Mammal Biodiversity Across Houston's Bayous

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Abstract

To examine the difference in biodiversity between Brays Bayou and Buffalo Bayou, we used a camera trap survey protocol developed by the Urban Wildlife Network to track mammal species in the city of Houston. Species composition differs between the two bayous, potentially due to different levels of urbanization in the surrounding watershed. Results may highlight the effects of urbanization on biodiversity in the city of Houston.

Introduction

Houston, the Bayou City, has 2,500 open stream miles of bayous and human-made channels. Bayous provide animals a way to travel between green spaces in urbanized regions and provide habitats for various species. To study the effects of urbanization on biodiversity, mammal diversity along two of Houston's bayous was analyzed. Near the University of Houston campus are Brays and Buffalo Bayous. According to the Harris County Flood Control District, Brays Bayou and its tributaries have an Open Stream Milage (OSM) of 121 miles and the population within its highly urbanized watershed exceeds 700,000 people (Brays Bayou Watershed Overview). The channel of Brays Bayou has been extensively modified, including lining it with concrete. In comparison, Buffalo Bayou is a natural stream within an urban environment. Buffalo Bayou and its tributaries have an OSM of 106 miles, with a population of approximately 450,000 people within the watershed (Buffalo Bayou Watershed Overview). In this study, we compare mammal diversity along Buffalo Bayou and Brays Bayou to assess the influence of different levels of urbanization.

Methods

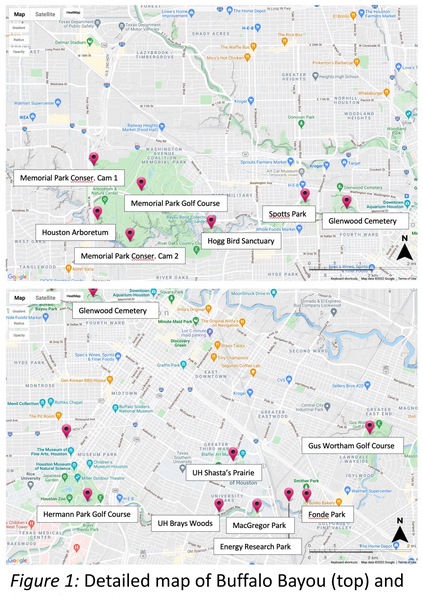

Figure 1: Detailed map of Buffalo Bayou (top) and Brays Bayou (bottom) showing waterways, terrain, and green spaces. Pink pins represent camera sites. All sites are at least 1 km away from each other to reduce overrepresentation of mobile species.

Figure 2: Cameras were placed on trees in randomly selected locations within each site. Implemented camera set, check, and pull protocols according to UWIN guidelines. Data collected and analyzed from Occupancy Reports.

Figure 3: Closeup view of camera trap

Sampling Season (2021)	Season Start Date	Season End Date
April	04/01/21	04/30/21
July	07/01/21	07/31/21
October	10/01/21	10/31/21

Figure 4: Cameras were operating for 28 – 30 days per season. 7 cameras around Buffalo Bayou and 8 cameras around Brays Bayou deployed and taken up over period of few days.

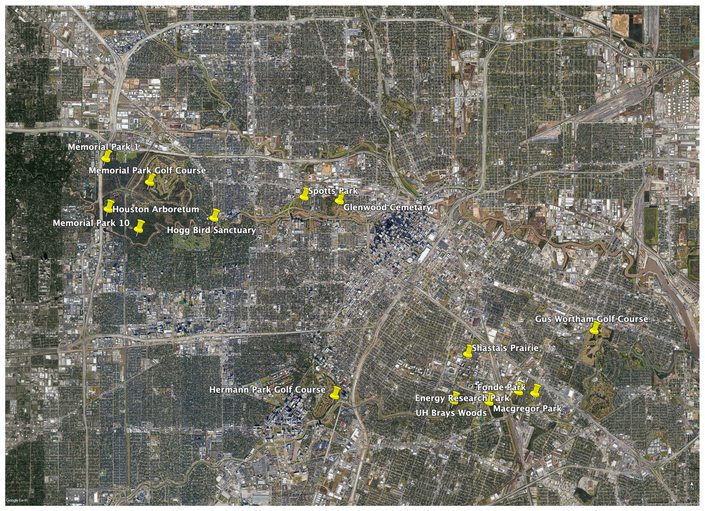

Figure 5: Satellite map highlighting green spaces and major roadways within the 610 Loop around Houston. Yellow pins represent camera sites along Buffalo Bayou (top left) and Brays Bayou (lower right).

