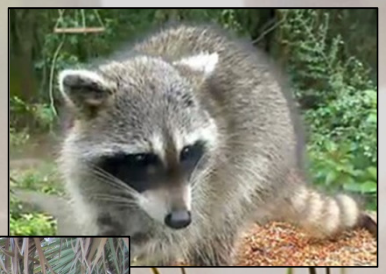
Key plant-animal interactions in the natural propagation of sabal palm (*Sabal mexicana*) and the restoration of palm forests in Texas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Sabal palm (*Sabal mexicana* Mart)

Only native palm Texas

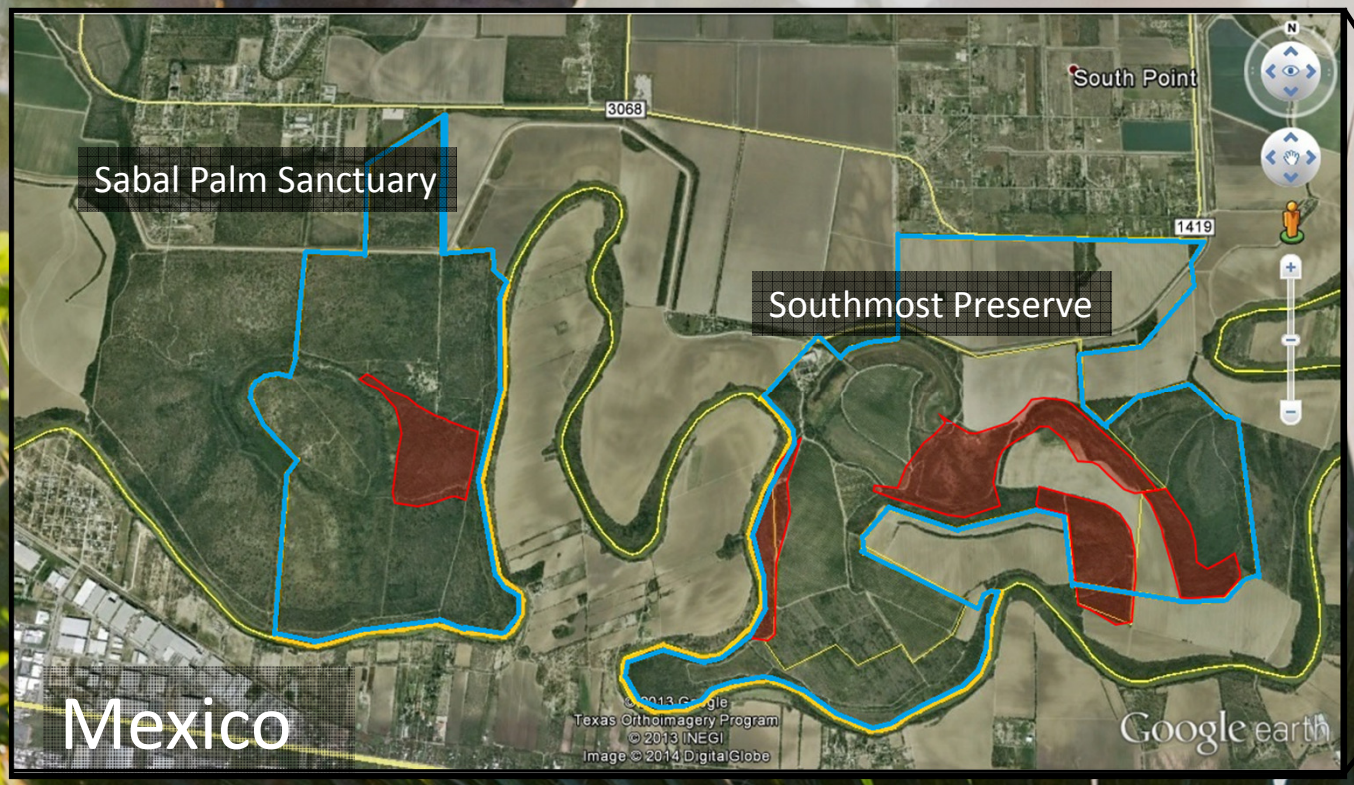
Listed as threatened in Texas (TOES)

