Urbanization, food provisioning, and transmission-relevant behaviors in Florida White Ibis

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Study System

American White Ibis (*Eudocimus albus*)

- Nomadic wetland bird of the southeastern USA that recently became habituated to taking human-provided food (i.e., bread) in urban parks[1]
- Infected by pathogens with range of transmission modes (e.g., *Salmonella*[1], feather mites[2], parasitic flatworms[3])
- Urban ibis have high site fidelity[4,5] but how individual variation within and among urban sites influences exposure to pathogens is unknown

1. How do white ibis activity budgets differ between urban and natural environments?

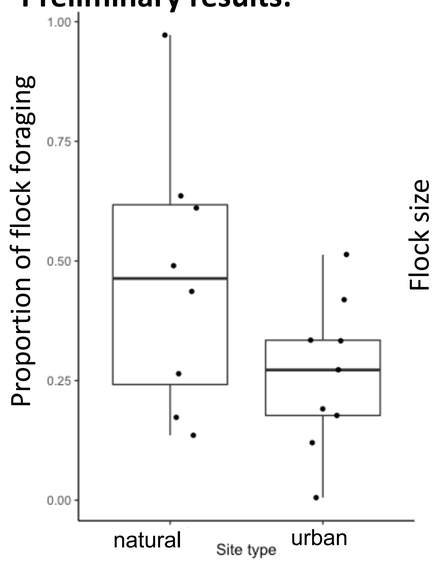
- Urban ibis tend to have lower ectoparasite scores than natural ibis, potentially due to differences in time spent preening[2]

Predictions:

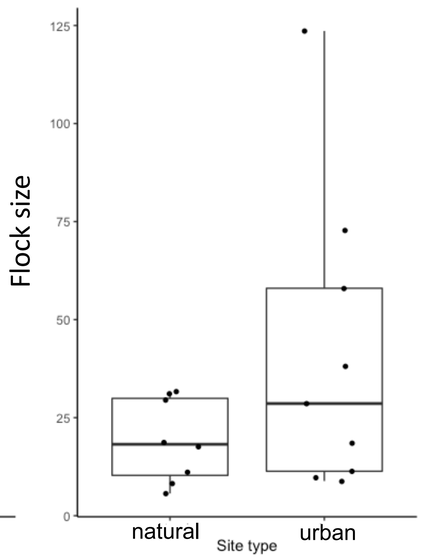
1. Natural ibis will allocate more time to foraging naturally than urban ibis because urban ibis consume human provided food.
2. Urban ibis will allocate more time to preening and resting if they spend less time foraging.

Methods: Conducted flock scans and recorded flock sizes at 3 urban parks and 3 wetland sites in South Florida during January and February 2021. Behaviors recorded included preening, foraging, vigilance, resting, walking, and bathing.

Preliminary results:



Ibis in urban parks spent less time actively foraging relative to those in natural wetlands



Relatively larger flocks in urban areas

Next Steps: Conduct more flock scans during the non-breeding season to continue to explore these patterns; Use landcover data to classify sites along gradient of urbanization

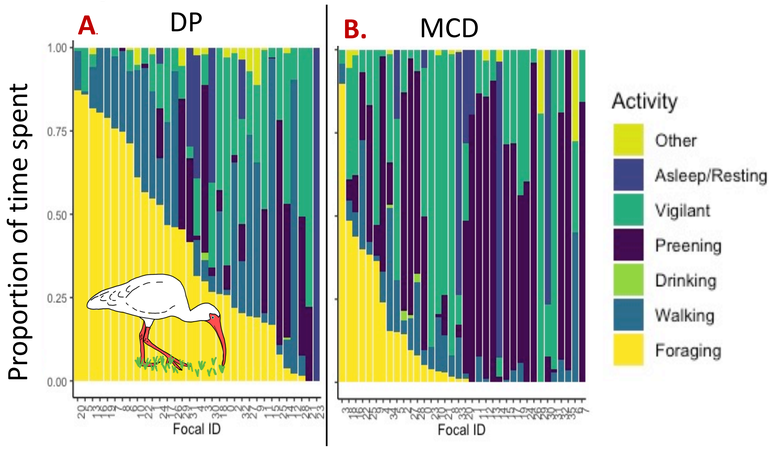
2. What factors influence variation in behavior across urban sites?

