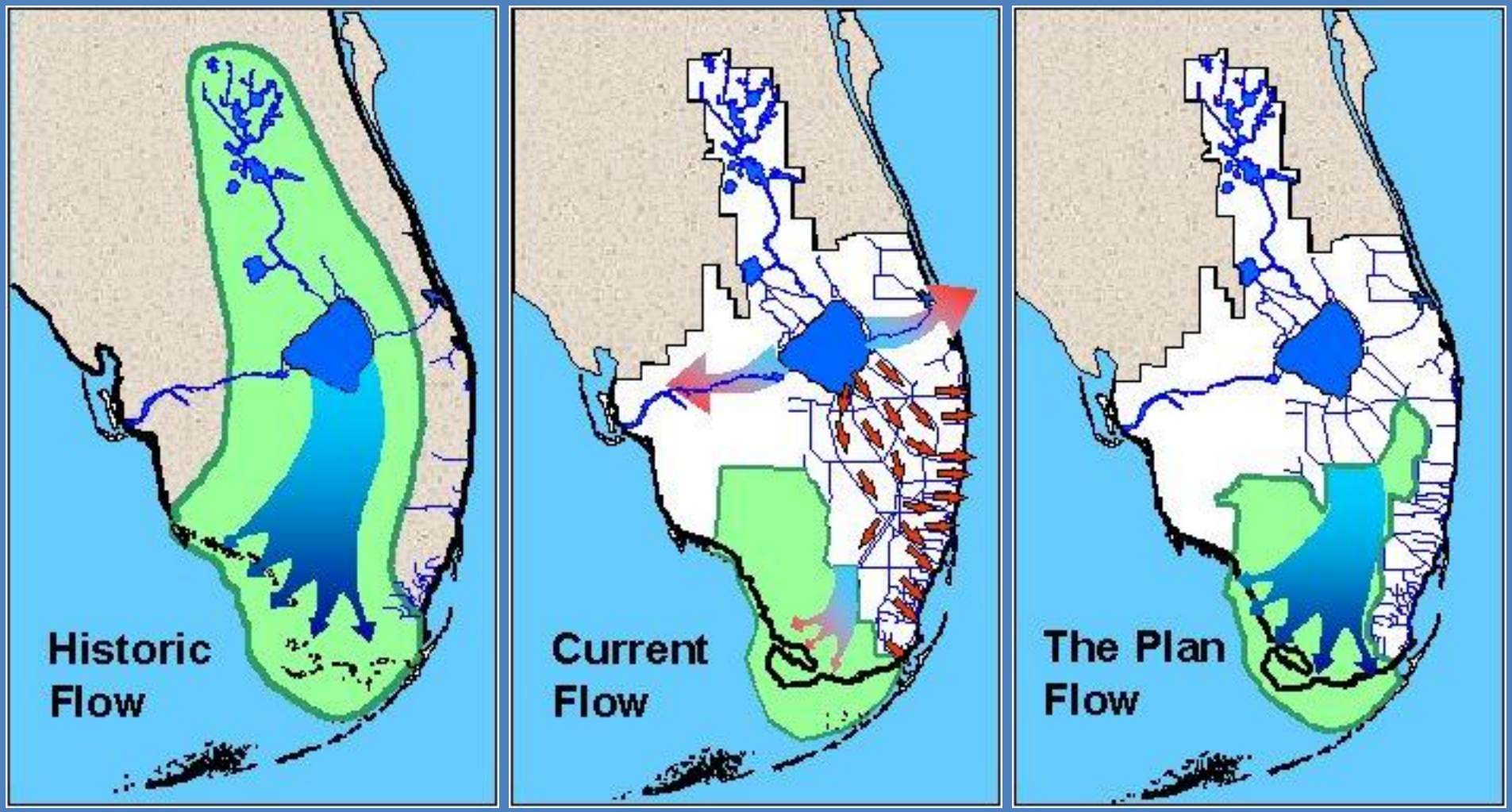
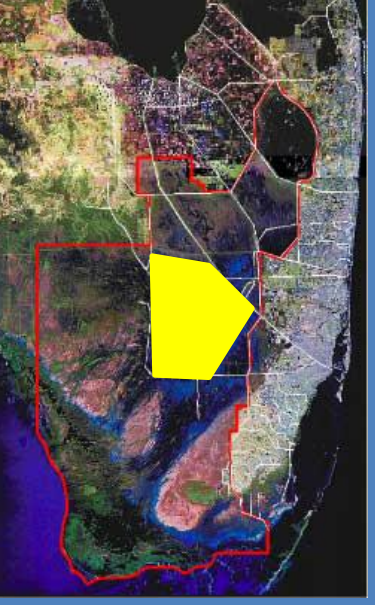
