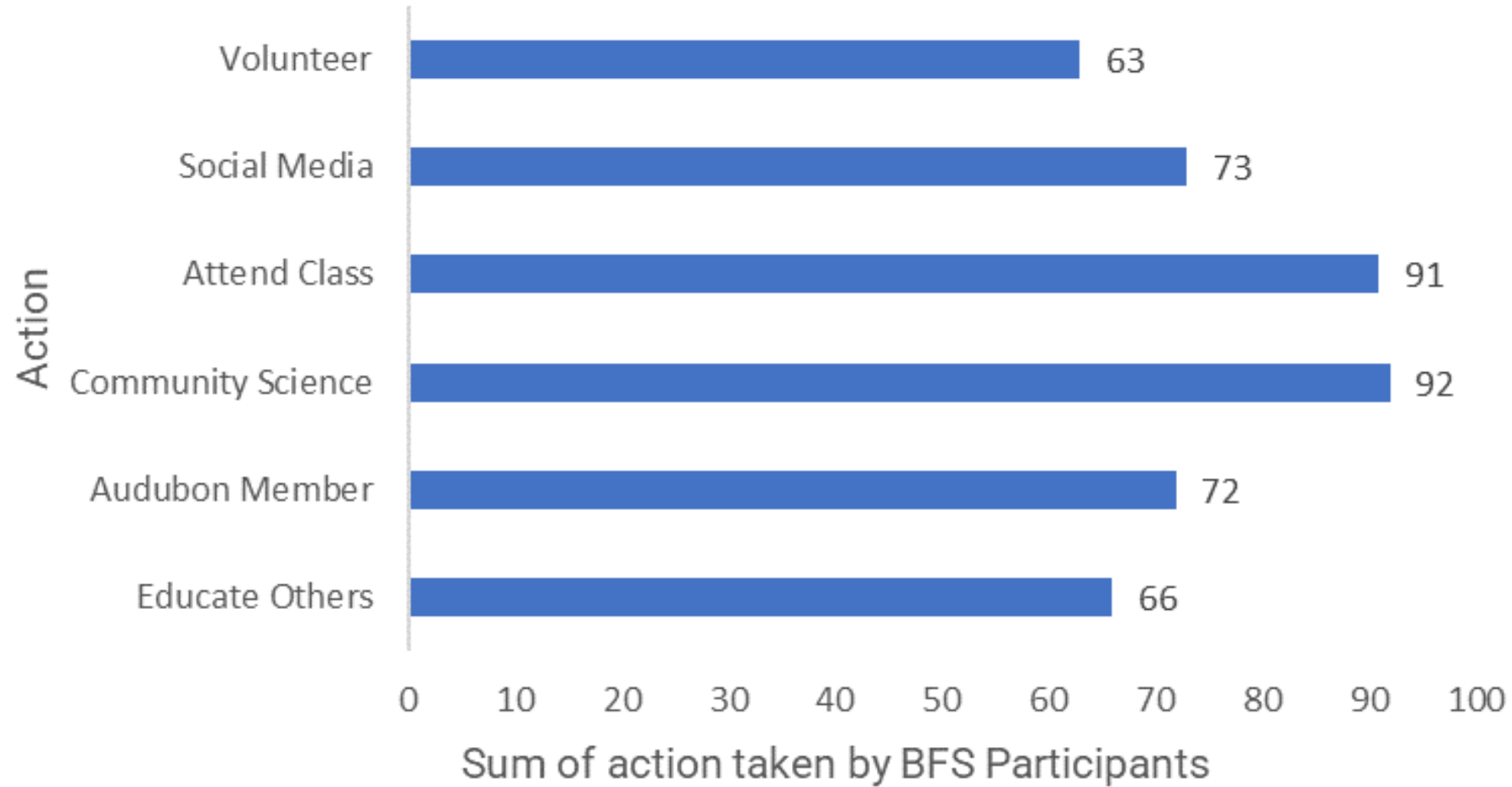
Actions taken by BFS Participants



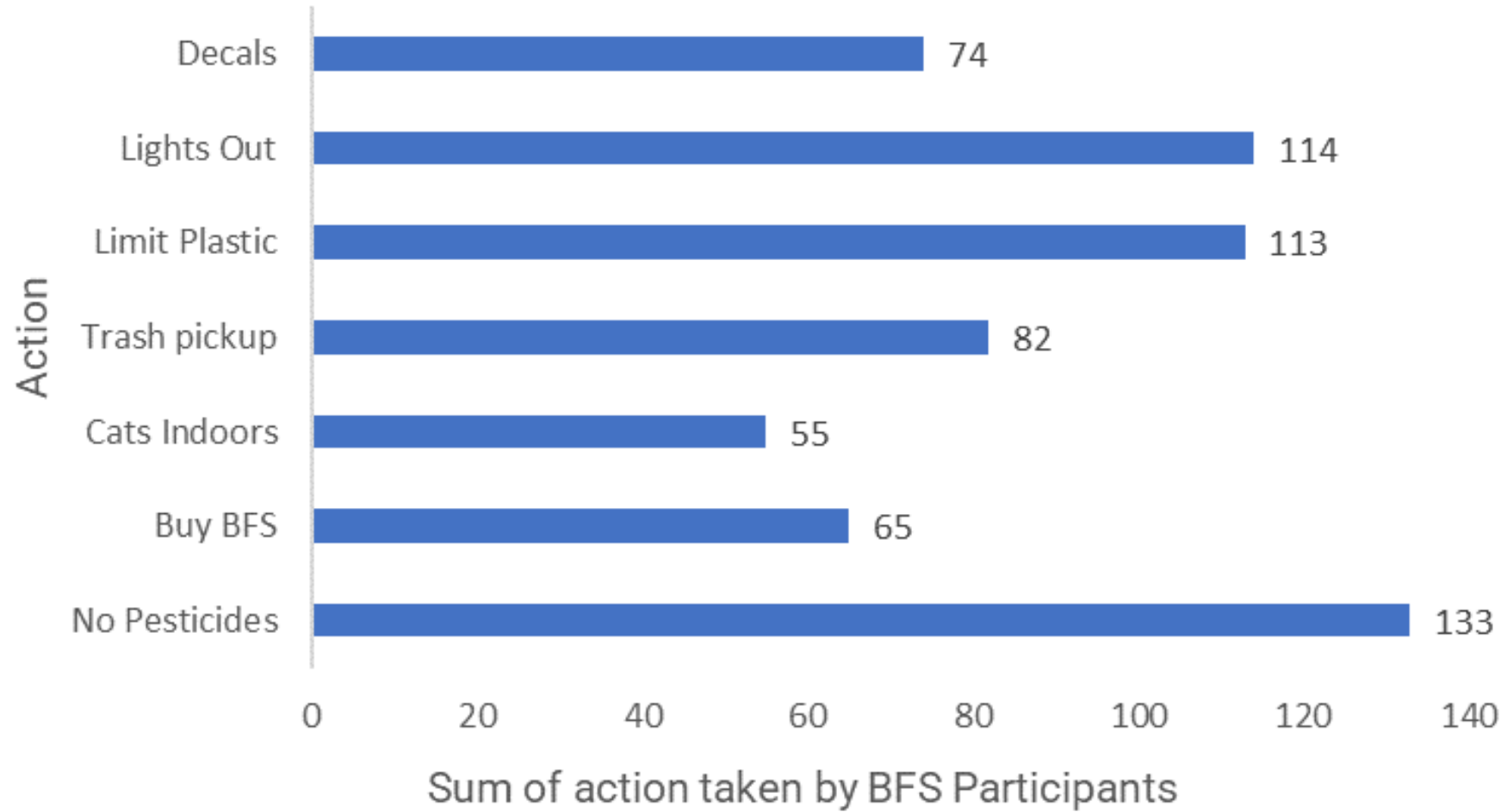
Actions that Provide Habitat



Actions that Connect with Others



Actions that Reduce Hazards



Discussion

- Providing Habitat was the most frequently actioned category, followed by Hazard Reductions, and Connecting with Others.
- We suspect that cost was less of a barrier than previously expected
 - Costs nothing to turn out lights
 - Costs of Providing habitat (bird houses, native plants, feeders, and water feature) are all greater than the Hazard reductions actions, with the exception of retrofitting windows.
- It is possible that there is simply a knowledge gap in Hazard Reductions.
- Political tension and assumed social perceptions.



Discussion

- Some actions more difficult
- How to make certain actions more actionable
 - Incentives?
 - Discounts?
- Going forward, a comparison of the actions taken to the cost and effort of each action could provide further insight into why some actions are taken over others.
- A survey of BFS participants could shed light on why some actions are taken more frequently than others.



