

Patterns of plant diversity in fragments of globally imperiled pine rockland forest: effects of recent fire frequency and fragment size



Jennifer Possley and Joyce Maschinski
Fairchild Tropical Botanic Garden



Steven W. Woodmansee
The Institute for Regional Conservation

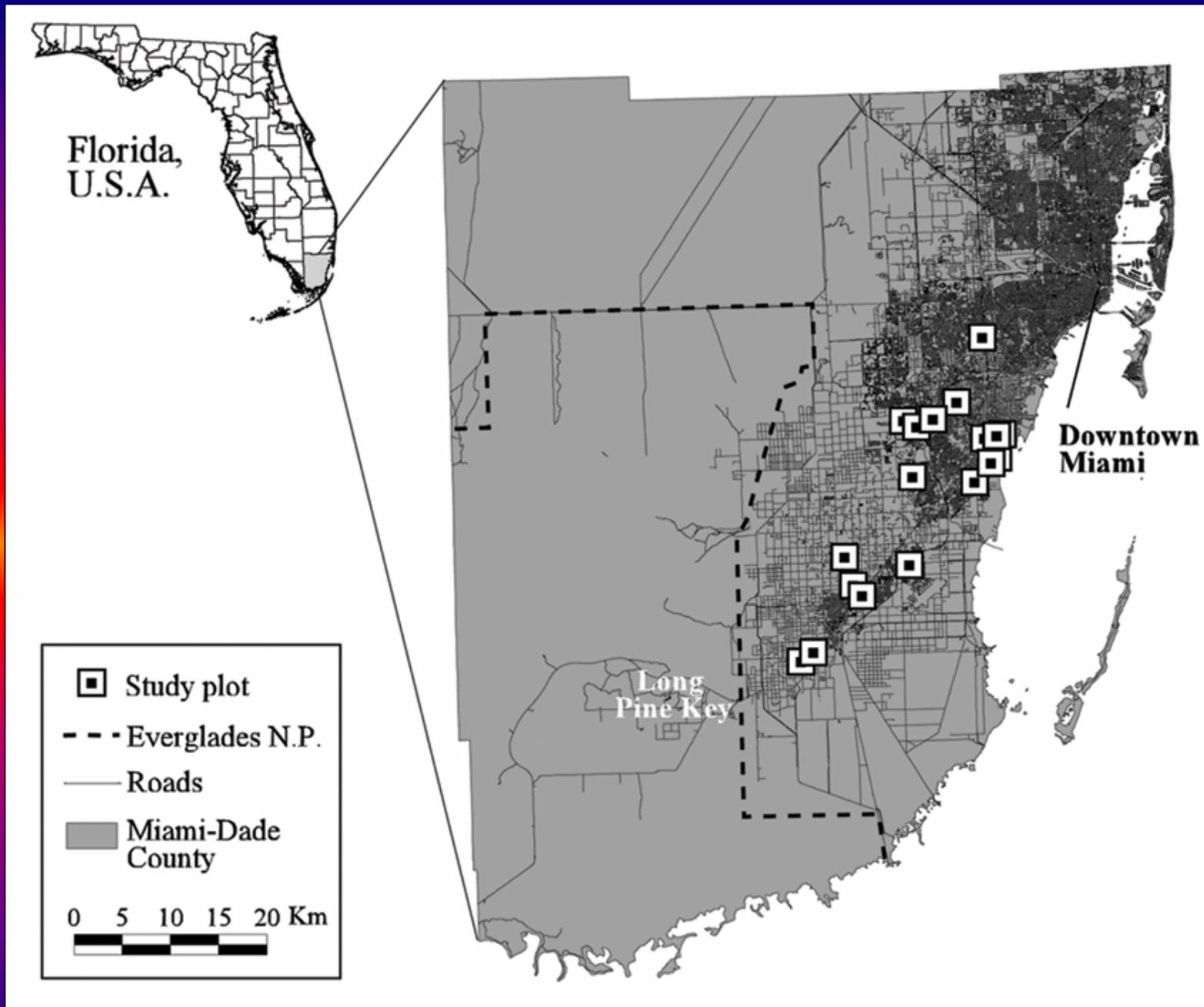
Miami-Dade County Pine Rocklands

● 1995

● 2003



Patterns of plant diversity in fragments of globally imperiled pine rockland forest: effects of recent fire frequency and fragment size



