



Re-analysis of past woody vegetation monitoring efforts to estimate historic woody vegetation cover and populations in the Kruger National Park

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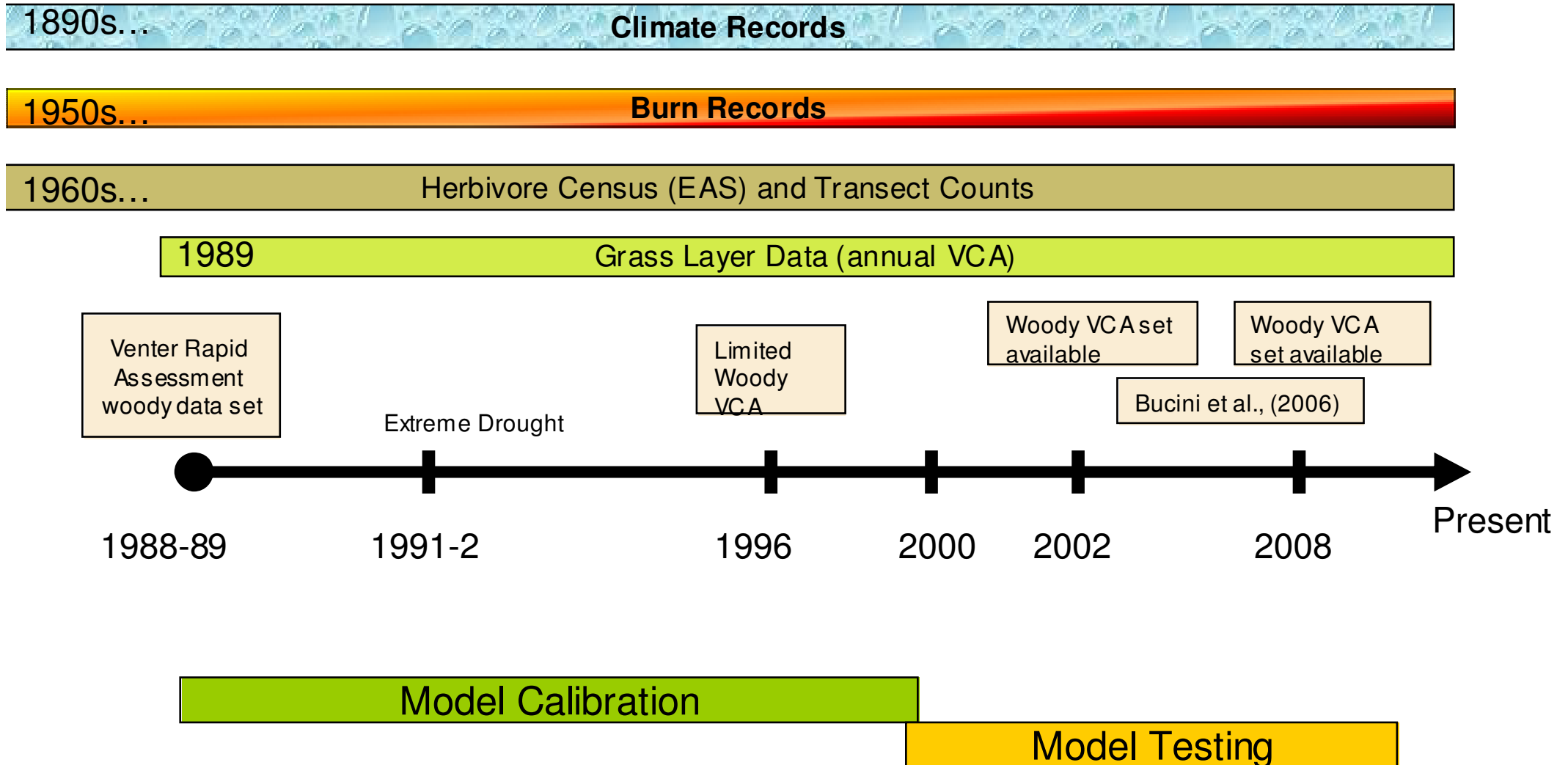