Conclusion

- While providing habitat is a huge deal for urban conservation, it only works when others provide habitat as well.
- Number of studies suggest that while the majority of scientists believe outreach is important, few participate themselves (the worst offenders being those in the natural sciences).
- Conservation biologists have a major responsibility to spread awareness and encourage the public to connect with others.

References

- Rosenberg K.V., et al. 2019 Decline of the North American Avifauna. *Science*. 366:6461, 120-124.
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- Ecklund E.H. et al. 2012 How Academic Biologists and Physicists View Science Outreach. *PLoS One*. 9:7, 5

Thanks!

Any questions?

You can find me at:

- sbrown@Houstonaudubon.org
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Michael Libbe_Great Blue Heron_APA 2013

Bird City Texas

Enhancing Bird Habitats & Community
Actions



Our Why



We Will Bend the Bird Curve



Our Why

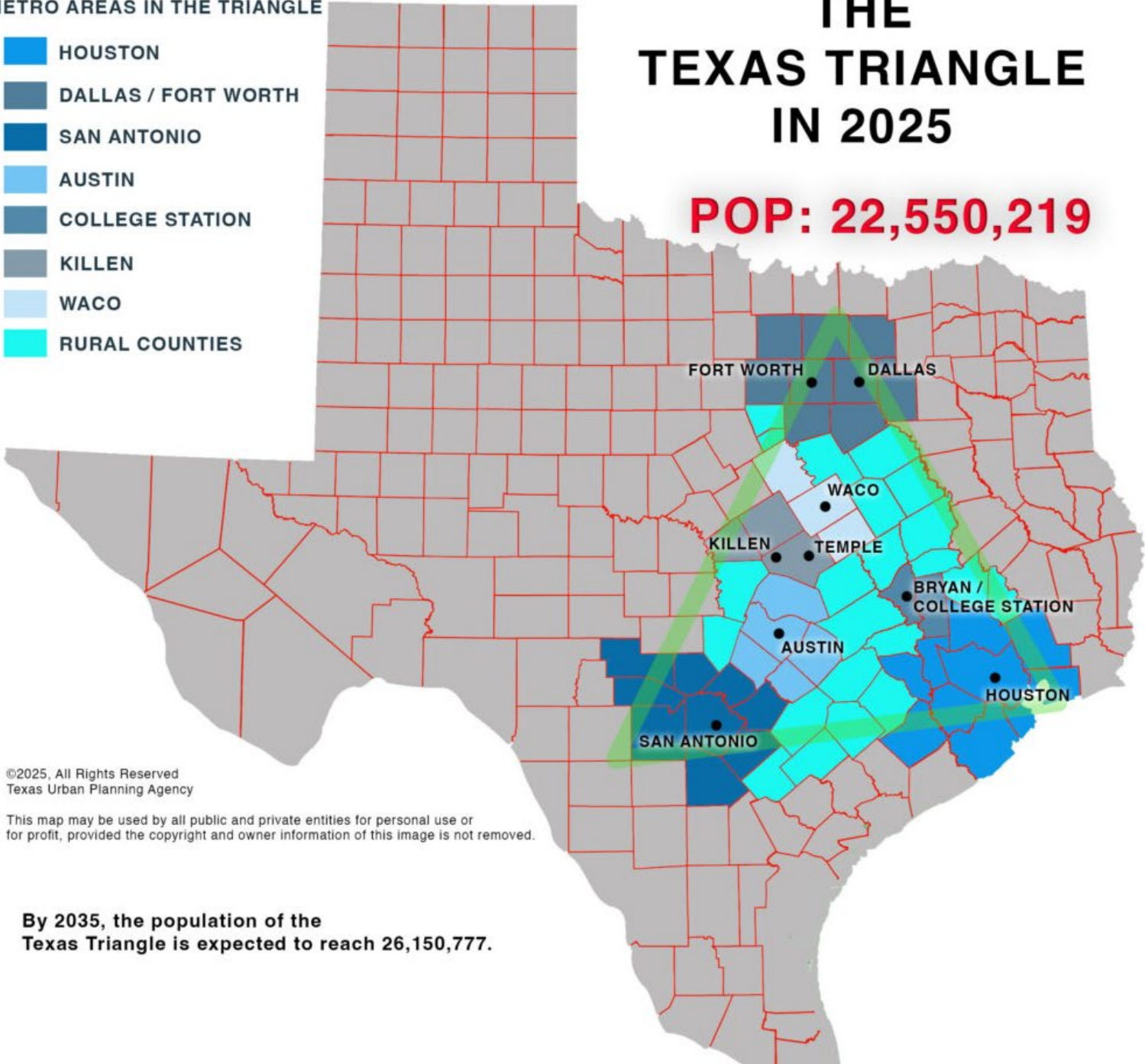


METRO AREAS IN THE TRIANGLE

- HOUSTON
- DALLAS / FORT WORTH
- SAN ANTONIO
- AUSTIN
- COLLEGE STATION
- KILLEN
- WACO
- RURAL COUNTIES

THE TEXAS TRIANGLE
IN 2025

POP: 22,550,219



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Texas Urban Planning Agency

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for profit, provided the copyright and owner information of this image is not removed.

By 2035, the population of the
Texas Triangle is expected to reach 26,150,777.



Our How





Ensure access to nature
Bastrop, Texas

What is Bird City?

A **Bird City** is a community certification where cities work to:

1. Increase habitat
2. Reduce threats to birds
3. Engage people
4. Promote sustainability



Bird City Network

Powered by ABC & EFTA with major support from USFWS
(Urban Bird Treaty Program and Midwest Region)



Network, Programs & Communities



ABC & EFTA



Regional
Partners

Local
Partners

Requirements

All Bird City requirements fall within a framework:

- 4 Categories of actions
- 22 Best Practices which further break organize those actions

Each program has a custom list of actions and requirements in this framework



CATEGORIES

Creating & Protecting
HABITAT

Addressing
THREATS to Birds

Educating & Engaging
PEOPLE

Promoting
SUSTAINABILITY

BEST PRACTICES

1.1 Habitat management
1.2 Create & protect habitat
1.3 Promote native plants
1.4 Control invasive plants
1.5 Provide nesting habitat
1.6 Support focal species
1.7 Address water quality

2.1 Invasive animals
2.2 Glass collisions
2.3 Light pollution
2.4 Direct human threats
2.5 Pesticides & toxins

3.1 World Migratory Bird Day
3.2 Increase awareness
3.3 Engage all ages
3.4 Ensure access to nature
3.5 Involve the community
3.6 Promote science
3.7 Mobilize support

4.1 Climate education
4.2 Reduce energy use
4.3 Improve infrastructure

Bird City Texas - Requirements



10 Required Actions for both BC and HF

- BC: You choose the additional 9 actions: Habitat (3) Threats (3) Engagement (3) = 19

13 Additional for HF + 4 Required HF Actions

- HF: You choose the additional 13 actions: Habitat (5) Threats (5) Engagement (3) + 4 HF* = 27

