Disease, Habitat Quality and the Gopher Tortoise

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Hatchling Gopher Tortoise

Gopher Tortoise-5 years

Gopher Tortoise burrow

We measure burrows not tortoises

Gopher Tortoise life history

- Females produce 5-8 eggs, probably not every year
- High predation on eggs and juveniles
- Shell hardens at 6-8 years
- Sexual maturity at 11-24 years (function of habitat quality)
- Life expectancy is more than 70 years
- Most of life is spent in burrows

Assaults on their well being

- Hoover chicken
- Habitat loss & fragmentation
- Habitat degradation-fire suppression
- Diseases-upper respiratory tract disease (URTD)
- Uncontrolled growth of human population
- Stress from all of the above

Human population growth

- 1950 2,771,000
- 1960 5,000,000
- 1970 7,000,000
- 1980 10,000,000
- 1990 13,000,000
- 2000 16,000,000
- 2006 18,000,000 (estimate)

1,000 people move to Florida every day

Sandhill habitat

Sandhill habitat

Sandhill without fire

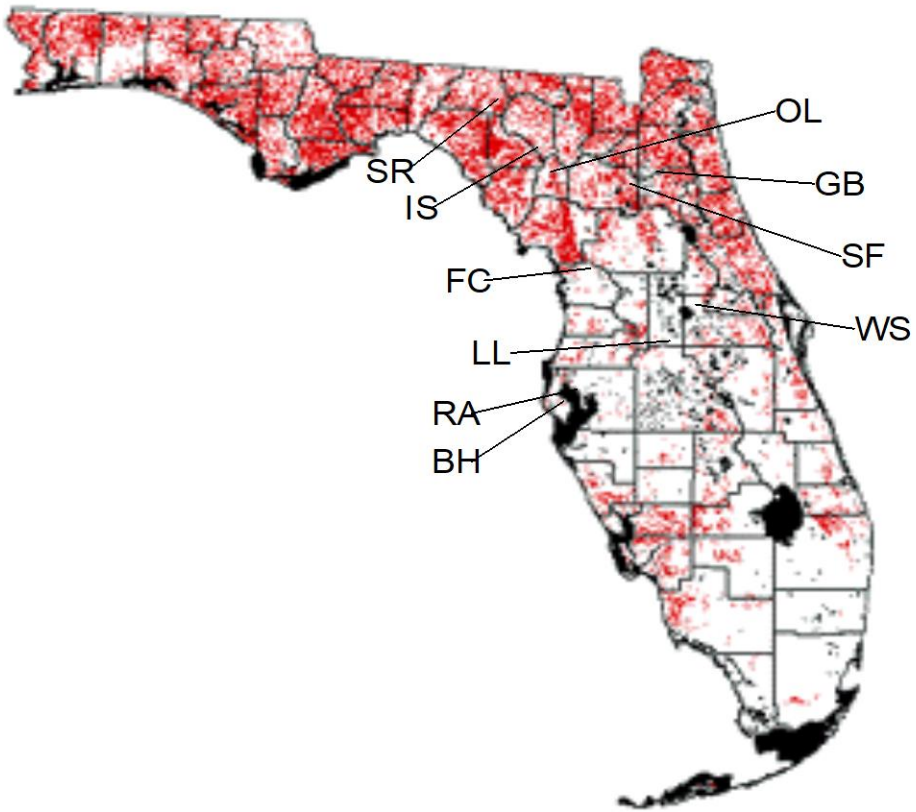
Research

- Ten populations were surveyed in late 1980s, all on public lands
- URTD was discovered at four sites in 1990's
- Ten populations were resurveyed in 2000-01
- Individuals were hand captured for URTD and health assessment

URTD

- Caused by Mycoplasma agassizii
- Clinical symptoms include nasal discharge swelling around eyes, respiratory distress.
- Dead individuals are very light weight
- Dead individuals are reproductive size
- Many seropositives show no symptoms
- The disease is widespread and old!