20 study plots in 18 Miami-Dade County pine rockland fragments

3 Hypotheses

- ① Fragments receiving more frequent fires will have higher native diversity in the understory



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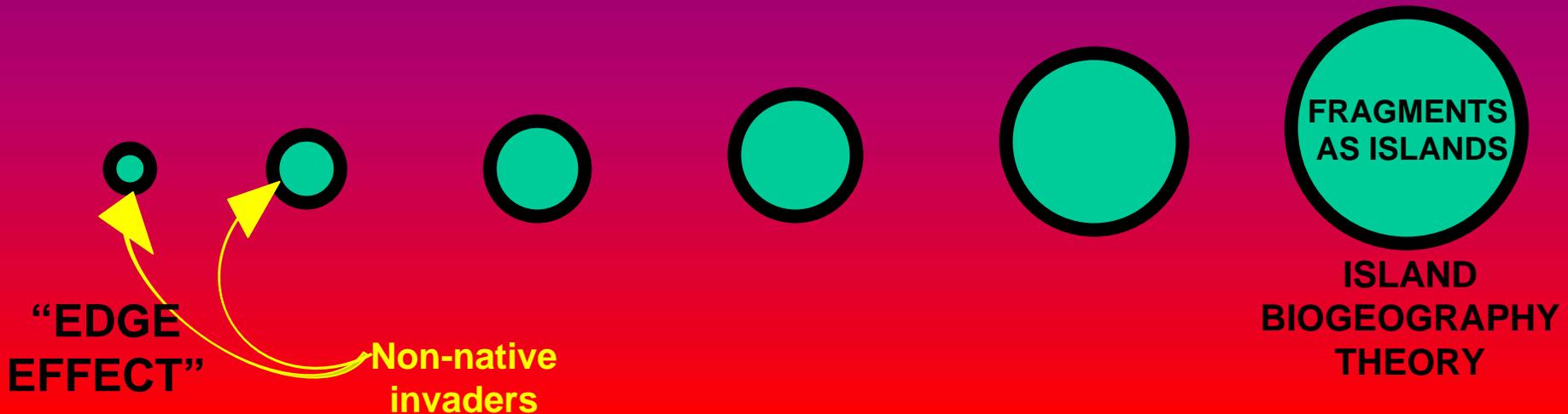
② *Serenoa repens* cover will be unaffected by 1 fire, but suppressed by more than 1 [Snyder et al. 1990, p. 259]



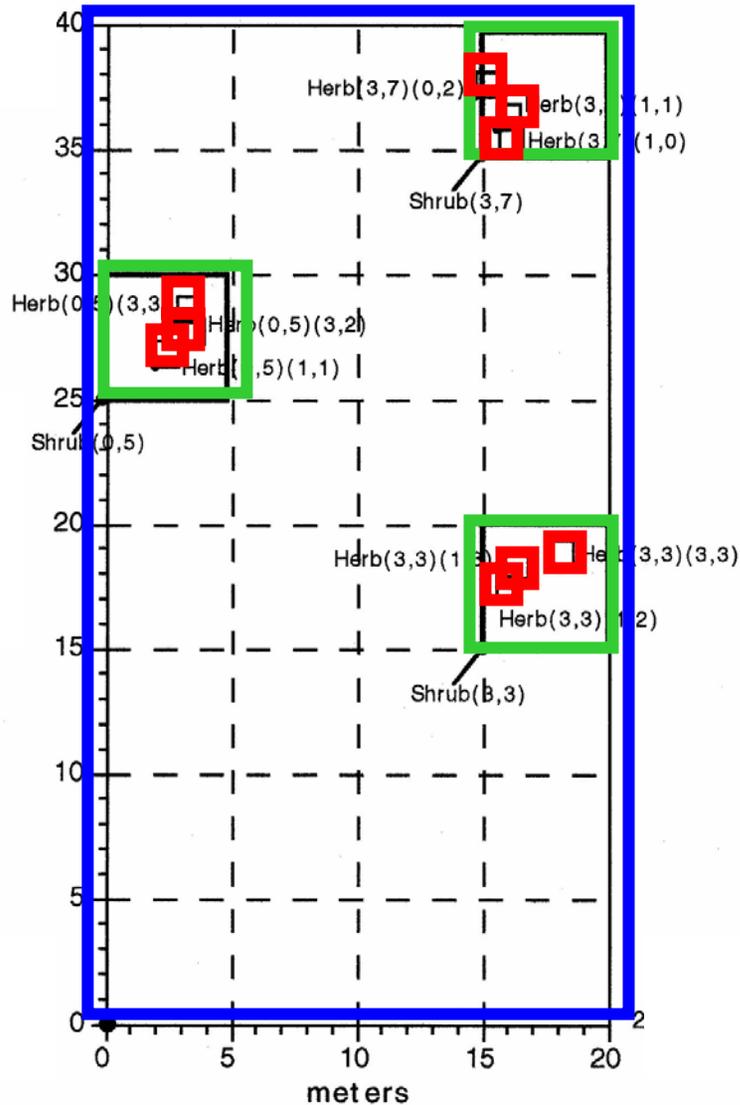
Saw palmetto (*Serenoa repens*)