CATEGORIES

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HABITAT

Addressing
THREATS to Birds

Educating & Engaging
PEOPLE

Promoting
SUSTAINABILITY

BEST PRACTICES

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4.1 Climate education

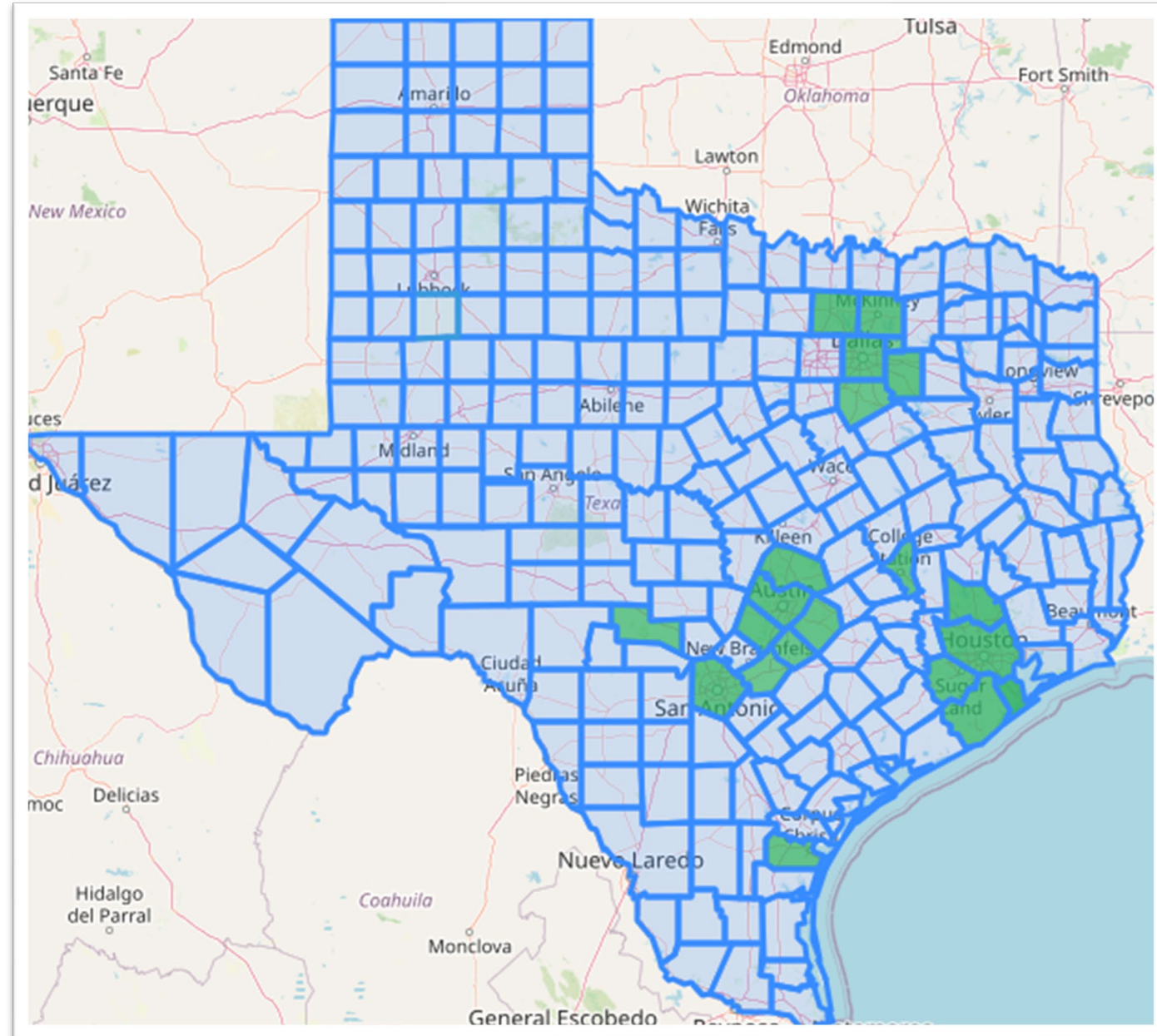
4.2 Reduce energy use

4.3 Improve infrastructure



Across Texas

- 15 Cities
 - Largest is Houston
 - Smallest Surfside Beach
 - Cover over 21 counties
 - Over 1.3 million acres





What's in it for the community?

1. Enriches Local Communities
2. Promotes Healthier Environments
3. Supports Avian Conservation
4. Strengthens Our Economy



The What





Bird City & Galveston High Flyer

Habitat

- East End Lagoon – 684 acres
- Scenic Galveston – 22 acres
- Coastal Heritage Preserve – ~1,000 acres of 1,400 goal
- Galveston Island SP – 2,000+ acres
- Bacon Ranch – 250 acres
- Dos Vacas Muertas – 6 acres
- Galveston Beaches – 800 acres



Habitat

1.1.10 – Under the guidance of a Wildlife Management Plan, community actively uses prescribed fire that benefits birds and native ecosystems.

[At the state park] Prescribed fire is used to restore coastal prairie and help manage shrub habitat. This also benefits the adjacent residents by reducing available fuels and flammable vegetation on the landscape



Reducing Threats

2.3.3 – Actively participate in Lights Out, Texas!

Galveston businesses and residents have participated in Houston Audubon's Lights Out for Birds program since 2017 after an unfortunate incident killed nearly 400 migratory birds in one night after colliding with the American National Insurance Building in Galveston during spring migration.



Engagement

- World Migratory Bird Festivals
- Birding Events – Hotter Than Hell Big Day
- Birds & Brews – Beer Collaboration
- Children's Art Contest
- Nature Walks



Education

- Demonstration Garden at the Cruise Port
- Working with schools – plastic & native plants
- Interpretive signs or benches!
- Speaker series with Galveston County Audubon Group
- Partnership with Parks for Pollinators BioBlitz
- Waterbill insert in English & Spanish



¡Ave es la palabra!

La migración de primavera está a la vuelta

Aproximadamente un billón de aves migran a través de Tejas cada primavera y más de 200 especies de aves pueden verse en Galveston durante este tiempo. Muchas aves se detienen para descansar y realimentar, mientras que otras se quedan todo el verano para anidar. Como comunidad certificada designada Ciudad de Aves de Tejas, nos comprometemos a ayudar a las aves a prosperar en Galveston. A continuación, encontrara algunas maneras de ayudar a las aves en su patio o lugar de trabajo, también maneras de salir y disfrutar estas hermosas aves.

UTILIZAR PLANTAS NATIVAS

Las plantas no nativas a esta región crean escasos alimentales para las aves, mientras las plantas nativas cultivan los alimentos que las aves necesitan para sobrevivir. La primavera es un buen momento para plantar semilla. Plantas sugeridas para las aves: Live Oak, Mexican Plum, Wax Myrtle, Turk's Cap, Scarlet Sage, Cardinal Flower, Firewheel. Puede encontrar más ejemplos listados en el hiperenlace abajo.

APAGUE LAS LUCES

Las luces desorientan a las aves que migran de noche, incrementando el riesgo de choques mortales. Apague las luces no esenciales por la noche durante la migración. Instale temporizadores en las luces. Apunte las luces hacia abajo.

REDUCIR CHOQUES CON AVES

Las aves no pueden ver vidrio. Los choques con las ventanas matan a un billón de aves solo en los Estados Unidos. Instale tela para pájaros, cinta, o pintura temporal en las ventanas. Separe los diseños de 2 a cuatro pulgadas de distancia.

AMARRE A SUS MASCOTAS

Las aves dependen de nuestras playas todo el año. Mantengan a las mascotas atados con su correa en todo momento para reducir las molestias que le causan a las aves mientras se alimentan, descansan, y anidan en la playa.

MANTENGA A LOS GATOS ADENTRO DE SU CASA

Los gatos matan a 2.4 billones de pájaros cada año, solo en los estados Unidos. Aprenda sobre soluciones alternativas en: www.abcbirds.org/cats

Migración de primavera

Marzo 1 – Junio 15
Cuspe: Abril 19 – Mayo 7
*aproximadamente

Dónde observar las aves

Artist Boat Coastal Heritage Preserve
Dos Vacas Muertas Bird Sanctuary
East End Lagoon Nature Preserve
Galveston Island State Park
Laffite's Cove Nature Preserve

Próximos eventos

FeatherFest
Abril 20 – 23, 2023
GalvestonFeatherFest.com
Caminata mensual gratis para ver aves
East End Lagoon Nature Preserve
GalvestonNatureTourism.org

Más información sobre las aves en:
GALVESTONNATURETOURISM.ORG



Sustainability

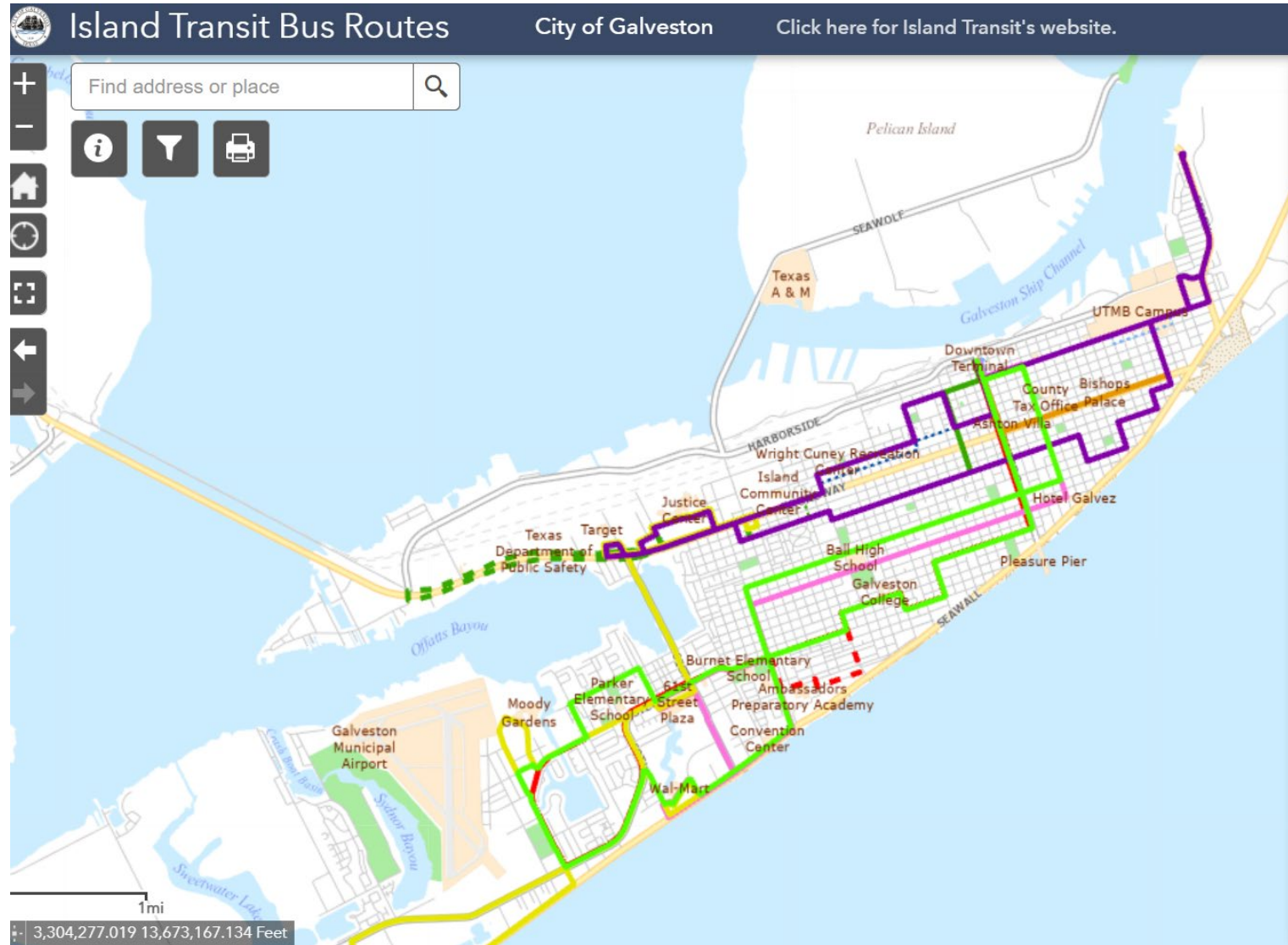
4.3.2 – Provide alternative transportation throughout the community (e.g. hike and bike trails, rideshare programs, bike lanes)