Study sites



SITE	AREA	DATE
Boyd Hill Nature Preserve (BH)	10	1986/2000
Fort Cooper State Park (FC)	78	1990/2000
Gold Head Branch State Park (GB)	397	1990/2000
Ichetucknee Springs State Park (IS)	370	1990/2000
Lake Louisa State Park (LL)	65	1987/2000
O'Leno State Park (OL)	269	1990/2000
San Felasco Hammock State Preserve (SF)	141	1990/2000
Suwannee River State Park (SR)	89	1990/2000
USF Ecological Research Area (RA)	32	1988/2001
Wekiwa Springs State Park (WS)	599	1990/2000

Survey methods

- Both original and resurveys used burrows to assess populations
- Burrows were classified and measured
- Seven meter wide belt-transects were conducted by three researchers
- Presence of tortoises determined the extent of transects
- Vegetation was measured during both surveys

URTD research

- Bleed tortoises within five minutes of capture
- Test blood for antibodies
- Determine blood levels of corticosterone

Bleeding a tortoise

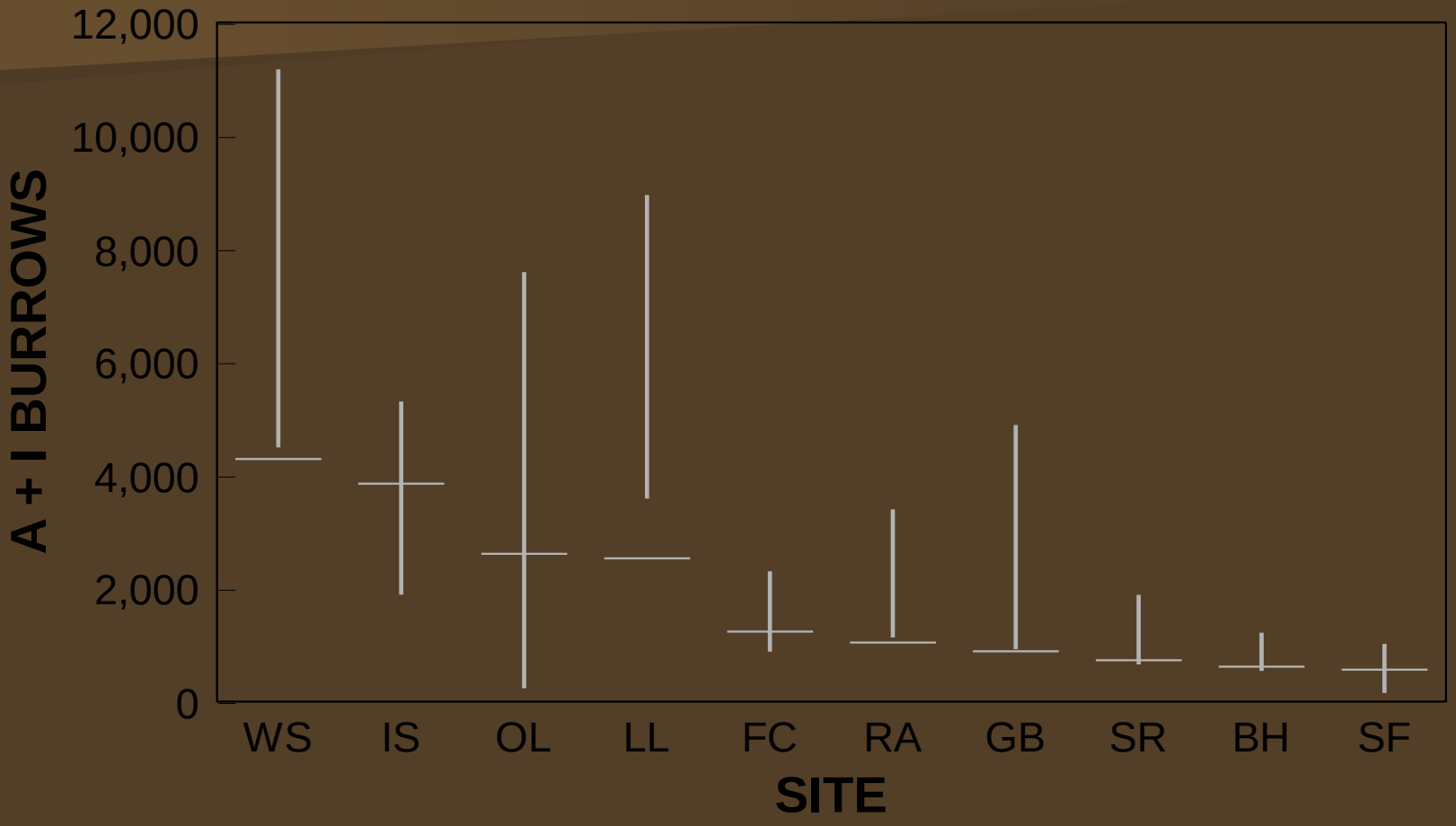
Broad questions addressed

- Has tortoise demography changed?
- Are changes associated with URTD?
- Are changes associated with habitat quality

