

# Managing Uplands with Keystone Species



The Case of the Gopher tortoise  
(*Gopherus polyphemus*)



# *Biology*

**Question:** Why consider the gopher tortoise for conservation to begin with?

**Answer:** The gopher tortoise represents a species that must be protected *before* its numbers decline any further.

# The Burrow

- Water table determines both depth and length
- **Protects** inhabitants from:
  1. Fire
  2. extreme temperatures
  3. desiccation
  4. predators



# The Burrow

Provides home to an individual tortoise

- Tortoises are known to switch burrows and to reuse older burrows
- 0.67 tortoises per burrow outdated

# The Burrow

Provides:

- home and refuge to some 360 additional species



E. Indigo snake  
(threatened species)



Burrowing Owl  
(species of special concern)



Florida mouse  
(threatened species)

## *Gopherus polyphemus* as a Keystone Species...

**Def:** A species whose loss from an ecosystem would cause a greater than average change in other species populations or ecosystem processes; whose continued well-being is vital for the functioning of a whole community.

**Def:** A species that plays an important ecological role in determining the overall structure and dynamic relationships within a biotic community. A keystone species presence is essential to the integrity and stability of a particular ecosystem.

# Reproductive Biology

What makes the gopher tortoise so vulnerable?

- Deferred sexual maturity (12 to 24 years old)
- Low fecundity:
  - female may produce a successful clutch only once every 10 years
  - low number of eggs 3-15
  - annual reproduction
  - susceptibility of juveniles to predation until they are 6-7 years old
- Long generation time (takes ~33 years to replace a generation)



# Tortoise Habitat



Longleaf pine forest

# Population Decimation

Over the past 100 years, the total gopher tortoise population within Florida has declined by 60-80% (~ equivalent to 3 tortoise generations)

At the current pace gopher tortoise populations will be **eliminated** completely from private lands within the next three generations

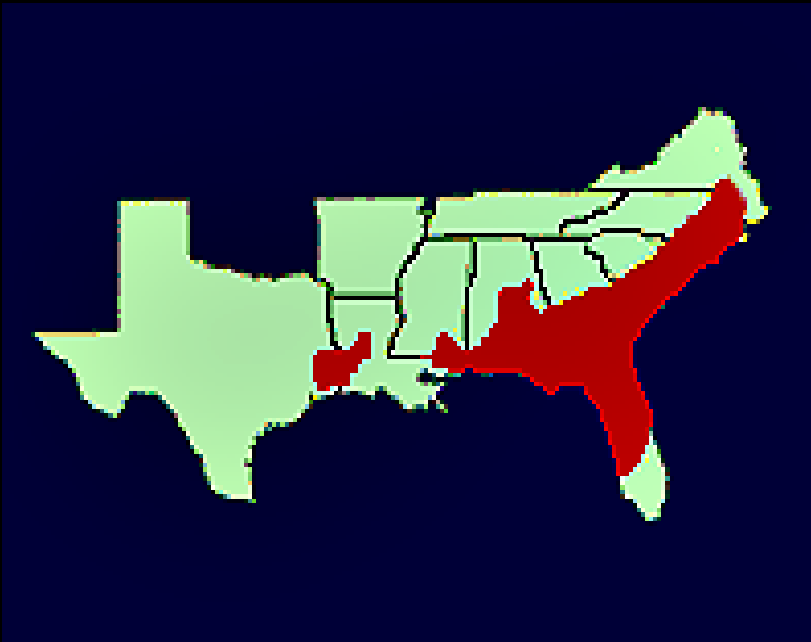
Imagine 80% of the human population of Florida dying in the next century due to mass flooding...

Protection of tortoise habitat involves more than just acquisition. Accurate and informed management is necessary based upon a sound understanding of its biology to have any hope of conserving this and other species in the future

## Management Issues Affecting the Gopher Tortoise and its Habitat

1. Appropriate preservation of tortoise habitat.
2. Habitat requirements such as proper soils and drainage for burrows, and proper space and communities of vegetation on the ground to provide ample food for foraging and movement.
3. Protection from unnatural predation and death associated with vehicles, people, dogs and cats.
4. Long term vs. short-term management.