This designated bike lane network covers 15 miles and is proposed to increase, plus 10.3 miles of paved sidewalk along the Seawall.

The island transit system has been in operation for more than 40 years, but due to budget uncertainty, the routes have decreased to from 7 to 6.



**BIRD
CITY**
TEXAS



Now What?



Local action scales up

Bird City Galveston is the building blocks for a healthier bay



Galveston's Bird City Team + partners | Audubon Texas



Thank you
Chloe Crumley
chloe.crumley@audubon.org



Filling in the gaps:

Using Houston Audubon's Urban Bird Surveys to Improve the Quality of Community Science Datasets

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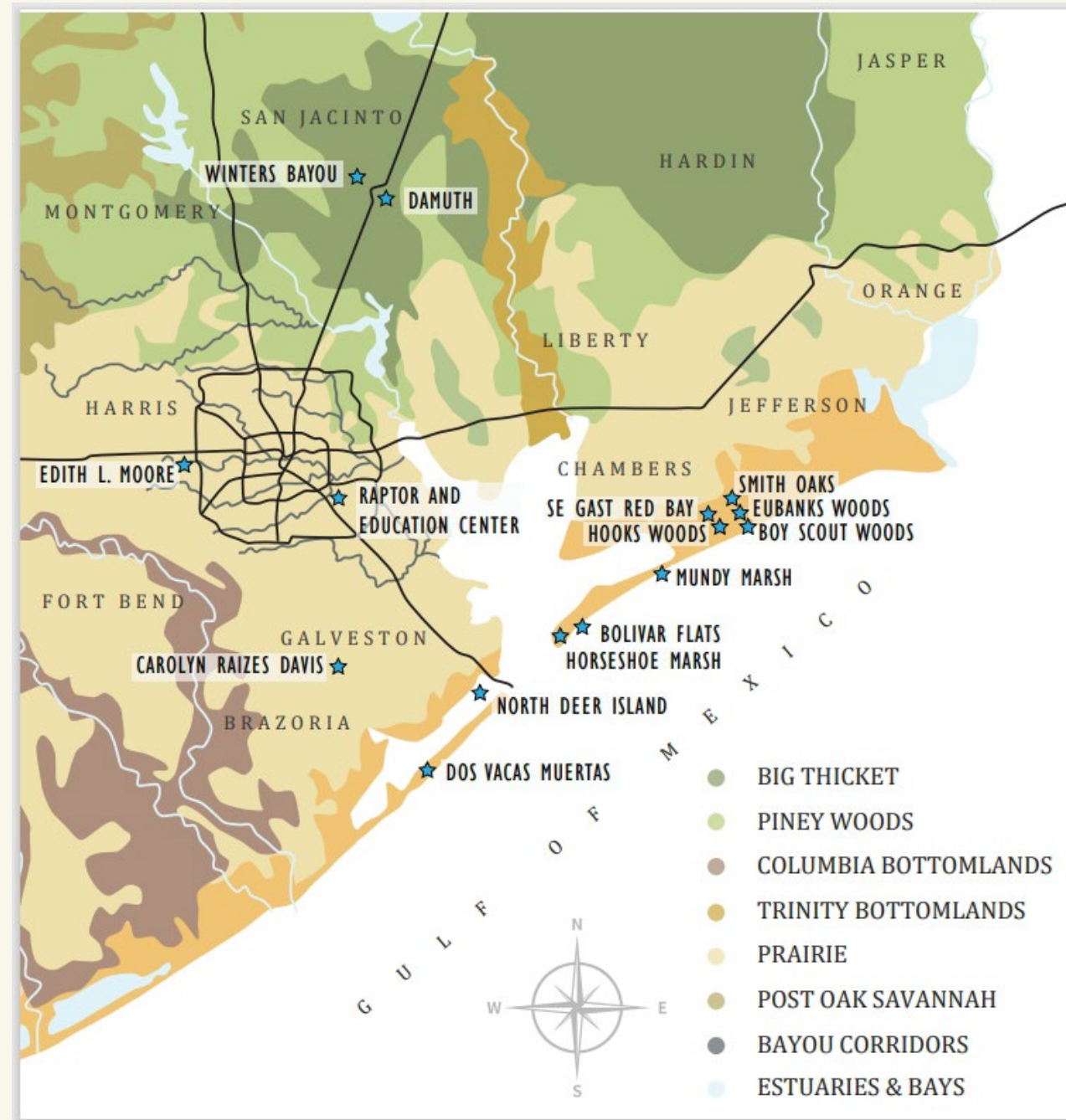
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Advancing the conservation of birds and their habitats since 1969.



Introduction

- As bird populations decline, large amounts of data are required to understand how to efficiently and effectively conserve them.
- eBird is a semi-structured community science platform with millions of bird observations that can be leveraged for conservation projects.
- Quality of submitted data to eBird varies greatly with effort and experience.
- Can control quality of data by filtering/aggregating, but results in large grain size (small scale)
- More systematic approach could help improve datasets at local scale.



Introduction: Houston Audubon Bird Surveys

- Non-profits have opportunity to leverage volunteer base to potentially improve eBird datasets.
- Houston Audubon conducts 27 public bird surveys in the Greater Houston – Galveston area.
- Blend between rigorous systematic bird surveys (e.g. point counts, transects, etc.) and interpretative bird walk.
- Purpose is to introduce the general public to birds and conservation of birds, while growing a dataset that can give information on the state of birds in the Greater Houston-Galveston Area.