Overview



- Challenge: Modeling for Adaptive Management
 - Landscape Scale Elephant/Vegetation Modeling
- Development of operational databases for modeling and analysis efforts
 - Critical for model testing and validation efforts
- Has Woody Cover/Populations changed significantly over the past 20 years?
 - Land Systems/Land Type scale analysis
 - Comparison of 3 different Woody Vegetation Techniques

Aligned Spatial and Temporal Databases



Venter (1990)

- Mid to Late 1980s
- Braun-Blanquet Rapid Assessment
 - Shrub (0.75m – 2.5m) height class
 - Brush (2.5m – 5.5m) height class
 - Tree (>5.5m) height class
- Crown Cover estimation by classes

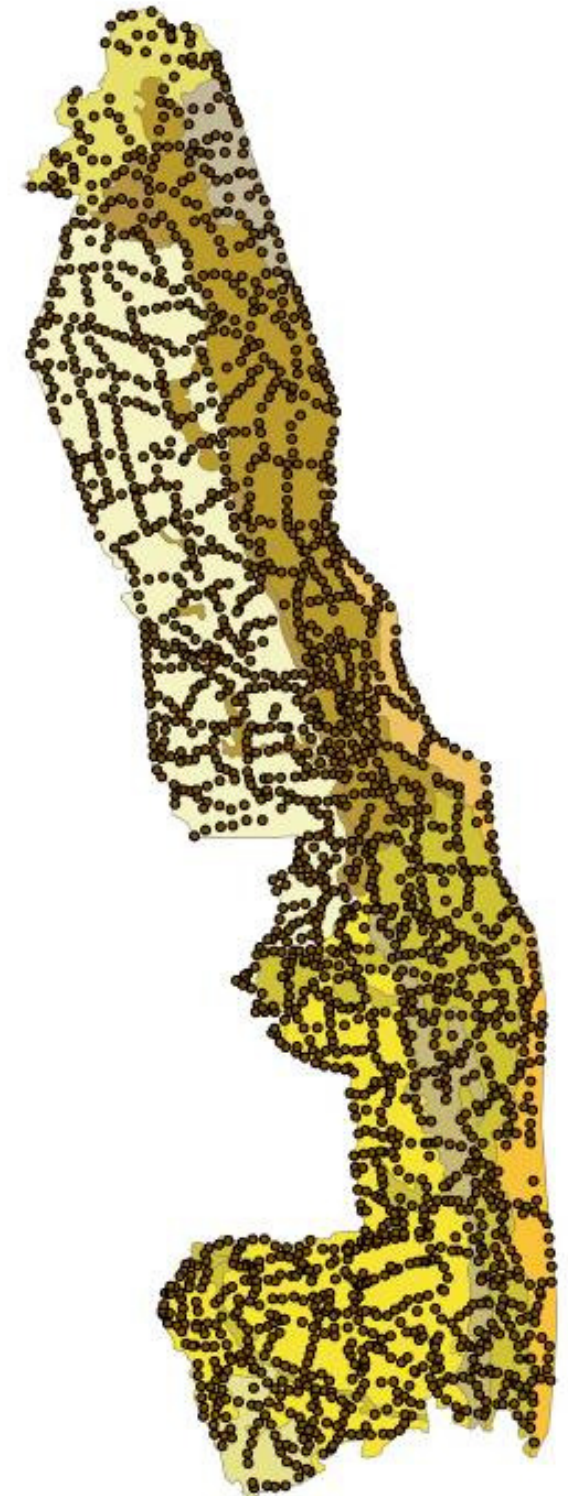
Braun-Blanquet symbol	Crown cover (%)	No of canopy diameters separating canopies
R	-	>30
+	0,1-1	8-30
1	1-5	3-8
2a	5-12	2-3
2b	12-25	1-2
3	25-50	Touching
4	50-75	
5	75-100	Overlapping

(Venter, 1990 pg 60)

Woody Population 1996



04.59 18 27 36
Kilometers



1996 Woody VCA

- Exploratory effort
- Ph, Le, Sa and Sk Land systems
- Based on existing grass VCA sites
 - 1m radius circle (0-1m height class)
 - 3m radius circle (1-3m height class)
 - 6m radius circle (> 3m height class)