Photo Gallery

Figures 6-11: Most frequently sighted species – Virginia opossum (a), Fox squirrel (b), Eastern gray squirrel (c), Armadillo (d), Raccoons (e), Cottontail rabbit (f)

Figures 12-14: Less frequently sighted species – Coyote (left), Nutria (middle), Gray fox (right)

Results

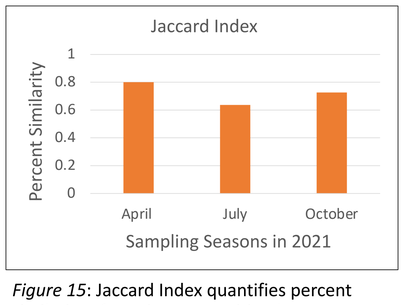

Figure 15: Jaccard Index quantifies percent similarity of species composition between bayous

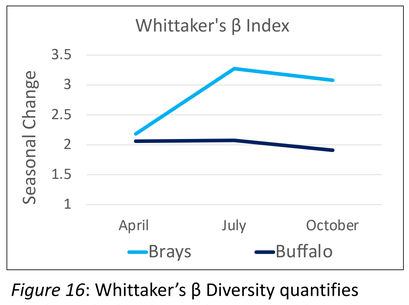

Figure 16: Whittaker's β Diversity quantifies spatial variability in species composition along each bayou

Key (Days sighted per 3 months)	Mammal Species	Bayous	
		Brays	Buff
zero	Armadillo		
<1 day	Bobcat		
1 to 4	Canine		
5 to 8	Cottontail rabbit sp.		
9 to 12	Coyote		
13 to 15	Domestic cat		
16 to 24	Domestic dog		
	Eastern gray squirrel		
	Eastern wood rat		
	Fox squirrel		
	Gray fox		
	Nutria		
	Raccoon		
	Virginia opossum		
	Feral hog		
	North American river otter		
	Striped Skunk		
	White-tailed deer		

Figure 17: Species composition and cumulative occupancy along each bayou during the three seasons April, July, and October 2021. Several species found in the Greater Houston area were not detected at Buffalo or Brays Bayou during the survey (listed at the bottom).

Key (Days sighted per month)	Mammal Species	Brays			Buffalo		
		April	July	Oct	April	July	Oct
zero	Armadillo						
<1 day	Bobcat						
1 to 3	Canine						
4 to 6	Cottontail rabbit sp.						
7 to 9	Coyote						
10 to 12	Domestic cat						
	Domestic dog						
	Eastern gray squirrel						
	Eastern wood rat						
	Fox squirrel						
	Gray fox						
	Nutria						
	Raccoon						
	Virginia opossum						
	Feral hog						
	North American river otter						
	Striped Skunk						
	White-tailed deer						

Figure 18: Seasonal variation in species composition and occupancy along each bayou in 2021. Undetected species known to occur in the Houston area are listed at the bottom.

Conclusion

- Buffalo Bayou and Brays Bayou have comparable numbers of unique species, 10 species around Buffalo and 11 species around Brays.
- Jaccard Index demonstrates 60-80% similarity in species composition.
- Whittaker's β demonstrates that spatial variability of species composition changes seasonally along Brays Bayou, but not along Buffalo Bayou.
- Large, contiguous green space around Buffalo Bayou may allow for stable spatial variability in species composition.

References

- Brays Bayou Watershed Overview. https://www.hcfcd.org/Activity/Active-Projects/Brays-Bayou.
- Buffalo Bayou Watershed Overview. https://www.hcfcd.org/Activity/Active-Projects/Buffalo-Bayou.
- Urban Wildlife Network. https://www.urbanwildlifenetwork.org/.

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