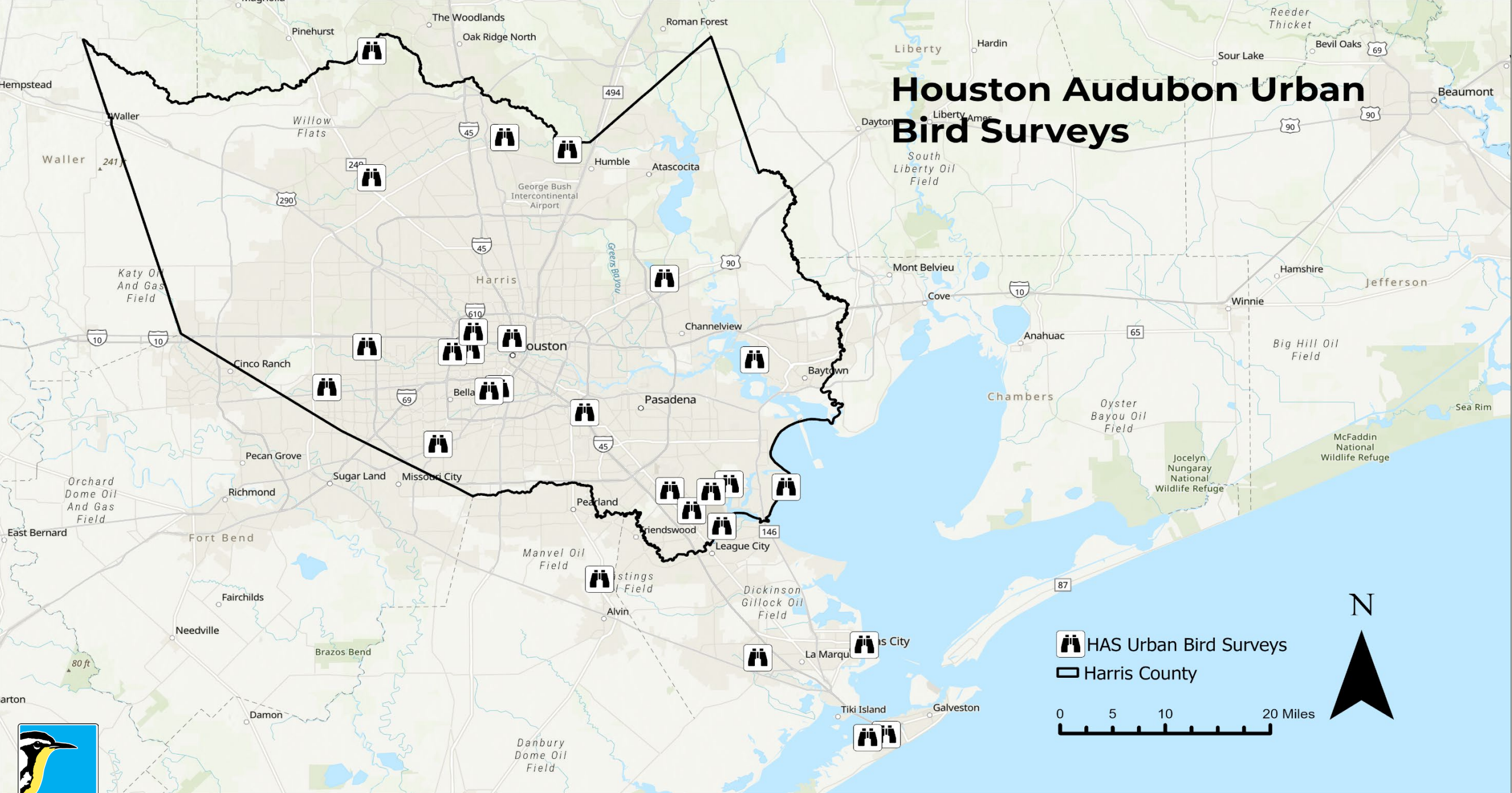


Introduction

- Goal: Determine whether Houston Audubon Bird Surveys improve the quality of the eBird dataset.
 - H_0 : Houston Audubon Urban Bird Survey data do not improve the quality of eBird data
 - H_1 : Houston Audubon Urban Bird Survey data do improve the quality of eBird data
- Objective: Compare species richness of eBird dataset without Houston Audubon data (baseline) against eBird dataset with Houston Audubon data for each greenspace
- Objective: Compare per unit effort change (or lack there of) in species detection.



Houston Audubon Urban Bird Surveys



Methods: eBird Data

- eBird Basic dataset downloaded from eBird.org
 - Filtered by year: 2021 – 2025
 - Filtered by County: Harris
- Requested data on 12/8/2025, made available on 12/9/2025



Methods: HA Urban Survey Data

- Downloaded from eBird.org on 12/5/2025
- Contain similar fields as eBird basic dataset, but differs in field names
- Volunteer data, collected once to twice a month
- Volunteers leaders are joined by participants with varying birding experience
- Routes, and start and end times are typically the same, but some groups do take liberties
- 27 current surveys



Methods: Data processing

- All data were processed using the R scripting language in the RStudio interface.
 - Packages used: tidyR, dplyr, ggplot2, readr, & base.
- Both datasets were read into R.
- Removed HA observations from Baseline via Sampling ID.
- Filtered Baseline hotspots to match HA dataset using Location ID.
- Filtered to match dates, protocol. Not necessary to match duration or distance.
- Cleaned dataset fields by developing a mapping object



Fields in eBird and HA Datasets

Sampling event ID	Location ID (Hotspots)
Scientific Name	Observation Date
Protocol Name	Duration (Minutes)
Distance (km)	



Data Processing cont'd

- Summarized effort by dataset (HA+Baseline & Baseline) and location
 - Total hours: Sum of min / 60
 - Total distance: Sum effort distance in km
- Summarized spp richness
 - Alpha diversity, or simply a count of distinct spp in each location
- Effort corrected richness
 - Richness / hr
 - Richness / km



Fields in Richness dataset

Location ID (Hotspots)	Richness Baseline
Richness Baseline + HA	Richness Baseline / hr
Richness Baseline + HA / hr	



Data Analysis: Permutation Test

- Permutation tests how unusual our observation would be given under the assumption that Houston Audubon data adds nothing to the eBird dataset.
- Permutation test calculation
 - Calculate mean of differences of effort corrected richness
 - Scramble effort corrected richness and permute ($p = 10,000$) to generate null distribution
 - Compare



Data Analysis: Effect Size

- Want to know how often do Houston Audubon Surveys increase richness in a given greenspace
- Simple mean difference % test:
 - $\text{mean}((\text{richness/hr HA} - \text{richness/hr baseline}) > 0) \times 100$



Results



Results

- Two datasets created from processing
 - Augmented dataset with all eBird and HA observations
 - Richness dataset, including effort corrected richness
- 15 samples (locations)
 - Removed personal locations
 - Removed surveys with fewer than two years worth of data (at least 24 checklists)



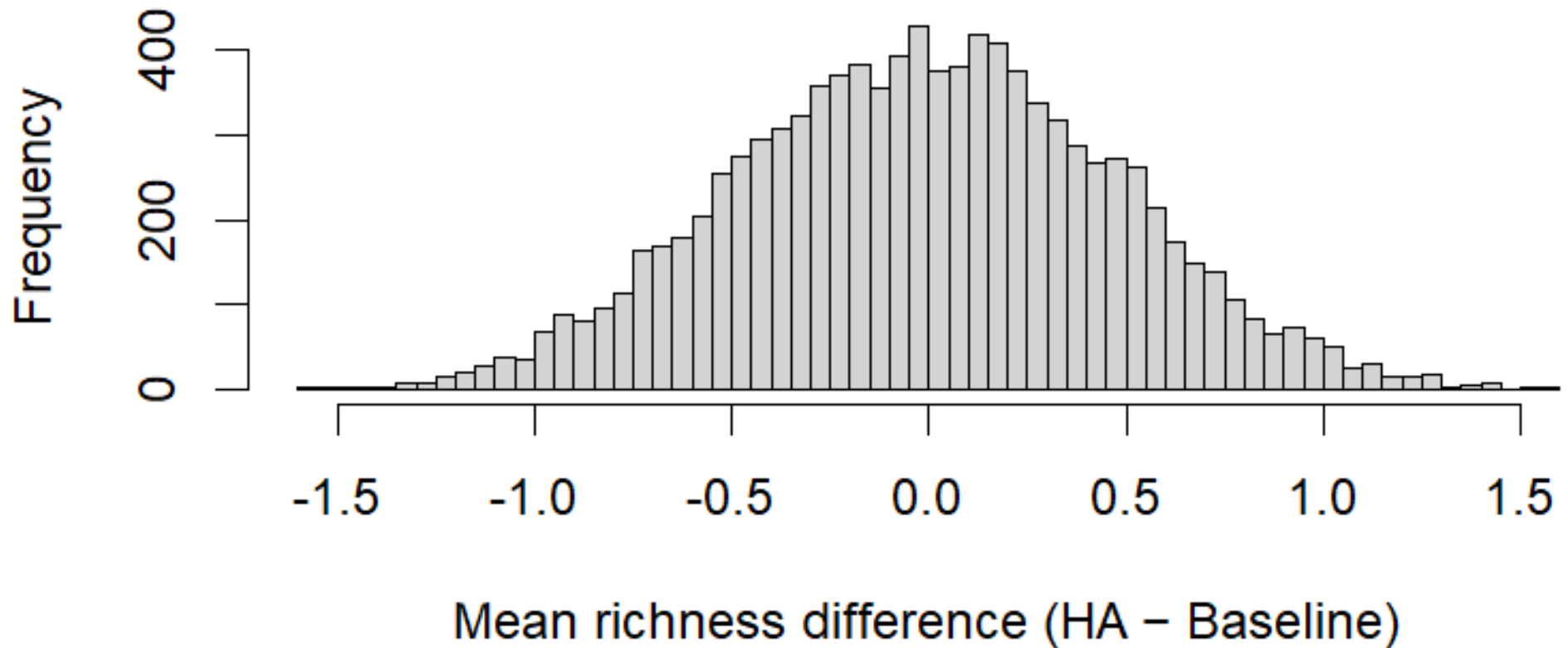
Location	# eBird Checklists	# HA Checklists
Sheldon Lake SP	20,886	27
Archbishop Fiorenza	21,690	45
Kickerillo	3,715	27
Memorial Park	9,532	40
Mitchell NP	40,598	124
Lorraine Cherry NP	3,943	142
Hermann Park	19,488	130
Willow Waterhole	11,266	40
U of H	2,951	24
Pine Gully	7,403	25
Jesse H. Jones	6,183	36
Houston Arboretum	22,216	43
Woodland Park	9,865	66
Willow Waterhole	11,260	46



Permutation Test Results

- We tested for magnitude of the difference in HA + Baseline and Baseline Avian Species Richness.
- We used *mean* avian species richness as the test statistic, and created a null distribution using 10,000 permutations of the data.
- The difference between the observed data and the null distribution was significant ($p < 0.0005$).