Woody Population 1996



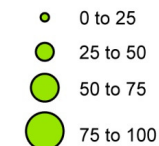
04.59 18 27 36
Kilometers

2002 Woody VCA

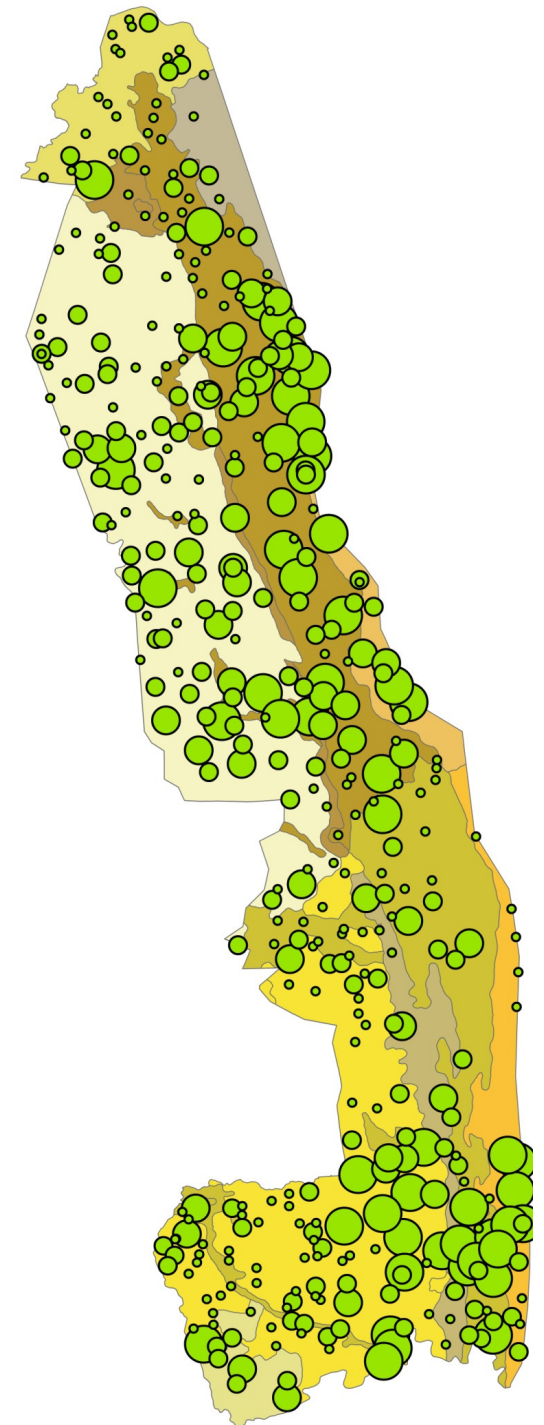
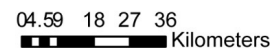
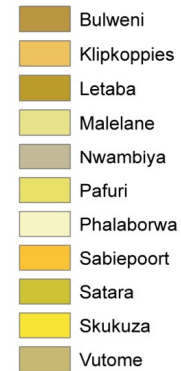
- Expanded and refined techniques from 1996
- Based on existing grass VCA sites
 - 1m radius circle (0-1m height class)
 - 2m radius circle (1-3m height class)
 - 5m radius circle (> 3m height class)