3 Hypotheses

- ③ Fragment size will negatively affect non-native invasive species cover [Saunders et al. 1991] and positively affect native species diversity [MacArthur and Wilson 1967]



Methods



Canopy
20 x 40 m
 veg over 2 meters tall

Midstory
5 x 5 m
 veg 0.5 – 2 meters tall

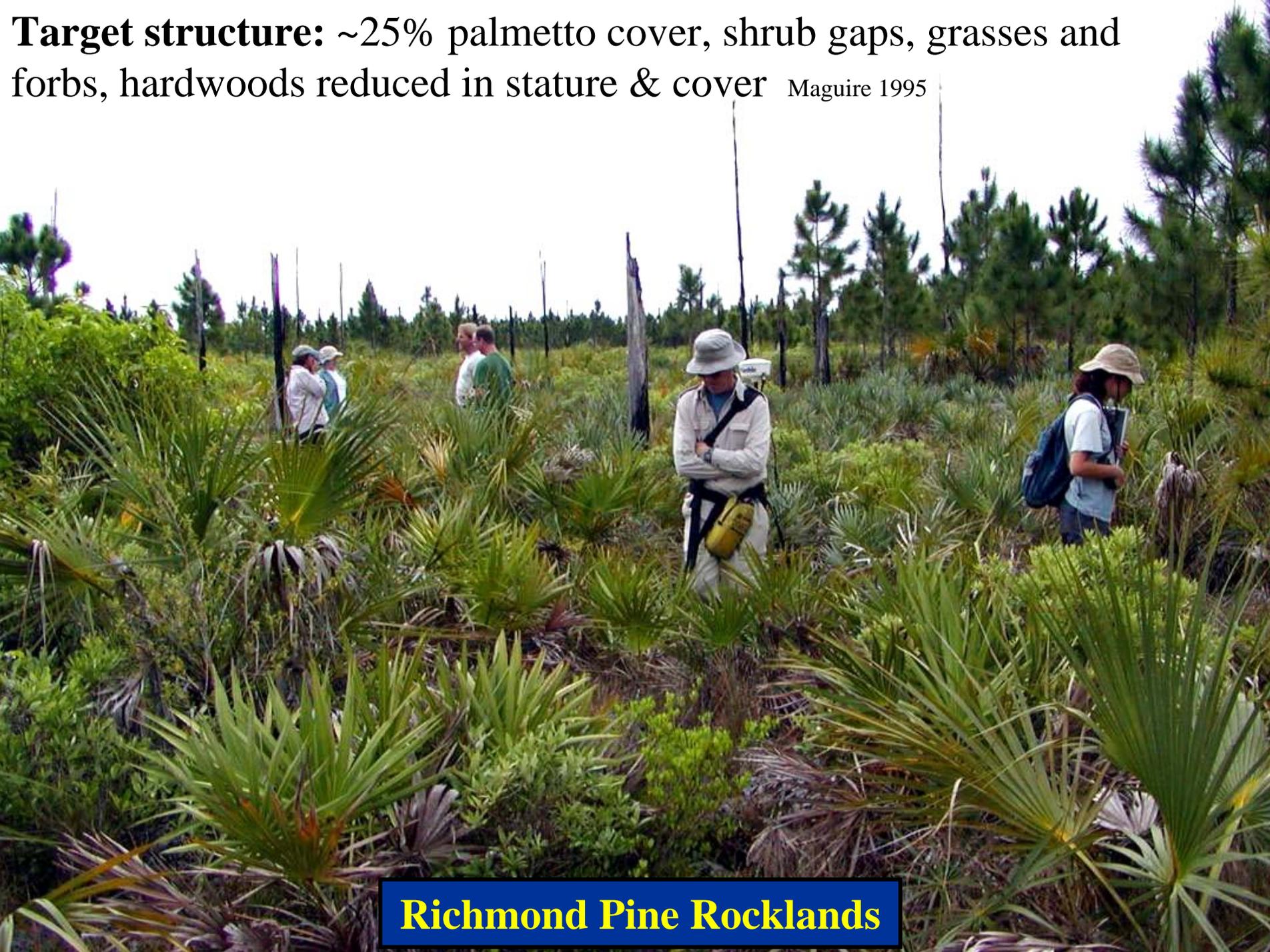
Understory
1 x 1 m
 veg <0.5 meters tall