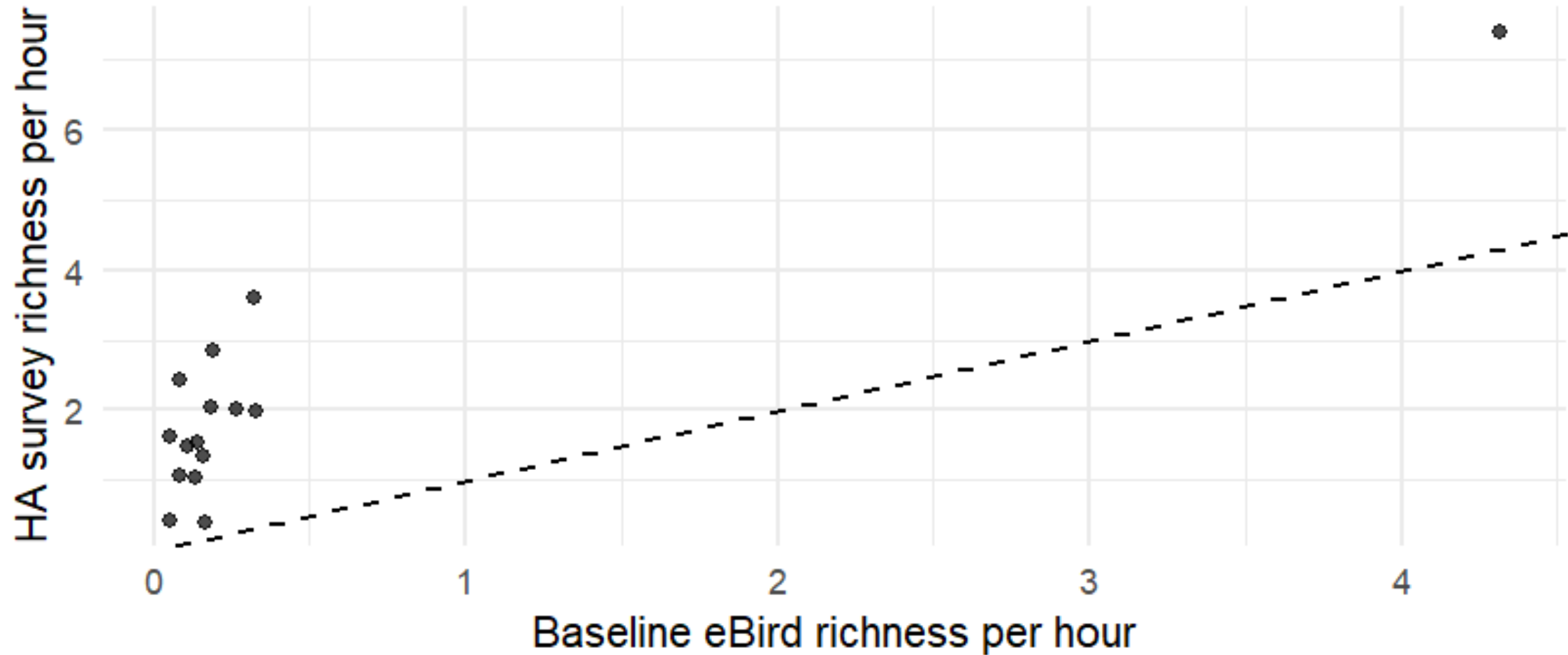
Null distribution of mean paired differences



Mean Percent Difference Results

- We tested what percent of the time do HAS surveys add richness to the eBird dataset using a Mean Percent Difference Test
- When Houston Audubon Bird Surveys are conducted at a greenspace, on average, they increase species richness 100% of the time.

Effort-corrected species richness by greenspace



Discussion

- **Houston Audubon data are combined with eBird Data**
- **Greater species per unit effort result could have more to do with number of novice birders than actual ability or effort of experienced birders.**
- Could look into how often are HAS surveys detecting a select number of species as compared to other eBird checklists (Treat effort as a variable).



Conclusion

- HAS datasets provide a valuable contribution to the eBird basic dataset, and should continue to be used as a tool for science in addition to outreach
- HAS datasets are a great example of what community science can contribute to big data science at a local level
- Non-profits should leverage their volunteer base for community science projects
- If staffing is available, non-profit orgs should collaborate to better understand effectiveness of land management through volunteer and open-source datasets.



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Thanks!

Any questions?

You can find me at:

- sbrown@Houstonaudubon.org
- Houstonaudubon.org



Beach -nesting Bird Conservation on the Upper Texas Coast

Stabilizing and Increasing Populations
through Habitat Protection, Population
Monitoring, and Public Outreach

Sarah Belles – Gulf Coast Avian Ecologist
American Bird Conservancy

State of the Bay Symposium
February 24 -25, 2026
Galveston, Texas

Snowy Plover Chick by Kristian Bell



ABC Gulf Coastal Program

Founded in 2012 in response to the Gulf Oil Spill,
with a goal of recovering shorebird and seabird
populations

- ❖ Protection
- ❖ Monitoring
- ❖ Outreach

Texas Shorebird and Seabird Stewardship Project

- ❖ American Bird Conservancy
- ❖ Audubon Texas
- ❖ Coastal Bend Bays and Estuaries Program
- ❖ Gulf Coast Bird Observatory
- ❖ Houston Audubon Society



Wilson's Plover nest by Sarah Belles



Beach-nesting “Fab Four”



Photo by Chuck Tague

Snowy Plover

N.A. pop = 27,000 birds
Coastal TX = 3,223 birds, 71% of entire Gulf of Mexico region
(Thomas et al. 2012)



Photo by Sarah Belles

Wilson's Plover

U.S. pop = $\leq 8,600$ birds
Texas = 2,660 birds, 31% of U.S. pop.
(Zdravkovic, M.G. 2013.
Conservation Plan for Wilson's Plovers (*Charadrius wilsonia*))



Photo by Sarah Belles

Least Tern

U.S. pop = 55,000 birds
(1980-90's)



Photo by DJ Zemenick

Black Skimmer

TX breeding pairs = 2,506
70% decline past 50 years
(TX Waterbird Society)



Threats

Natural

- Predators
- Rain
- High tides
- Vehicles

Human

- Beachgoers
- Trash



Photos by Kristen Vale



Methods

Protection

- Sites posted based on Florida Shorebird Alliance 2012 protocol

Monitoring

- Nesting sites surveyed 2 -3 times a week from March to August (or end of nesting)
 - ❖ Adults & Pairs
 - ❖ Courtship
 - ❖ Nests
 - ❖ Chick stage
- Solitary nests followed to hatch or fail
- Disturbances counted within 50 meters of nesting area

Outreach

- Opportunistic outreach during monitoring
- On-site stewardship on busy weekends and holidays
- Tabling events, presentations, and trainings