2002 WVCA Percent Woody Cover

1 m to 3 m Height Class

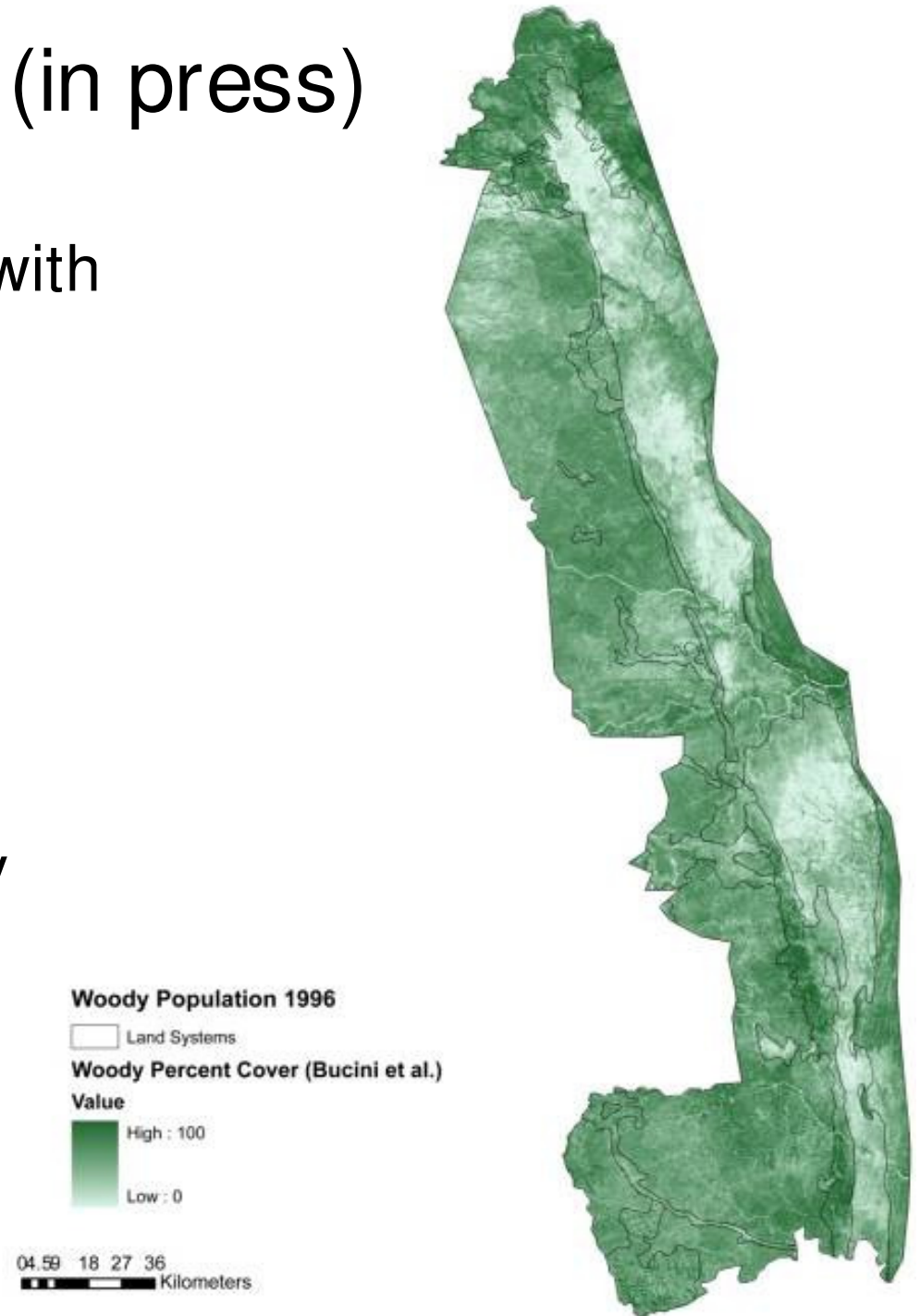


Land Systems



Bucini et al (in press)

- RS-derived covers combined with field measurements
 - Landsat (2000-2001),
 - JERS imagery (1996)
 - Field data collection (2006)
- 90m grid resolution
- Woody Cover % (for all woody species > 1.3m)



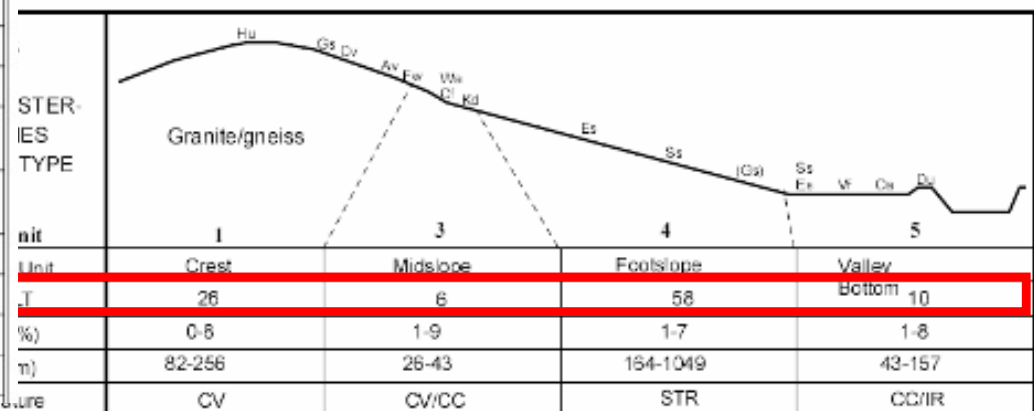
Estimation of Woody Cover on the Venter 1990 dataset