Nested Plot Design



% Cover of every species in the sample plot (1x1 m)

Target structure: ~25% palmetto cover, shrub gaps, grasses and forbs, hardwoods reduced in stature & cover Maguire 1995



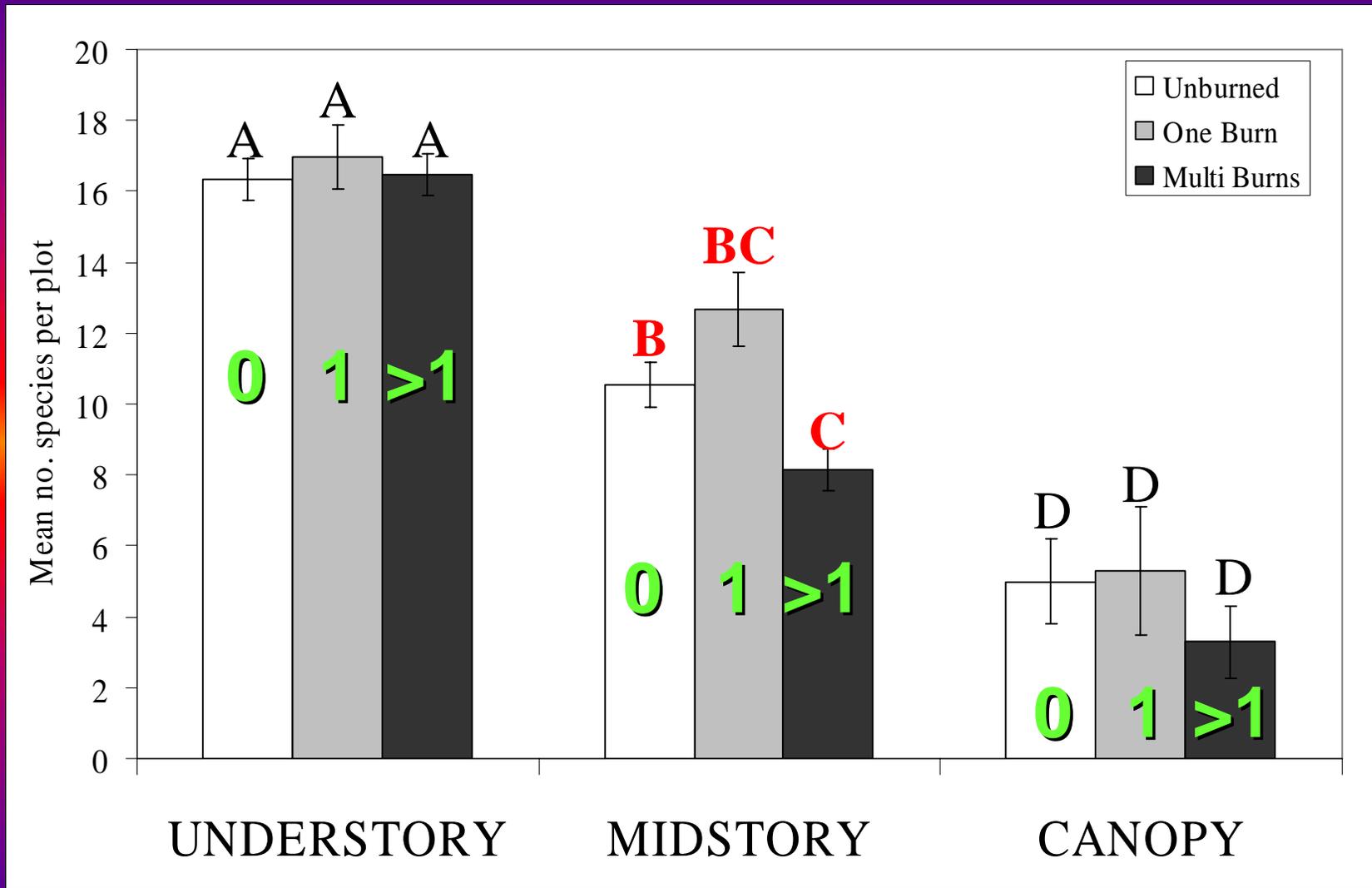
Richmond Pine Rocklands

Instead of . . .



Results and Conclusions

① Native species richness