Protective signage at San Luis Pass County Park by Sarah Belles



2025 Coast-Wide Monitoring



Houston Audubon Society

American Bird Conservancy

Gulf Coast Bird Observatory

Audubon Texas

Coastal Bend Bays and
Estuaries Program



2025 Upper Texas Coast Monitoring Sites

Over 500 acres monitored, 1,278 acres protected

High Island Beach

JNNWR Beach

Rollover Pass

Bolivar Flats Shorebird Sanctuary

Ferry Beach

East Beach

San Luis Pass Galveston Beach

San Luis Pass County Park

 American Bird
Conservancy



Estimated Breeding Pairs

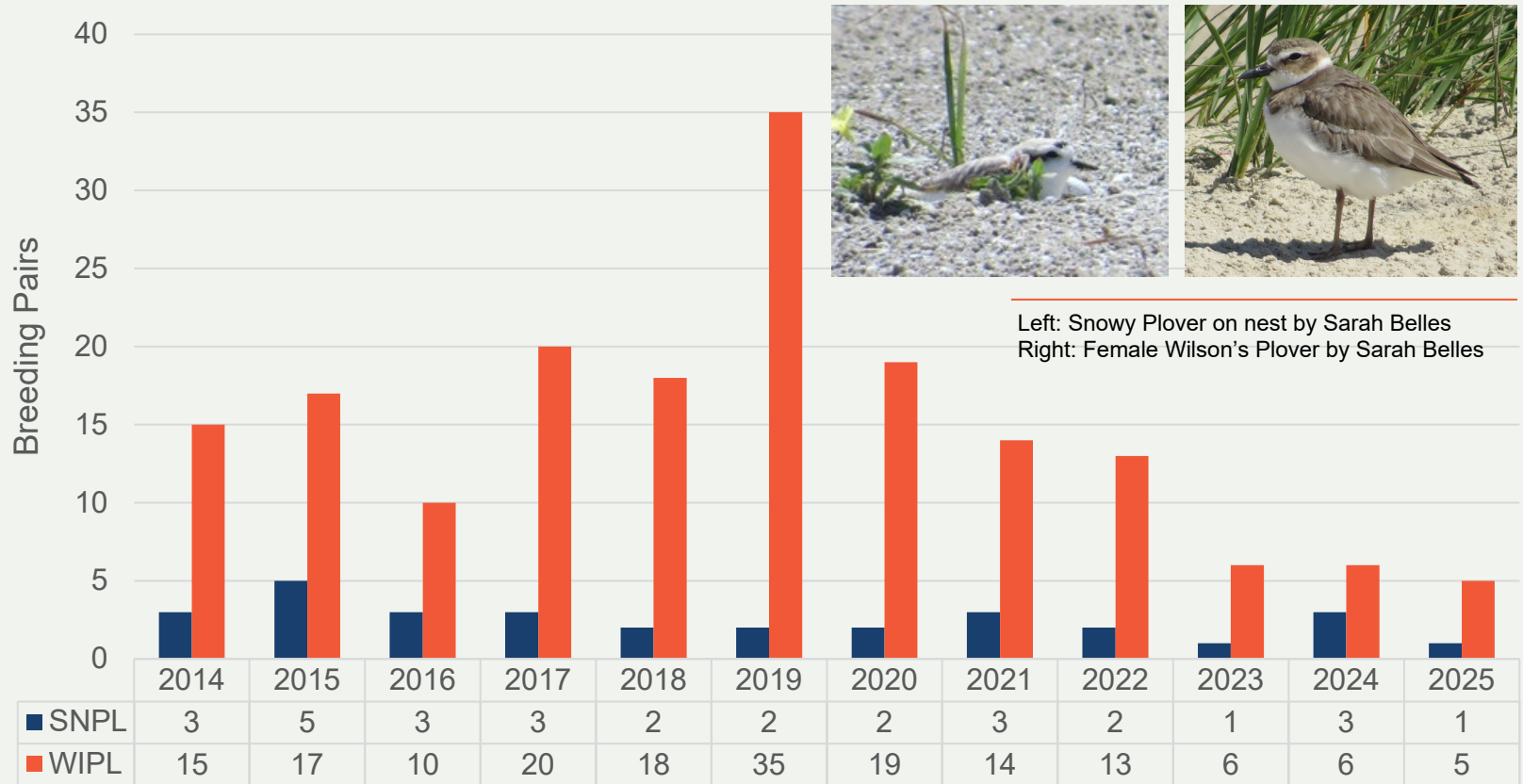
Site	WIPL	LETE	SNPL
High Island	7	90	0
JNNWR	0	3	0
Rollover Pass	0	0	0
Bolivar Flats	4	30	0
Ferry Beach	3	56	0
East Beach	5	32	1
San Luis Pass-Galveston	2	0	0
San Luis Pass County Park	2	0	0
TOTAL	23	211	1



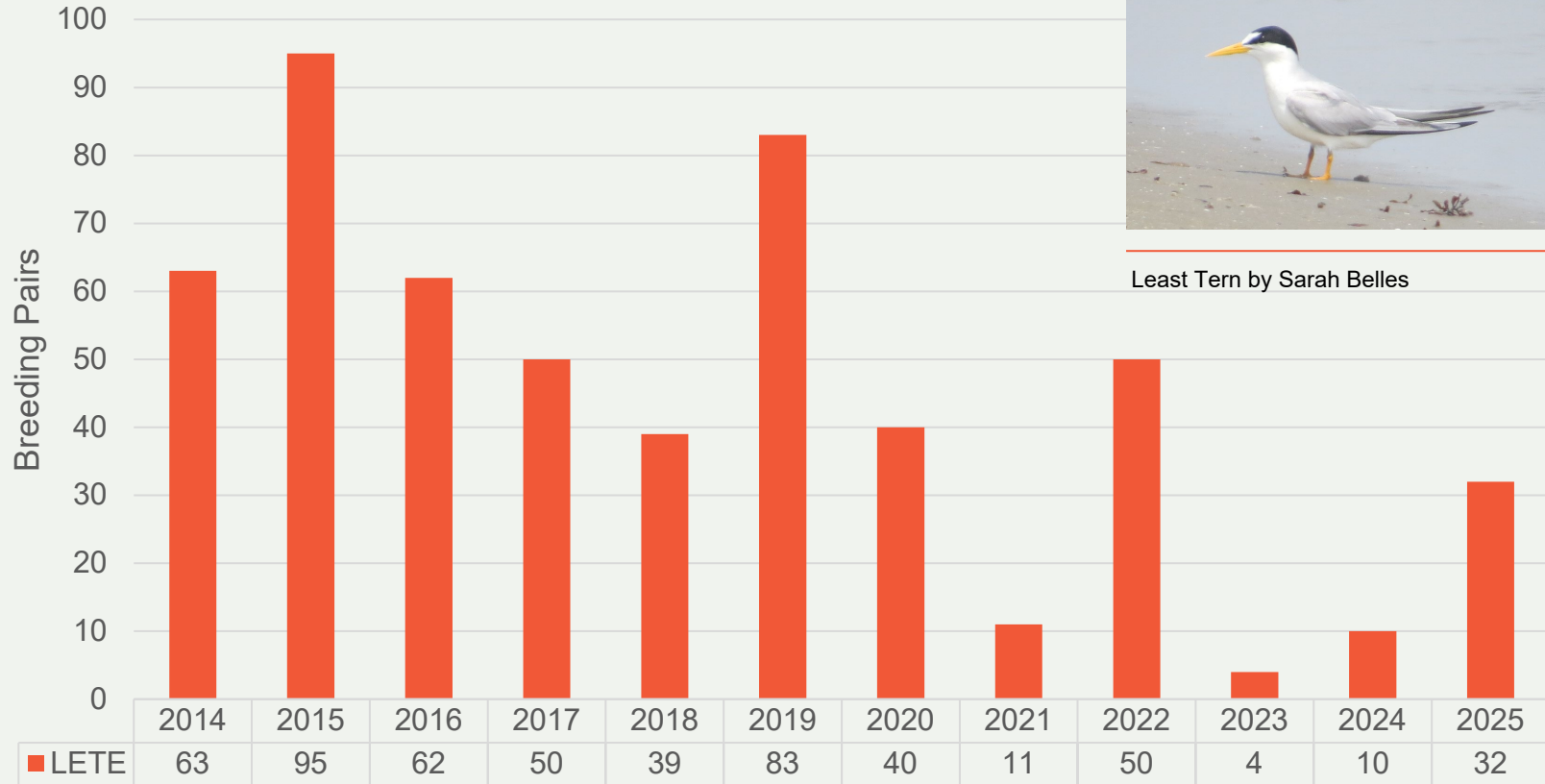
Wilson's Plover Pair by Sarah Belles



Breeding Pairs Over Time: East Beach



Breeding Pairs Over Time: East Beach



Least Tern by Sarah Belles



Estimated Number of Fledges

Site	WIPL	LETE	SNPL
High Island	8	21	0
JNNWR	0	1	0
Rollover Pass	0	0	0
Bolivar Flats	2	8	0
Ferry Beach	2	3	0
East Beach	3	0	0
San Luis Pass - Galveston	0	0	0
San Luis Pass County Park	1	0	0
TOTAL	16	33	0



Top: Banded downy Wilson's Plover chick by Sarah Belles

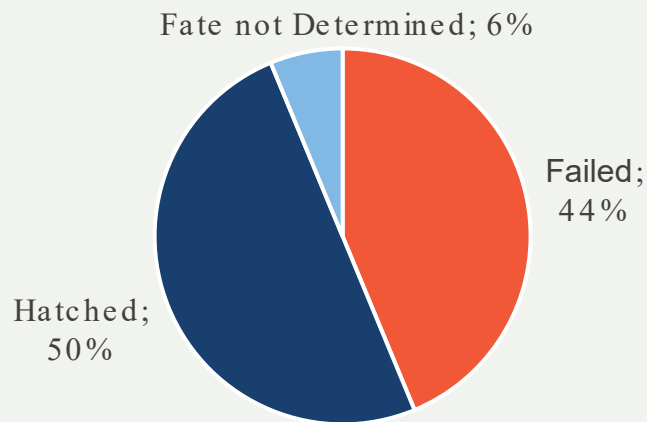
Bottom: Banded fledgling Wilson's Plover by Sarah Belles