- B-B cover classes were converted to mean, low and high cover percentages
- Sites were sorted for Terrain Unit, Land Type classifications
- All B-B covers within a height class were added together for each site giving an estimate for each Terrain Unit/Land Type
- Weighted means for Terrain Unit **5%, 8.5%, 12%** were used

TYPE	Site No.	SPEC	ShrubLevel	BrushLevel	TreeLevel	CV	LT code	Terrain Unit
			0.75m-2.5m	2.5				
								0.1%, 0.55%, 1%

Name	Symbol	Area		Altitude (m)	Stream frequency (n/km ²)	Local relief (m)	Slope classes (% of area)			
		ha	% of LS				0-2%	2-6%	6-15%	>15%
Pretoriuskop	Sk1	47 267	12,1	450-780	1,6	37	5	60	31	4
Napi	Sk2	39 473	10,1	350-490	1,8	24	7	65	28	0
Randspruit	Sk3	23 697	6,1	300-390	1,8	27	12	73	14	1
Lwakahle	Sk4	51 290	13,1	240-400	2,0	23	12	70	14	4
Makhuthwanini	Sk5	15 840	4,1	300-490	1,4	34	1	79	17	3
Renosterkoppietjes	Sk6	37 173	9,5	250-350	2,3	25	7	86	6	1
Skukuzza	Sk7	57 422	14,7	250-400	1,6	19	12	80	7	1
Nhlanguleni	Sk8	63 508	16,3	300-450	1,4	19	13	83	4	0
Muzandzeni	Sk9	35 067	9,0	300-400	2,9	17	11	85	4	0
Rabelais	Sk10	8 112	2,1	380-400	2,7	9	90	10	0	0

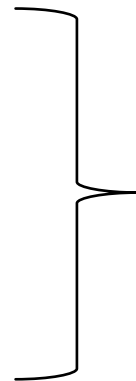
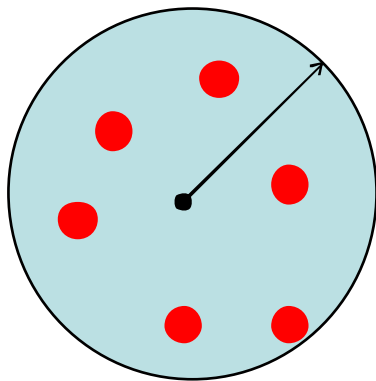
-	b07	gra	1
-	b06	dol	1
-	b07	gra	1



Estimation of Woody Cover from the 1996 & 2002 wVCA

- Within a height class all individual canopy areas were calculated from the recorded canopy diameter (assuming a circle)
- All individuals within a height class were summed for total area and population and averaged for all eight sampling sites within a single VCA site
- Results were joined to VCA data locations and sampled for Land System and Land Types

1m, 2m, 5m circles (x8)