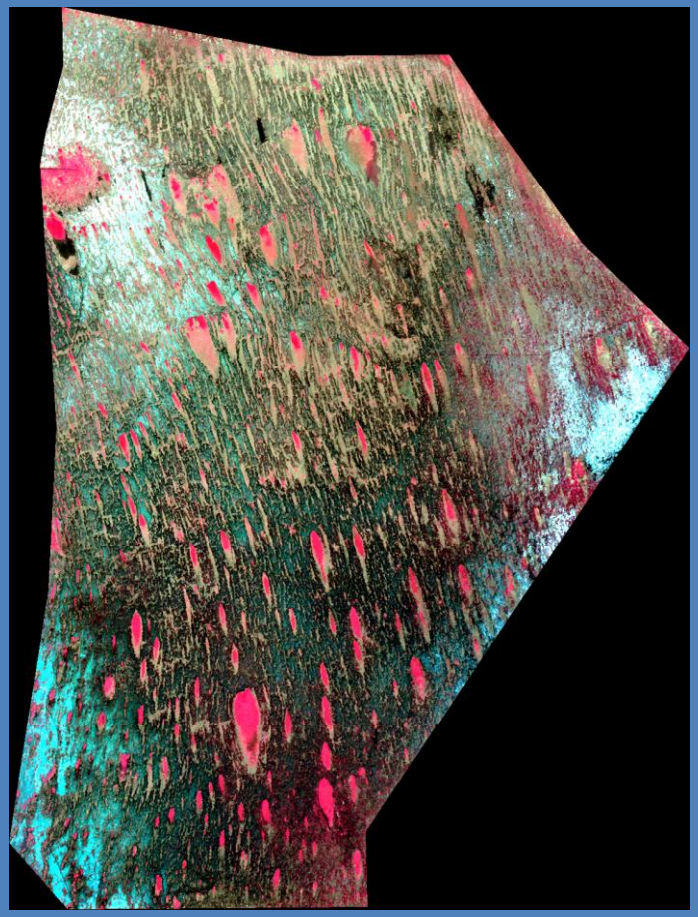
Ridge and slough multistate modeling for landscape management