Wilson's Plover: Nest Fates

Site	# Nests Found	Nest Success*
High Island	13	38.5%
Bolivar Flats	3	100%
Ferry Beach	4	75%
East Beach	9	22.2%
San Luis Pass-Galveston	1	100%
San Luis Pass County Park	2	100%
TOTAL	32	50%

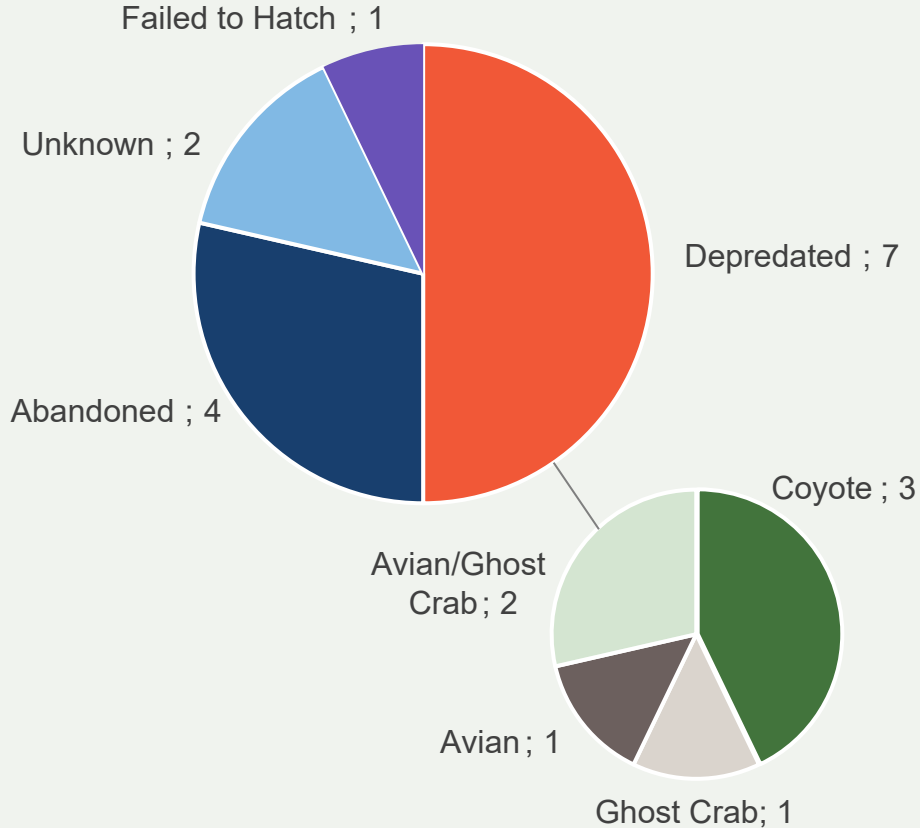
***Nest Success:** Raw percentage of found nests that hatched at least one egg



Wilson's Plover nest by Sarah Belles



Wilson's Plover: Causes of Nest Failure

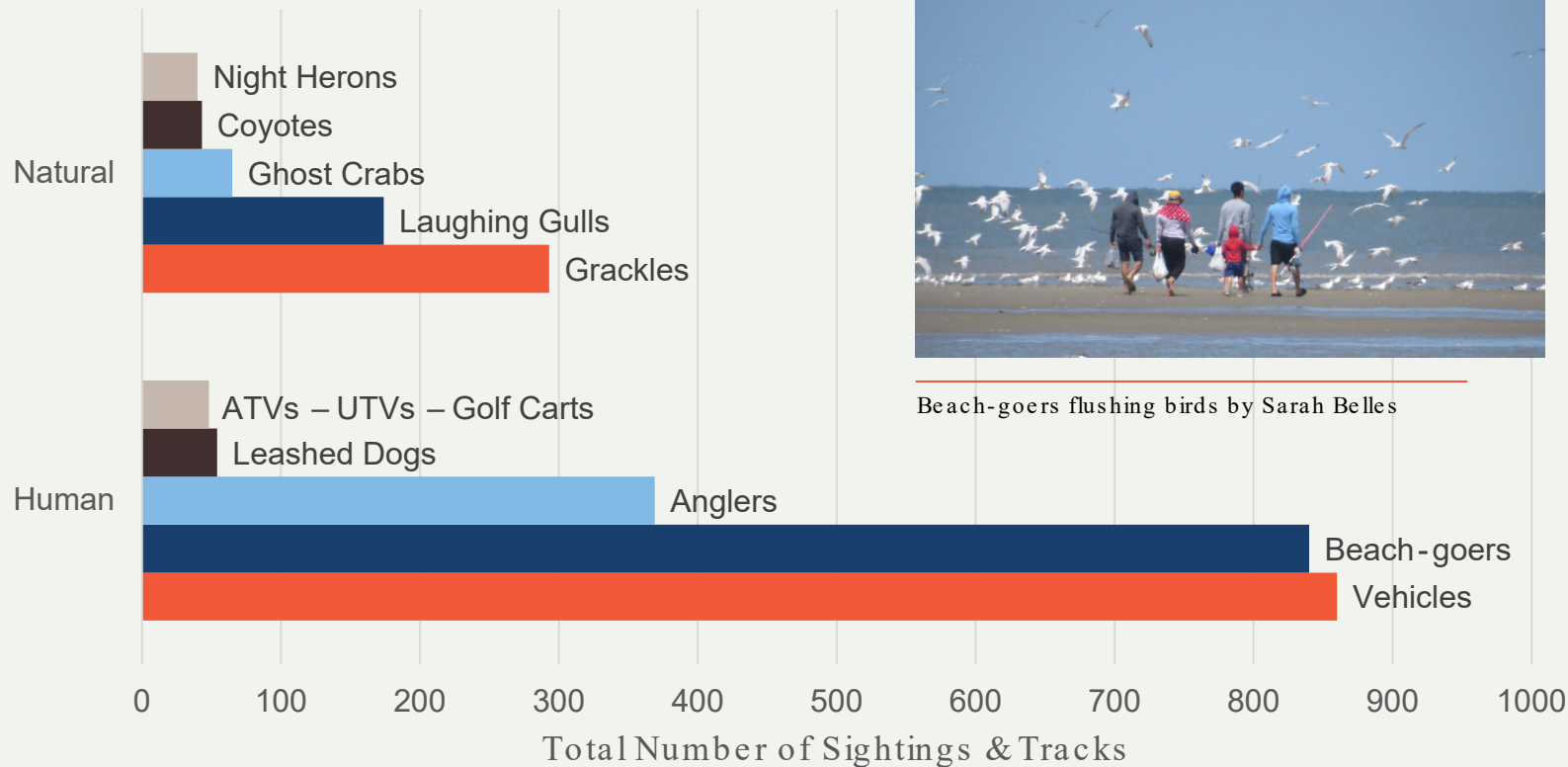


Top: Ghost Crab by Sarah Belles

Bottom: Depredated Wilson's Plover nest by Sarah Belles



Top Nesting Site Disturbances



Beach-goers flushing birds by Sarah Belles



Banding & Re-sight Efforts

- Wilson's Plovers banded
 - ❖ 3 adult females
 - ❖ 5 downy chicks
- Re-sighted banded birds
 - ❖ 1 Snowy Plover
 - ❖ 4 Wilson's Plover
- Total re-sight encounters: 47



Three banded Wilson's Plover chicks by Sarah Belles



Outreach

- Over **1,000 people** reached in 2025
 - ❖ **2 annual trainings** for coastal management crews
 - ❖ **5 educational programs** for students and lifelong learners
 - ❖ **5 tabling events** attended
 - ❖ **On-site stewardship** for Memorial Day, Independence Day, and sports tournament weekends
 - ❖ **Opportunistic outreach** during monitoring
- Over **15,000 people** reached since 2014, and over **4,000 hours** contributed by volunteers!



Independence Day Stewardship at East beach by Sarah Belles



Main Takeaways

- Less nests lost to wash - over events compared to 2024
- Similar fledging success to 2024, even with increased hatching success rates
- Potential need to address predation, particularly coyote
- Overall downward trend in number of pairs for our species over time at most sites
- 10 year summary report in progress



Black Skimmers near signage by Kacy Ray



Acknowledgements



Questions?

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