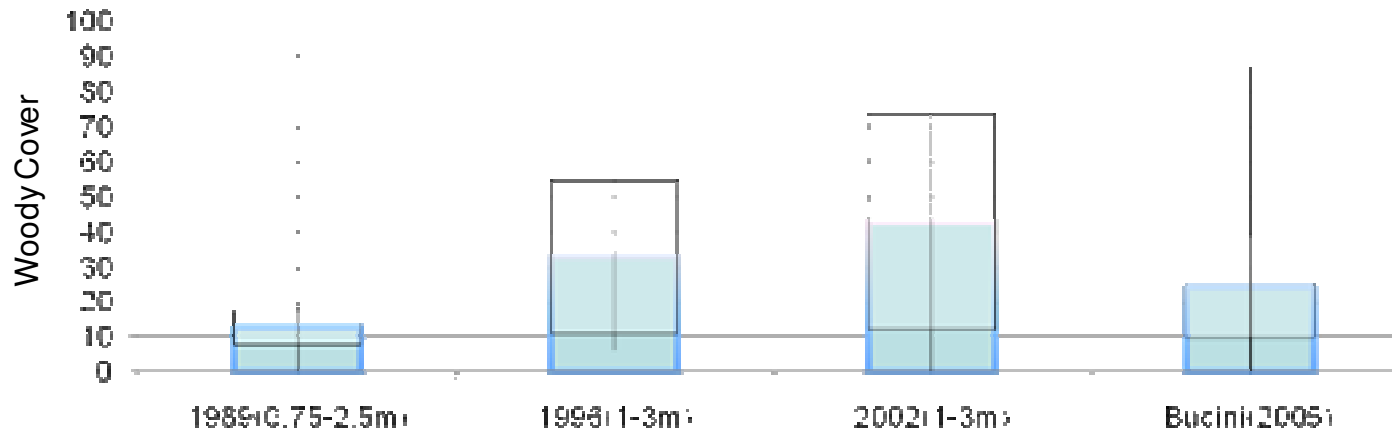
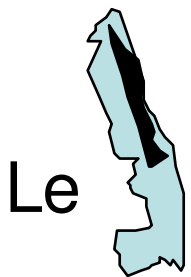
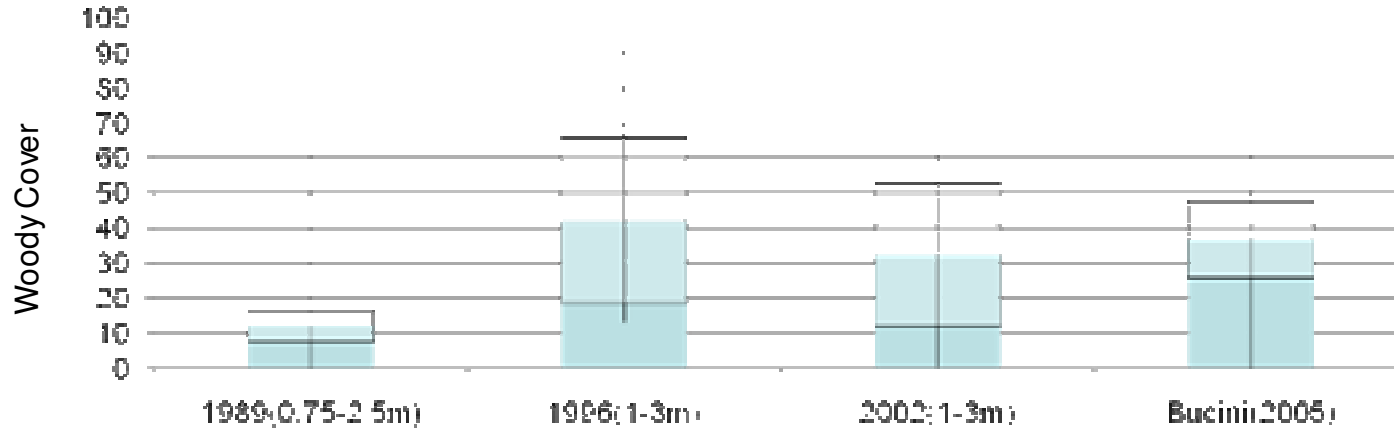
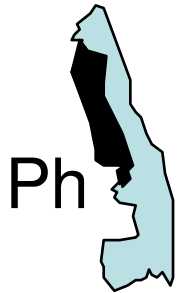