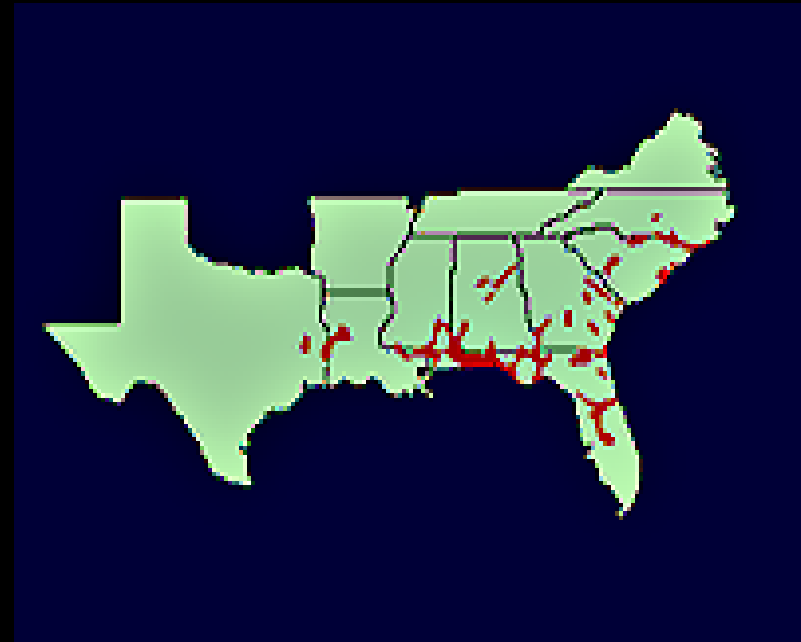
Historic Distribution of Longleaf Pine



Approximately 25-34 million Ha

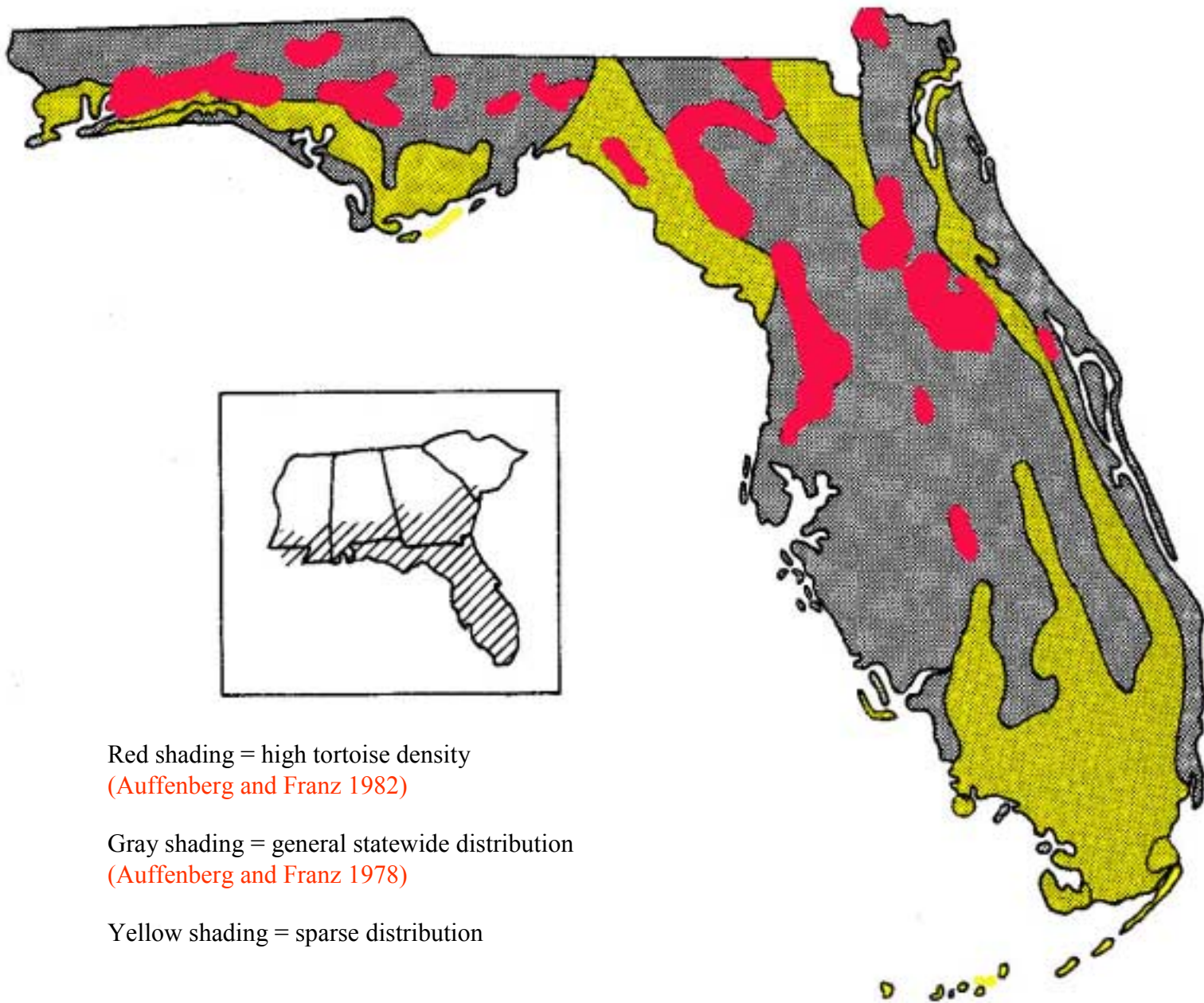
Pre 1900

Current Distribution of Longleaf Pine



< 2% of historic distribution

Present



Red shading = high tortoise density  
(Auffenberg and Franz 1982)

Gray shading = general statewide distribution  
(Auffenberg and Franz 1978)