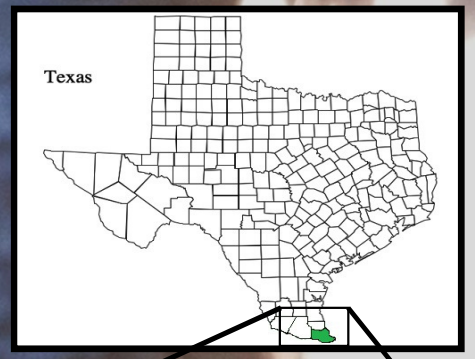
“Distinct Ecosystem” (Clover, 1937)

Current distribution and study sites

From RGV through eastern Mexico to Oaxaca

Only two forest remnants in US (~30 ha / 20,000 ha)





Hypothesis

Restoration success of sabal palm forests in South Texas does not depend on palm-animal interactions .

Objectives

1) Identify palm seed predators and dispersers.
2) Determine predation intensity and preference among fruit, clean seeds and seeds in scat.
3) Establish the coyote's disperser category (legitimate and/or effective and/or efficient).
4) Establish the coyote as palm seed protector and promoter of seedling recruitment.

Methods – Predator ID and Intensity

Clean Seeds

3 Habitat types
(core forest, edge forest, disturbed)

N = 100 seeds with daily replacement

5 replications

Trail cameras

Methods – Germination Test

3 Treatments: fruit, seeds, seeds (coyote scat)

Germination conditions:

- Substrate: 50% sterile peat and 50% vermiculite
- Relative humidity: 74-80%
- Photoperiod: 12 hours
- Temperature: 27˚C/22˚C (day/night)

Complete randomized design

5 replications; 100 seeds/replication

Viability test: at the end of germination (Tetrazolium chloride)

Methods – Predator's Preference

Treatments: Fruit, Seed, Seed from Scat

Site: old-growth Palm Forest

Trail camera: video to record predator's activity

Palm seed predators

Seed consumed/destroyed

Can occur pre and post dispersal

Insects, mammals, (birds ?)

Some may be predators and dispersers

(*Caryobruchus gleditsiea*)