- Urban sites differ in their attributes (e.g., size of water body and lawn area, and surrounding land cover), the frequency with which ibis are fed, and ibis flock sizes.

Predictions: The amount of available human-provided food and availability of suitable foraging habitat will influence ibis foraging behaviors.

Methods: Conducted ~250 ten-minute focal follows at five urban parks in South Florida during Summer 2019 using the iOS application Animal Observer.

Preliminary results:



Activity budgets of urban white ibis at urban sites: A) Dreher Park and B) McDonalds in South Florida. Colors represent different behaviors.

- Foraging, preening, and vigilance behaviors differ across urban sites observed (example of two sites shown above)
- Ibis at two urban sites foraged less, on average, than those at other sites, but spend significantly more time preening or being vigilant

Next Steps: Examine whether traits of urban parks (human-feeding frequency, available foraging habitat, flock size) explain site-level variation in behavior

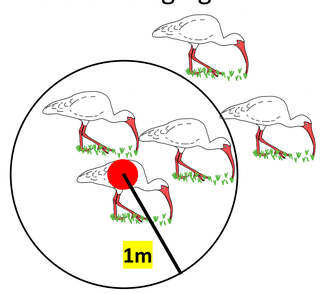
3. How does food provisioning affect ibis flock density and contact?

- Feeding wildlife promotes aggregation around resources[6], which could influence the transmission of close contact and fecal-oral parasites

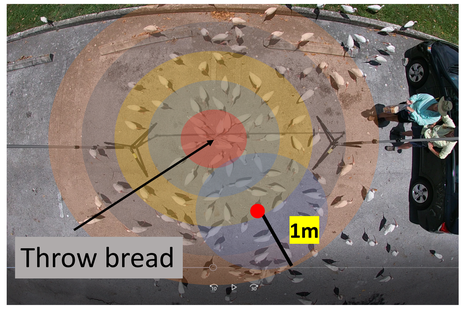
Predictions: When birds are being actively fed by people, ibis flock density will increase relative to natural foraging events.

Methods:

Natural foraging

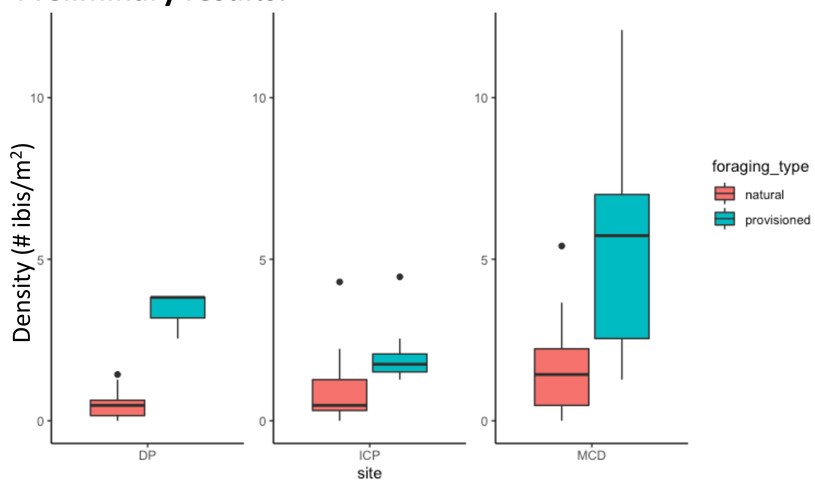


Active Provisioning



Counted the number of ibis within a 1m radius around focal bird while bird is foraging naturally (during 10-min focal follows) or being actively fed bread during 5-min recorded feeding events.

Preliminary results:



Ibis density increases by 3.4 times, on average, each time bread is thrown

Next Steps: Collect additional observations of provisioning events and compare to foraging behavior in wetlands

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References: **1)** Hernandez *et al.* 2016. *PLoS One*. **2)** Murray *et al.* 2018. *Phil. Trans. R. Soc. B*. **3)** Pence & Bush 1973. *J. Parasitol.* **4)** Kidd-Weaver et al. 2020. *PLoS One* **5)** Teitelbaum et al. 2020 *Mov. Ecol.* **6)** Wright and Gompper 2005. *Oecologia.*