Yellow shading = sparse distribution

## 9 Types of Gopher Tortoise Habitat (as listed by FWC)

North Florida Coastal Strand

South Florida Coastal Strand

North Florida Flatwoods

South Florida Flatwoods

Sand Pine Scrub

Longleaf Pine-Turkey Oak Hills

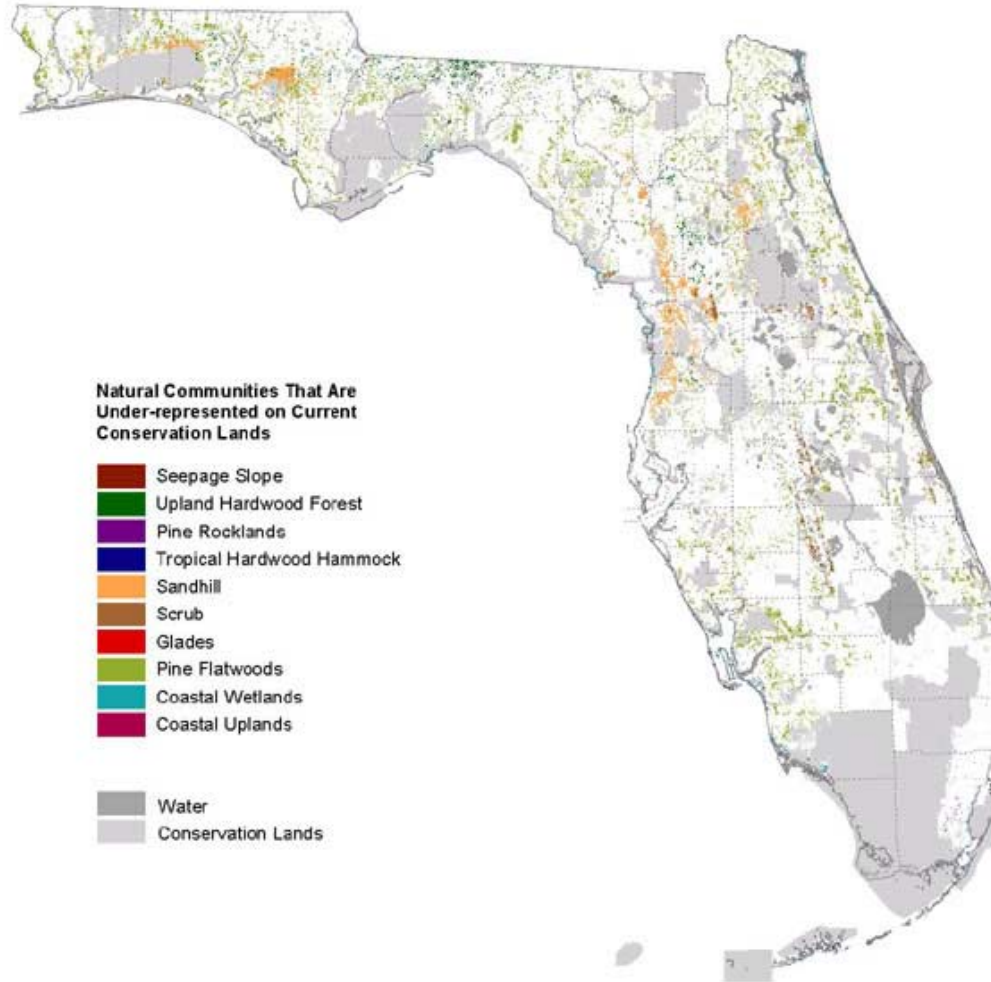
Mixed Hardwood and Pine

Upland Hardwood Hammocks

Oak Hammocks



### Under-represented Natural Communities





← Longleaf pine forest

Xeric scrub oak →



# Habitat Management

Soil composition is necessary for burrowing

- Well-drained, sandy soils
- Introduction of soil mounds
- Water table determines depth of burrow



# Habitat Management

Adequate area must be provided for foraging and natural movement of the gopher tortoise

Old Published figures for Average home range:

- males between 1.2 to 4.7 acres
- females between 0.2 to 1.6 acres

# Habitat Management

Homes ranges are affected by the amount of herbaceous ground cover upon which gopher tortoises feed

Adequate gopher tortoise habitat must have appropriate food sources or tortoises will leave the habitat in search of food

# Habitat Forage

Gopher tortoises primarily feed on:

- Broadleaf grasses
- Wiregrass
- Grass-like asters
- Legumes
- Fruits

# Habitat Forage

The presence of a *diversity* of plant species is vital to the gopher tortoise

Native species are always preferred **but** tortoises will do just fine with a number of non-native species

A study by Ashton and Ashton study found that gopher tortoises will eat 370 plant species from 22 different families.

# Habitat Forage

When developing practical management, questions of **plant diversity** must be addressed

1. What is the current plant diversity?
2. What is the desired plant diversity for this habitat and area?
3. What kind of land management is available for this habitat? (i.e burning, mowing, cattle grazing, etc.)



(Slash pine forest near Gainesville, Fl)