VCA Site #
 Σ area
 Σ individuals



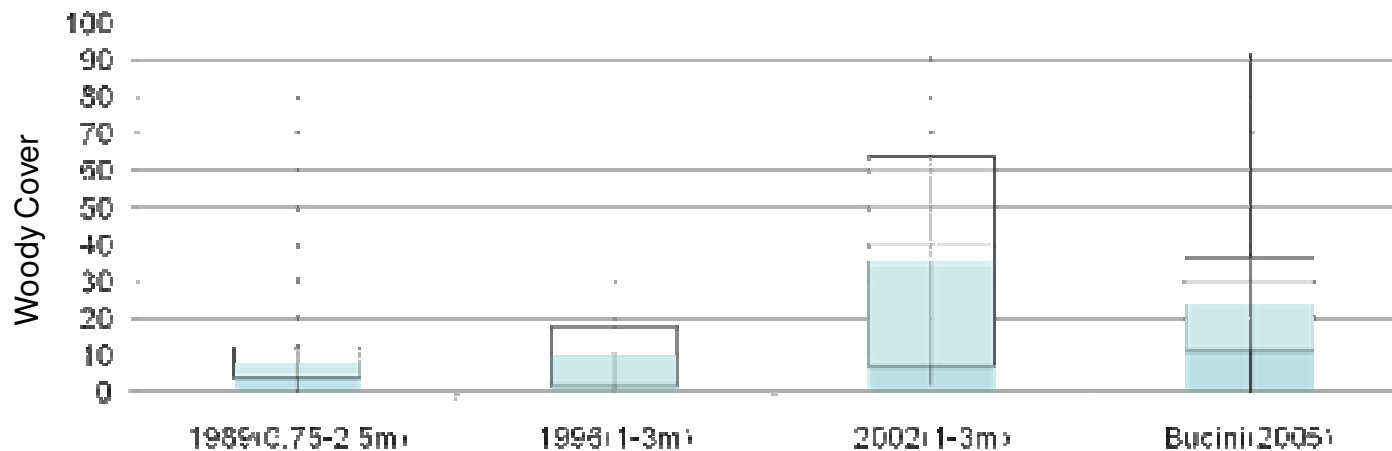
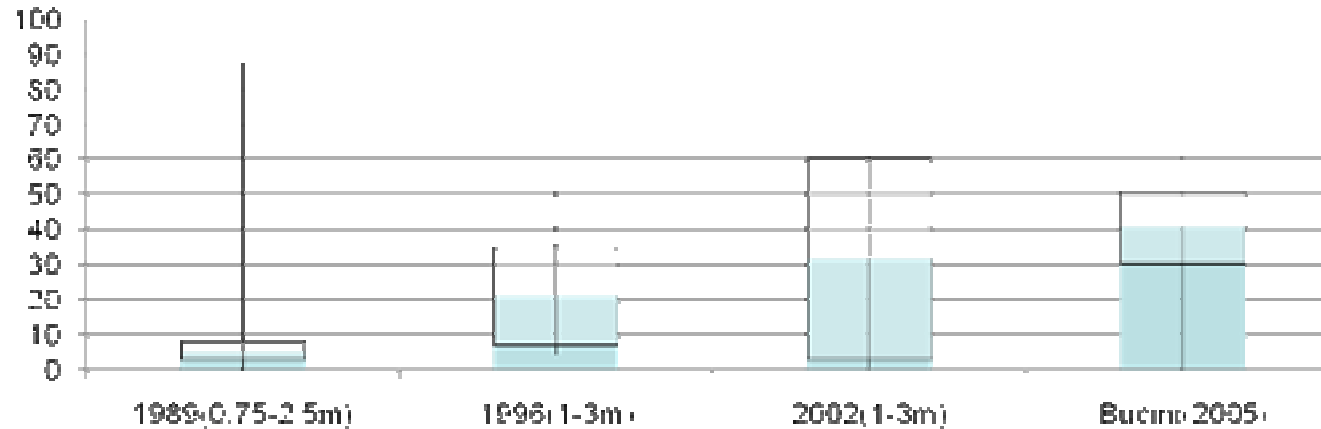
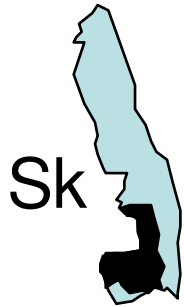
Granite/Basalt Woody Cover (%) Comparisons

Venter 1989, wVCA1996, wVCA2002 and Bucini2005 @ "Shrub Level"