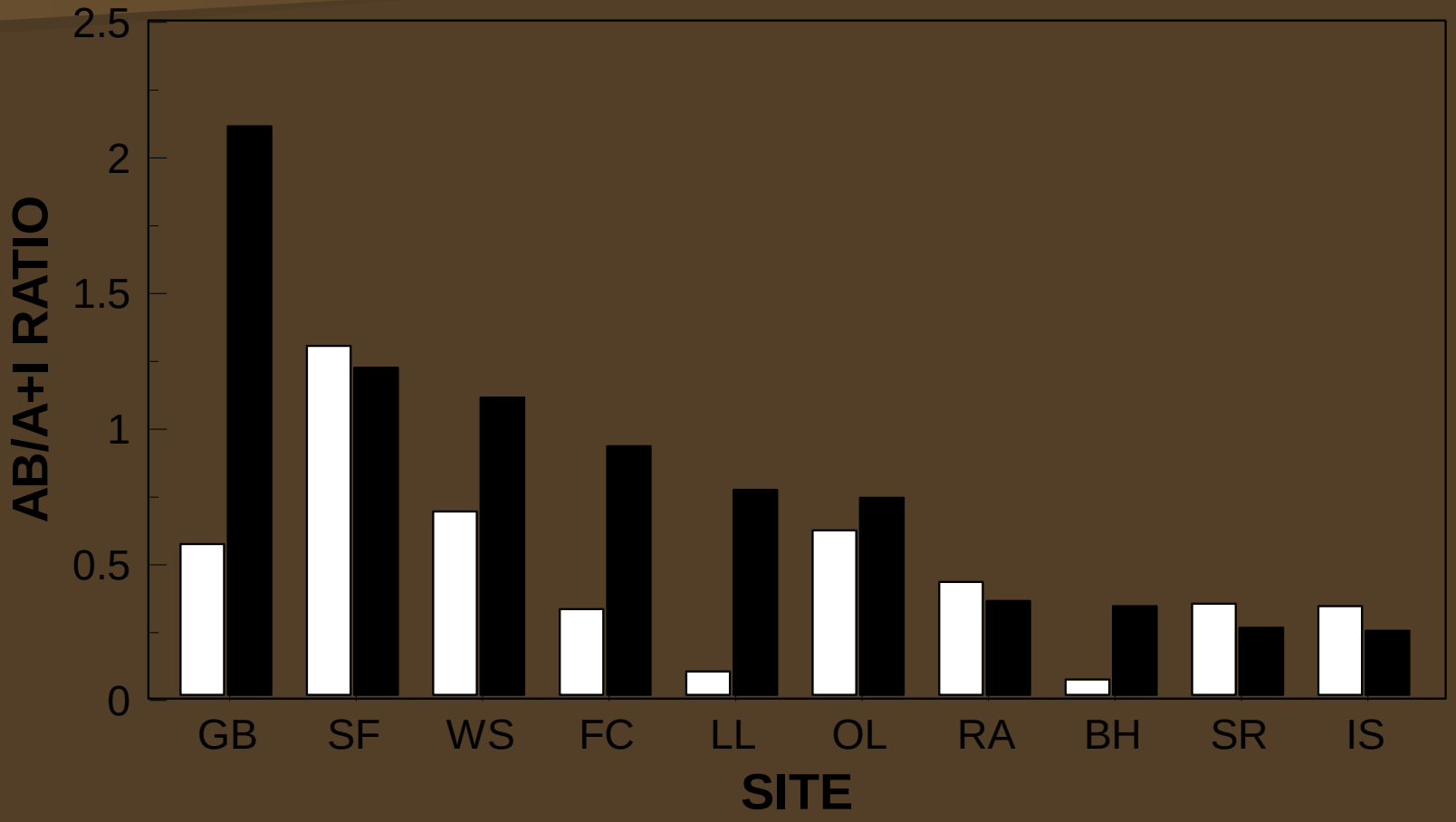
Gopher Tortoise demography

- Active, or active + inactive burrows declined at 8 of 10 (10% or more)
- Abandoned burrows increased at 6 of 10 (by 50% at 4 of 10)
- Size distributions of burrows along transects changed significantly
- Only slight changes in area occupied
- No changes in spatial arrangement of burrows along transects (core, periphery)