Christa L. Zweig
Wiley M. Kitchens

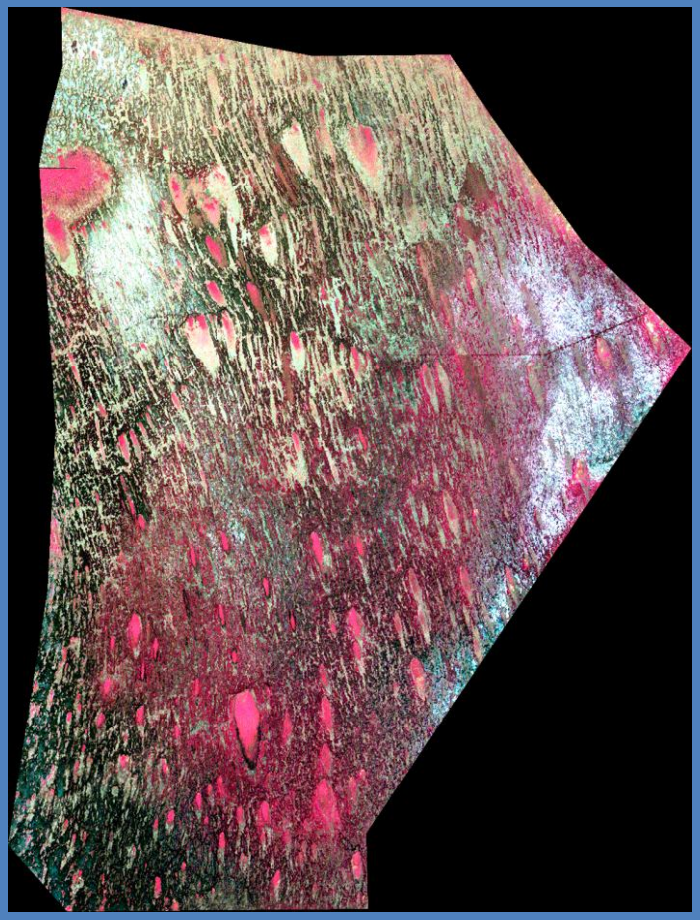

Historic
Flow
Current
Flow
The Plan
Flow



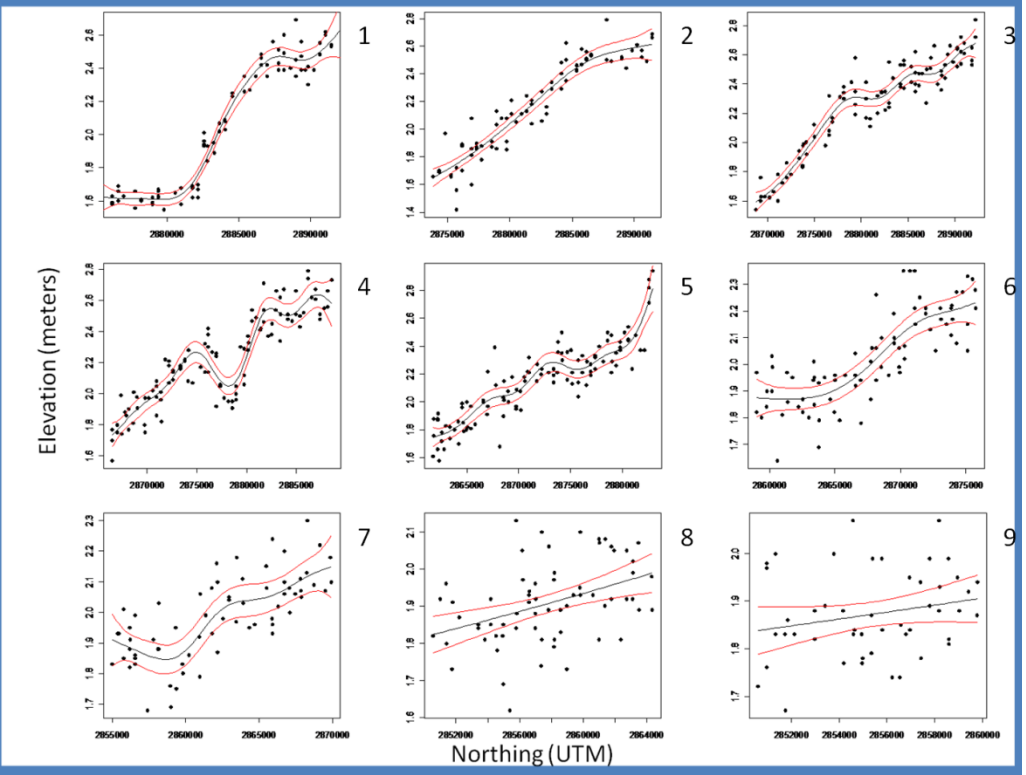
1988