Plots with no burns, one burn, or multiple burns 2003

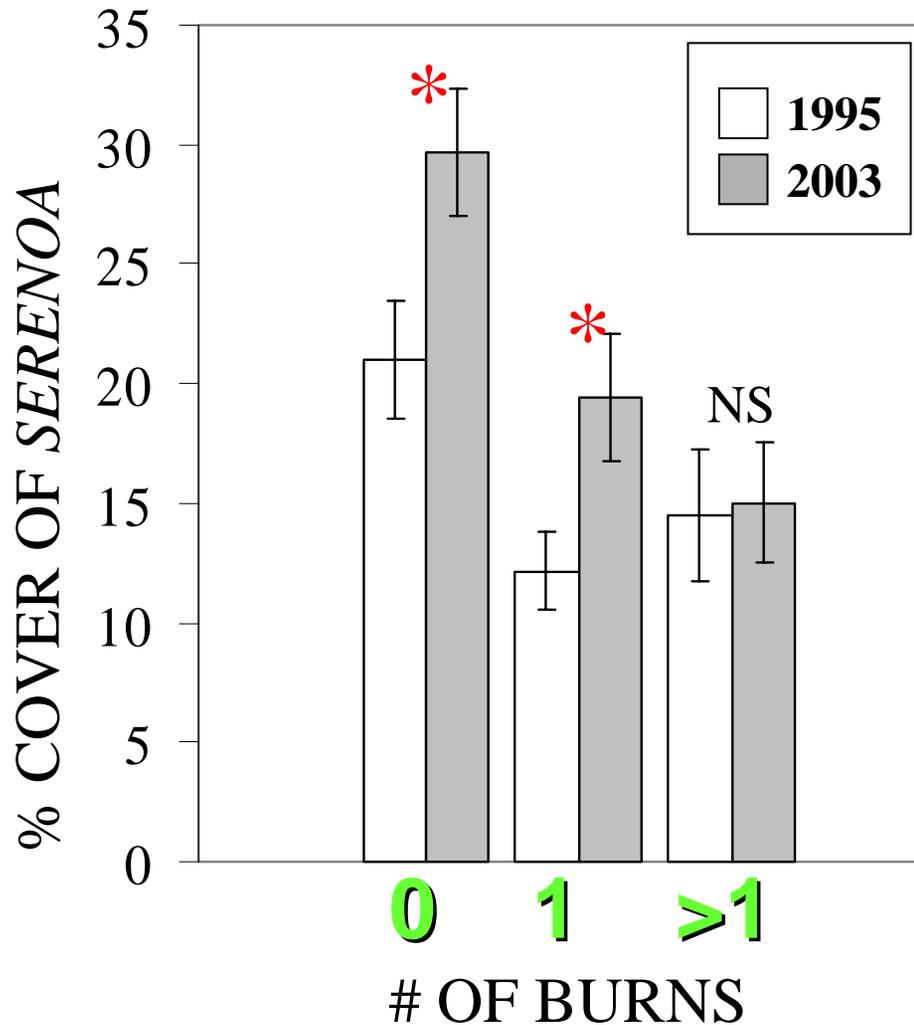
Conclusion

- ① Fragments receiving more frequent fires will have higher native diversity in the understory

No

Long fire-suppressed fragments in this study may need more burns to show a positive effect of herbaceous diversity