Declines in burrows



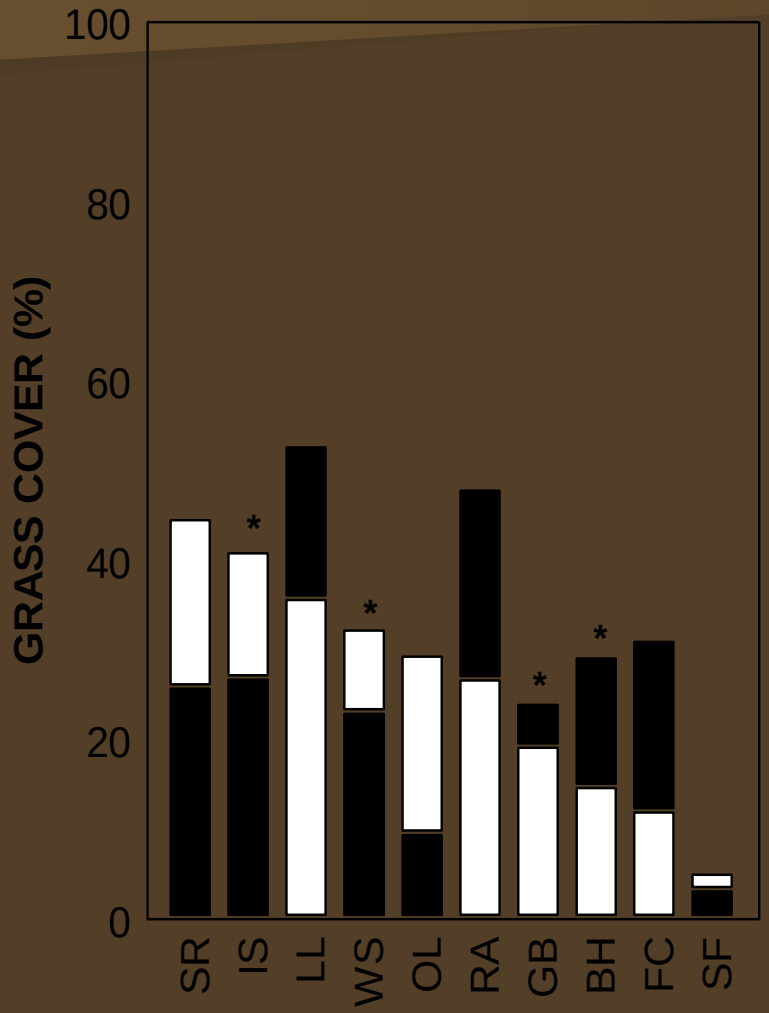
Ratio of abandoned/A+I



Demography at URTD sites

- 10% decline in active + inactive burrows at three of four sites
- 10% increase in abandoned burrows at three of four sites (50% at two)
- Fourth URTD site had a 30% increase in active or active + inactive burrows
- Seropositive individuals were found at four sites previously unknown to harbor the disease

Habitat structure



Habitat structure

- Changes reflect management efforts; more fire translates into more stable populations
- Loss of ground cover and increase in canopy are related to declines of burrows
- High and low canopy differentially influence ground cover
- No single variable sends a strong signal at sites with declining populations

Conclusions

- Demographic changes at most sites indicate a decline in well-being
- No clear connection between URTD presence and population decline
- Habitat quality reduction is related to decline in well-being
- Relatively small sites have greater declines than large sites

More conclusions

- URTD is widespread
- URTD detection is a function of sample size
- URTD targets mid-size individuals
- Habitat quality deserves more attention for the continued well-being of the gopher tortoise.

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- http://research.myfwc.com/publications/publication_info.asp?id=49960

Any questions?