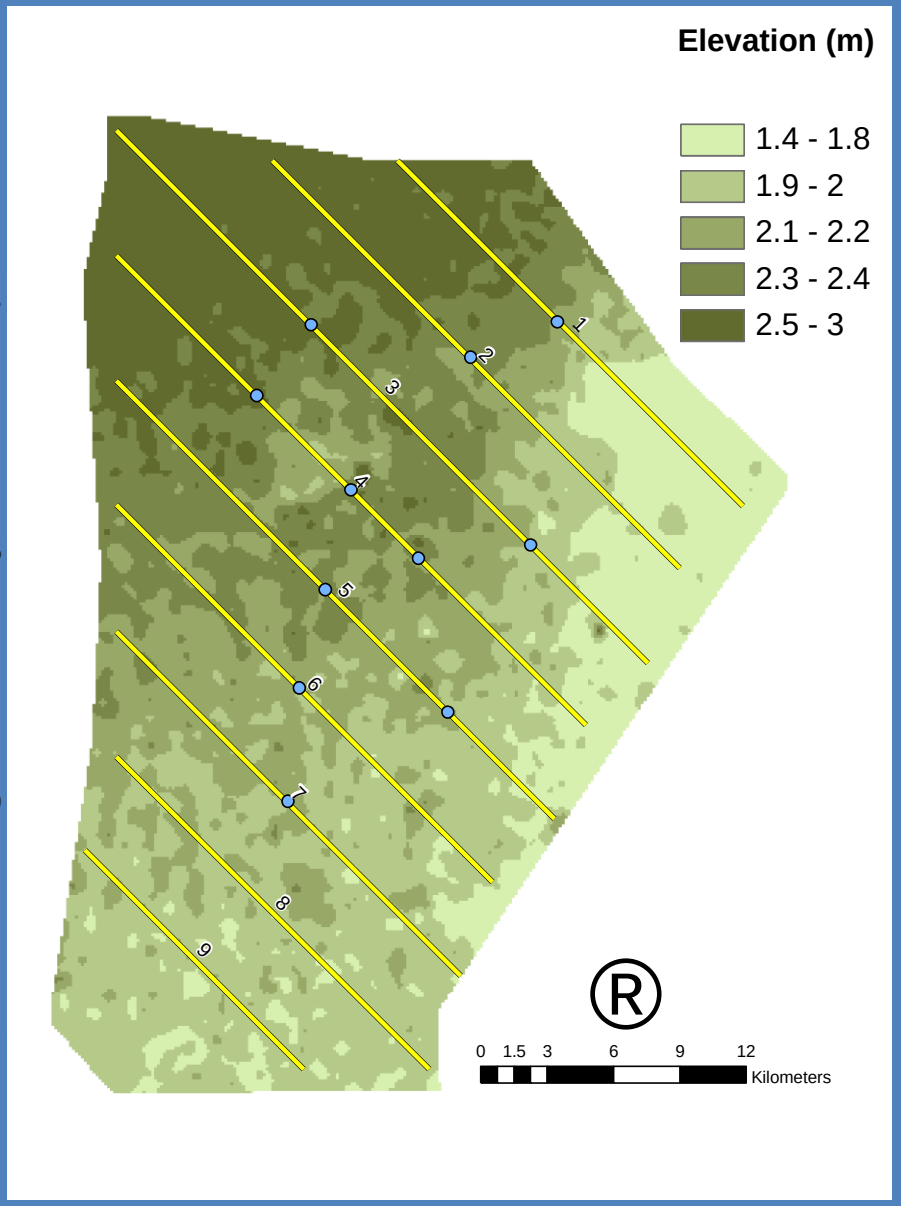


2002

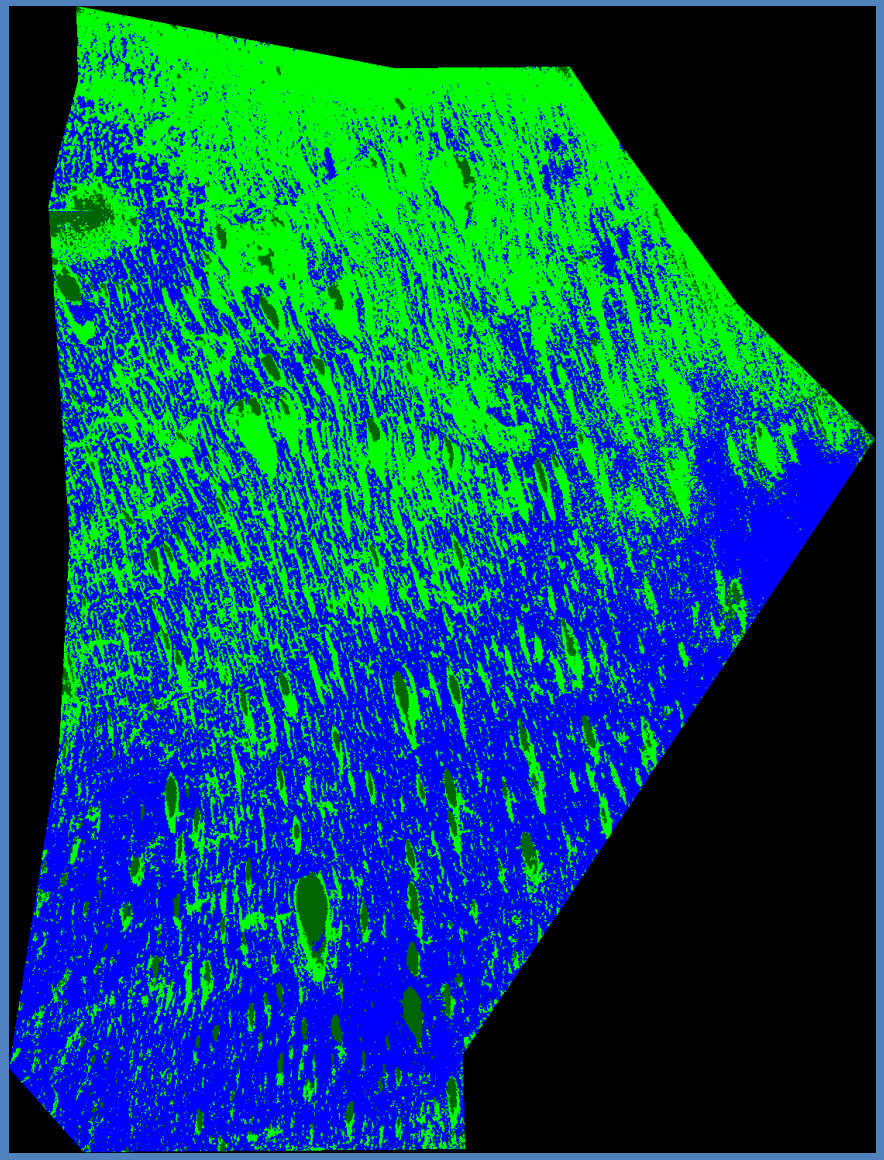


Bands: 4,3,2

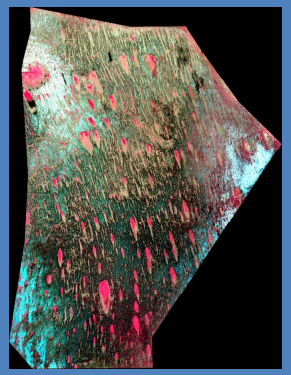

Elevation (meters)
Northing (UTM)
1
2
3
4
5
6
7
8
9

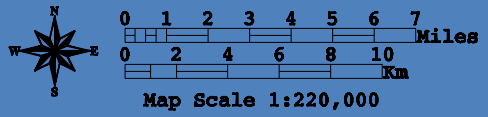

Elevation (m)
1.4 - 1.8
1.9 - 2
2.1 - 2.2
2.3 - 2.4
2.5 - 3
1
2
3
4
5
6
7
8
9
0 1.5 3 6 9 12
Kilometers