Palm seed dispersers

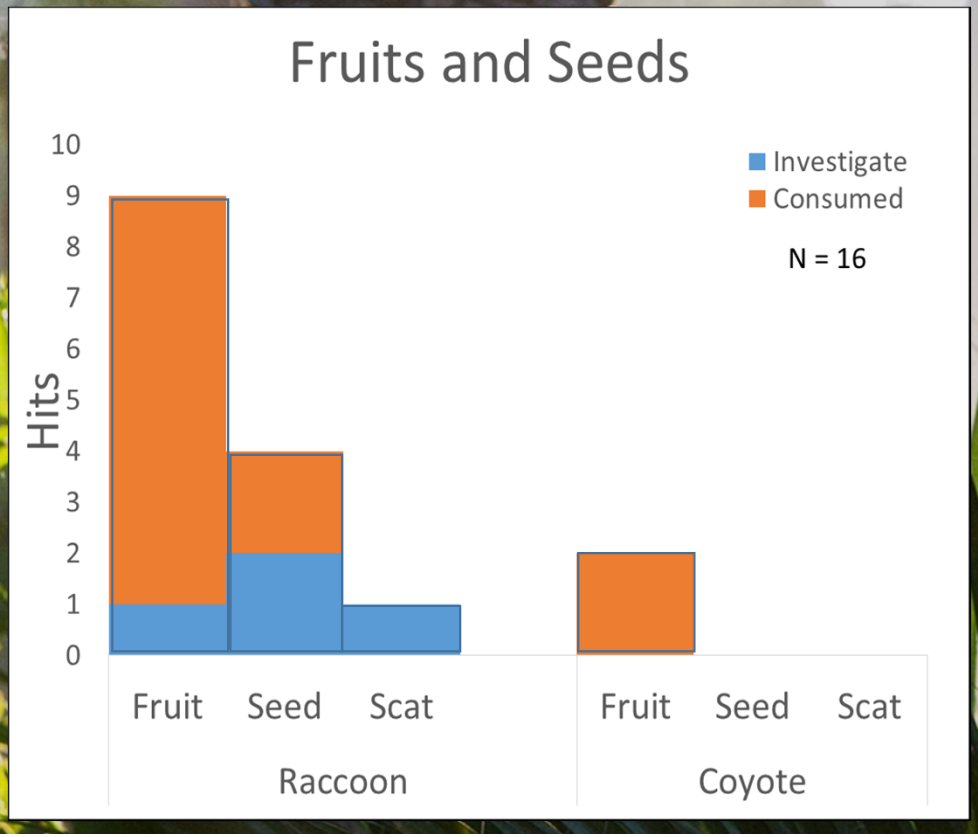
Legitimate: viable seed

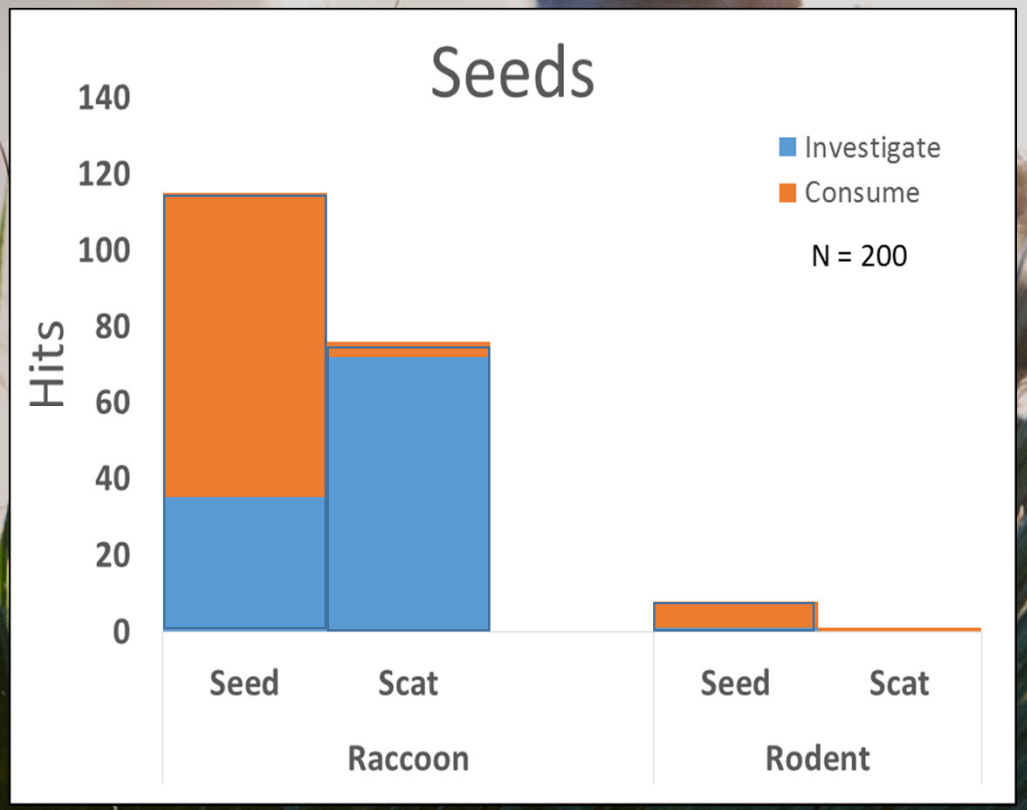