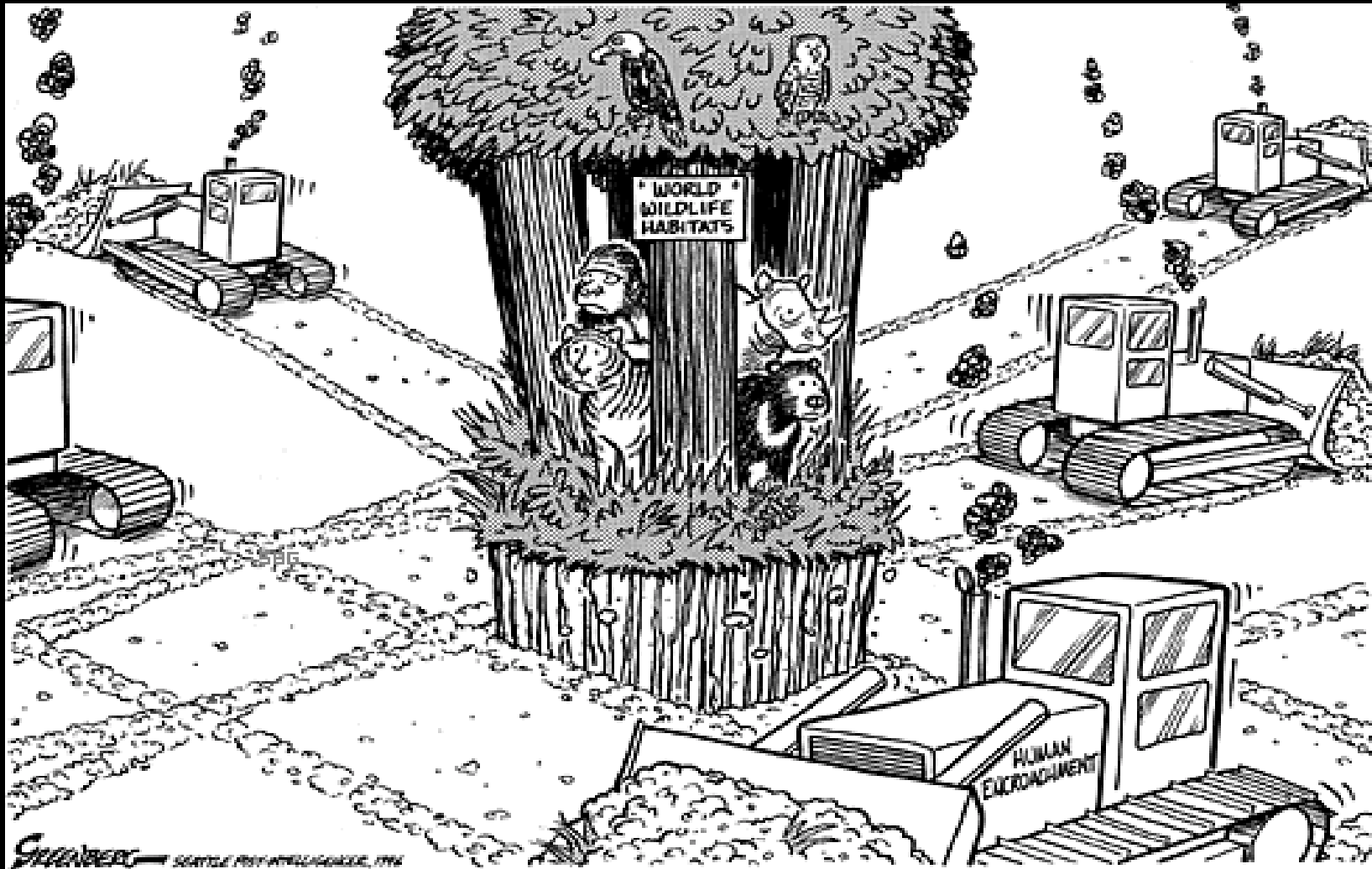
This density

- reduces light to the forest floor
- reduces gopher tortoise forage
- increases distances tortoises travel in search of food





The use of prescribed burns to maintain integrity of longleaf pine forest



Highway mortality is a significant contributor to tortoise mortality

Feral cats feed on hatchling gopher tortoises

Dogs attack adults, often by gnawing at their shells



Using tortoises for food is prohibited

Many immigrants bring with them their cultural tradition of eating tortoises



# Long Term vs. Short Term Management Strategies

Management strategies must provide for:

- biology (the longevity and low fecundity of tortoises)
- appropriate plant communities
- conflicting management strategies associated with habitat (forest succession, park creation, etc.)



Always look on the bright side of life...