Cover of *Serenoa*



Plots with no burns,
one burn, or multiple
burns 1995-2003



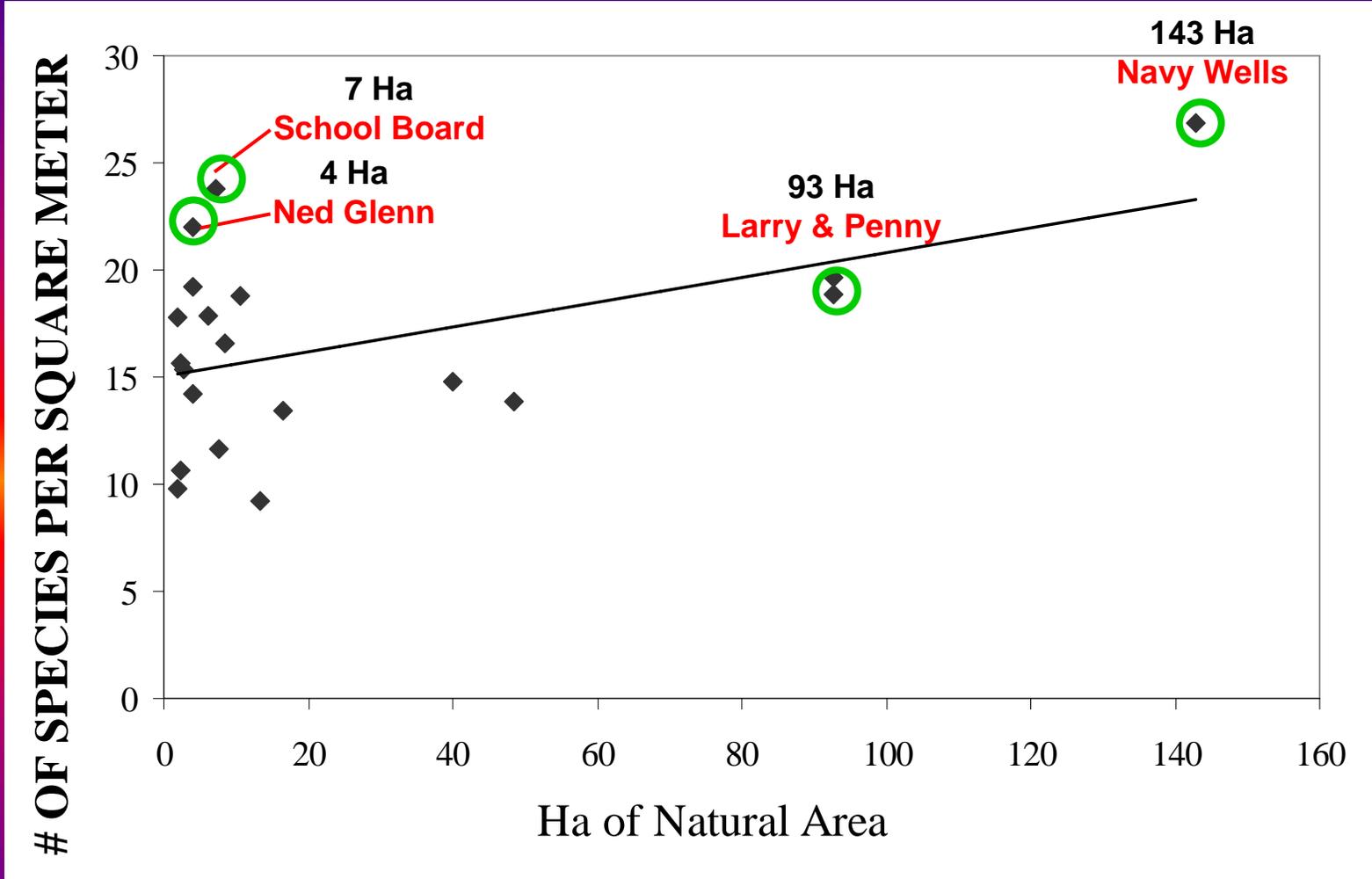
Conclusion

② *Serenoa repens* cover will be unaffected by 1 fire, but suppressed by >1

Yes

At least 2 burns are needed per 8 year period to prevent *Serenoa* cover from increasing

3



Regression of fragment size compared to native understory diversity in 1 m² study plots ($r^2 = 0.24$, $P = 0.03$).

Conclusion

- 3 Fragment size will positively affect native species diversity **No**
[and negatively affect non-native invasive cover **Not enough data**]

Small fragments had great variance in the total number of native species they supported. Some small fragments had nearly as many native understory species as the largest fragment in the study, emphasizing the importance small fragments can have for preserving native diversity.