Effective: improve germination

Efficient: suitable microclimate

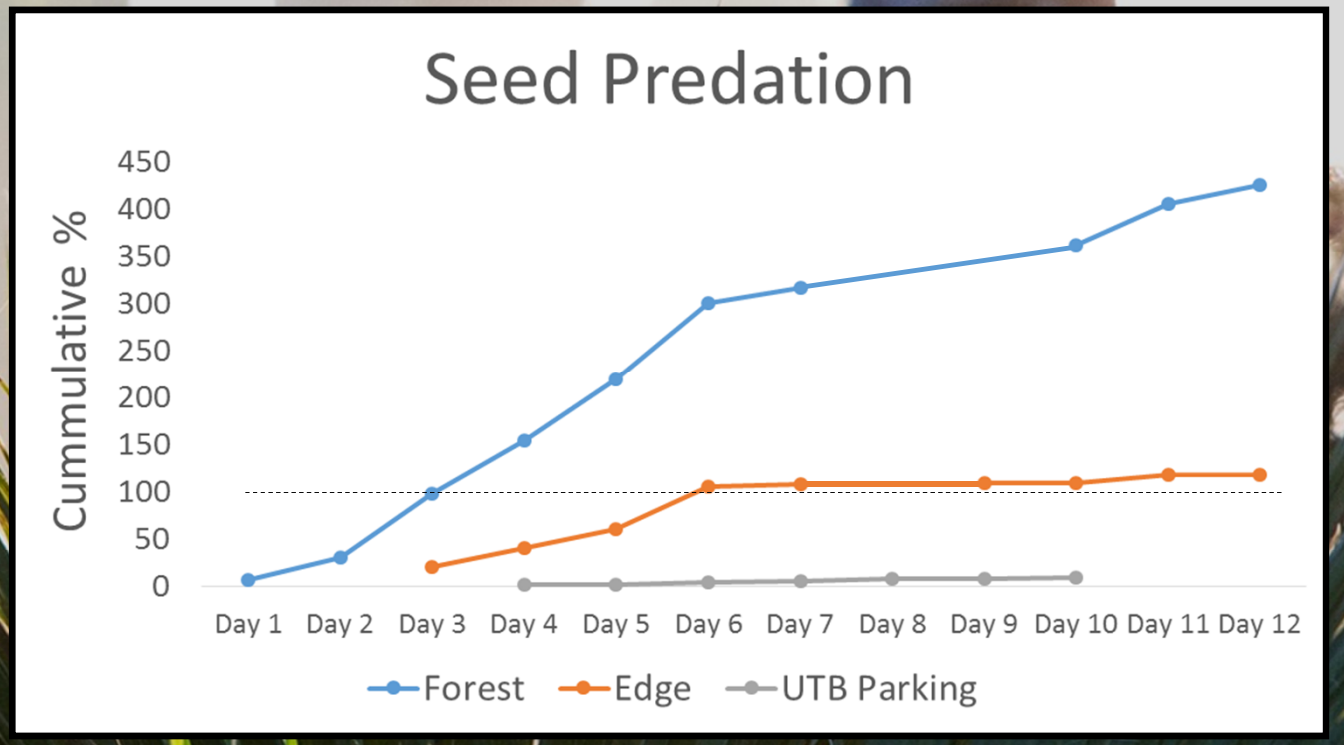
Protection ?