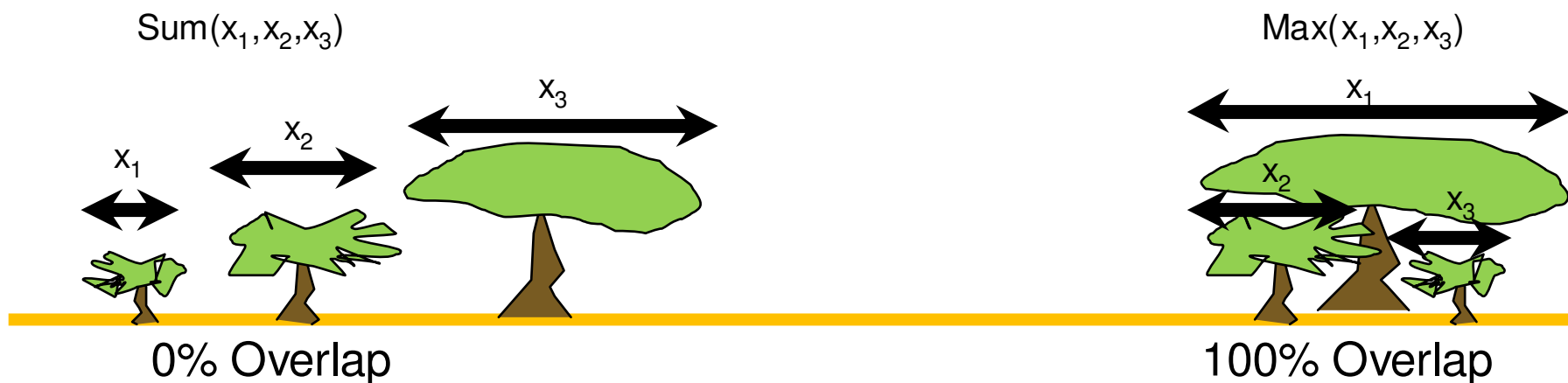


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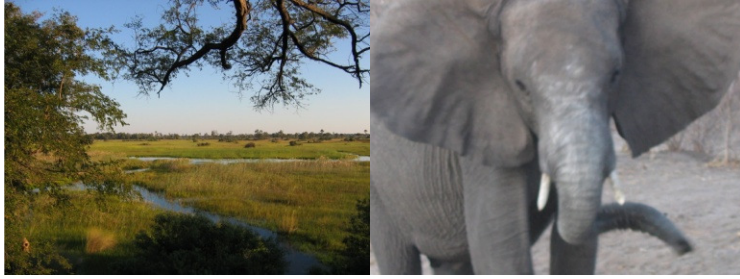


Woody Cover (%) Comparisons with Varying Overlap of Height Classes



Land System	BUC2005	TOTAL 2002 Cover		1996 WC %		Venter 1989			
	%WC	Overlap		Overlap		Mean Estimate		Hi Estimate	
	Mean	0%	100%	0%	100%	0%	100%	0%	100%
Sk	40.6	31.59	58.93	43.11	70.83	18.26	8.53	27.2	12.43
Ph	36.7	32.38	54.9	41.99	90.97	21.84	12.12	30.38	16.54
Sa	24.0	35.31	49.28	21.04	33.19	14.52	7.94	21.74	11.98
Le	24.2	42.69	61.06	32.74	61.94	17.31	12.61	24.22	17.37

- The amount of height group overlap can make a large difference in some Land Systems



Discussion



- Venter 1989 Re-analysis
 - Construction of B-B results give lower % covers for most LS
 - Methodological challenges?
 - Useful for species occurrence and related studies
- Estimations of woody population ($\#/m^2$) also available (1989 via calculations, 1996, 2002)
- Has Woody Cover/Populations changed significantly over the past 20 years?
 - Inconclusive
 - Overall WC % depends on assumptions of overlap of height classes
- We have a successful modeling “test-track” (1989 to present)
 - Final preparation of a *Koedoe* submission(s)
 - Next: Species-based maps and functional groups
 - Species Distribution Models using 1989, 1996, 2002 data
- Onwards and Backwards!
 - Into the Golden Oldies: Gertenbach/Coetzee andDeacon?

Thank you!



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