Trends over Time

- Rare Species

- Non-native Species

Rare Species

- 39 Species State-Listed and/or Endemic to Florida
- Only 3 rare species in canopy layer:
 - Ilex krugiana* (FL2)
 - Smilax havanensis* (FL2)
 - Tetrazygia bicolor* (FL2)
- All endemics in herb layer



West Indian lilac
Tetrazygia bicolor

Rare Species

Rare species occurrences in herb plots from 1995 to 2003

28 species **increased** # of occurrences by 1-22 plots

7 species **decreased** # of occurrences by 1-3 plots

2 species had **no change** in # of occurrences

	# Plots 1995	# Plots 2003
<i>Angadenia berteroi</i>	42	56
<i>Chaptalia albicans</i>	1	20
<i>Coccothrinax argentata</i>	40	62
<i>Crossopetalum ilicifolium</i>	7	17
<i>Cynanchum blodgettii</i>	10	22
<i>Galactia pinetorum</i>	7	22
<i>Phyllanthus pentaphyllus</i>	79	97
<i>Tragia saxicola</i>	36	46

Non-native Species

15 Species present in >1 plot:



Balsam pear
Momordica charantia

Albizia lebbek
Alysicarpus vaginalis
Ardisia elliptica
Desmodium triflorum
Emilia fosbergii
Ficus altissima
Macroptilium lathyroides
Momordica charantia
Neyraudia reynaudiana *
Passiflora foetida
Rhynchelytrum repens
Richardia grandiflora
Schinus terebinthifolius *
Spermacoce verticillata
Triumfetta semitriloba

* Only 2 species in canopy layer

Non-native Species

- Invasive species occurrences 1995 to 2003

Almost all species

decreased # of occurrences or had

no change in # of occurrences

Miami-Dade Natural Areas Management
1992

Non-native Species

Only one species increased:
Rhynchelytrum repens

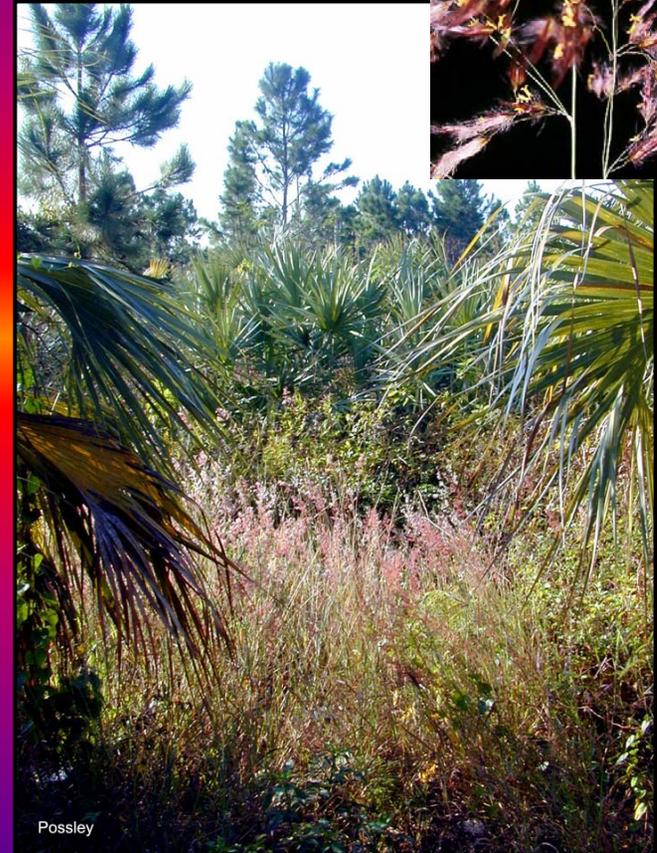
1995

1 herb plot
0 shrub plots



2003

24 herb plots
6 shrub plots



Rose Natal grass
Rhynchelytrum repens

Management Recommendations

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Watch out for *Rhynchelytrum repens*; kill infestations adjacent to pine rocklands

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More fire! At least 2 per 8 years to maintain saw palmetto; more to reduce it

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Watch out for *Rhynchelytrum repens*; kill infestations adjacent to pine rocklands



More fire! At least 2 per 8 years to maintain saw palmetto; more to reduce it



Keep doing what you're doing!

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