Predator Preference

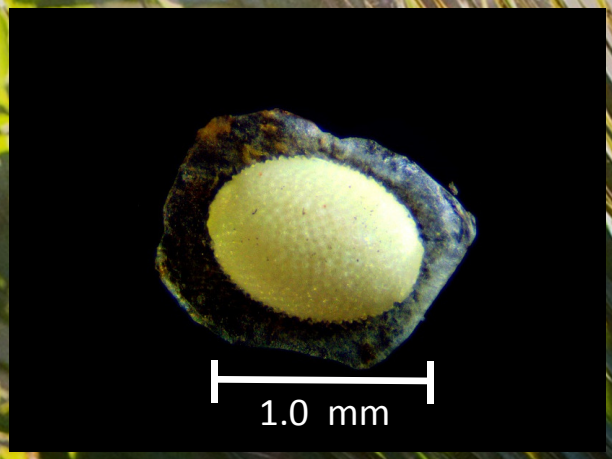


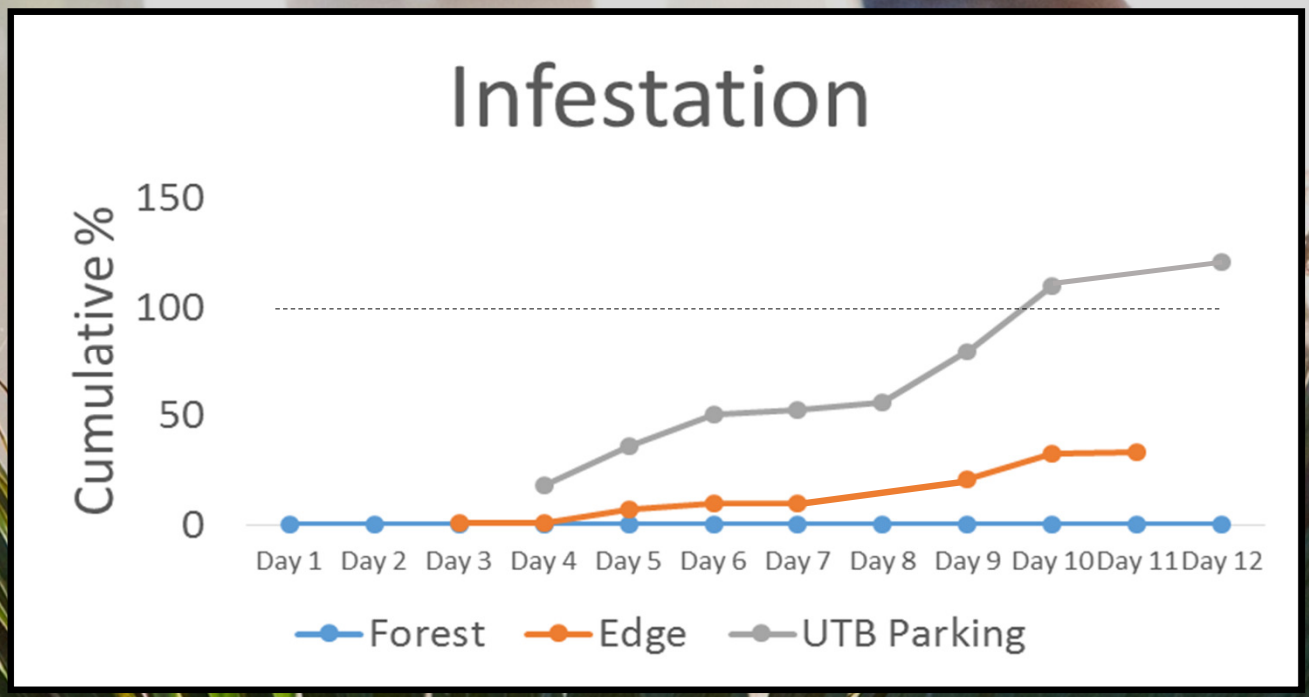


Predation intensity by mammals



Intensity of bruchid beetle Infestation





Germination

Treatment	Sample	Germination (%)	Germination % + Viability	Germination $Time_w$ (days)	Germination Rate ($days^{-1}$)	Synchronization Index
Scat Seed	n = 500	31 a	69 a	106 a	0.010 a	3.74
Whole Fruit	n = 500	44 a	68 a	115 ab	0.009 a	4.50
Clean Seed	n = 500	37 a	76 a	147 b	0.007 a	4.39

Different letter = significantly different ($p<0.05$)

Coyote
(*Canis latrans* Say)

Apex predator (S. Texas)

Opportunistic (Bekoff, 1977)

Gulps food (Murie, 1951)

Relatively large range

Diet: includes plant material (up to 80%) (Murie, 1951)

Congregated germination and seedling establishment

Conclusions

Palm seed predators = raccoon, rodents, bruchid beetle, chachalaca?

The totality of exposed seeds is predated in 3-9 days. Seeds in scat are not predated.

Coyotes → dispersers
- legitimate (viable seeds found in scats)
- effective (germination faster, more synchronized)
- indirectly efficient (seeds deposited on open ground, then carried by rain/wind)

Coyotes → seed protectors = seeds in scat protected for weeks from predators , and transported away from high predator concentration.

Significant natural propagation and palm forest regeneration/expansion unlikely coyote's balancing interactions

Mexico ?

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