1988

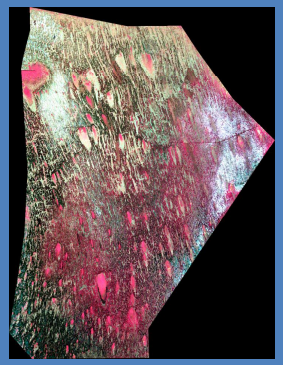


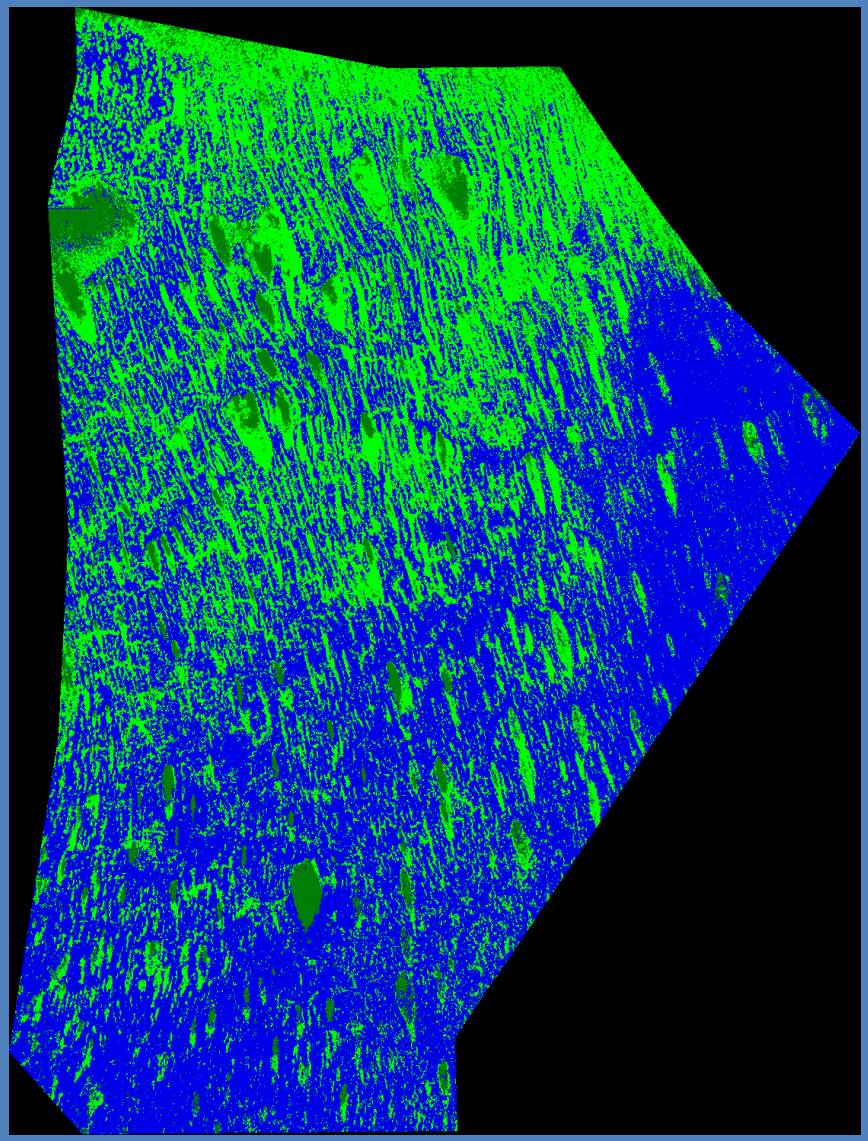
- Slough
- Sawgrass
- Tree Islands



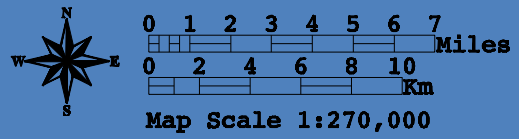


2002

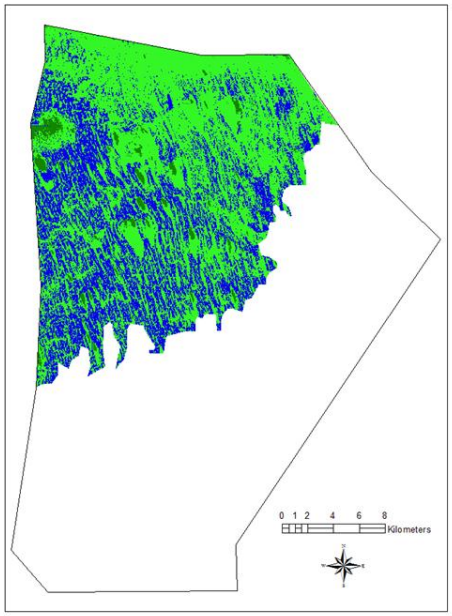




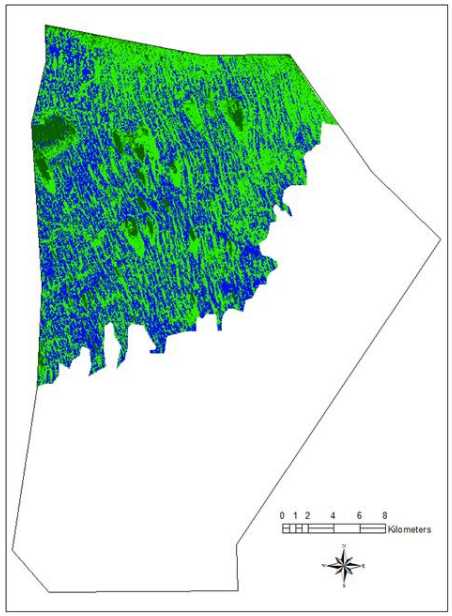
- Slough
- Sawgrass
- Tree Islands



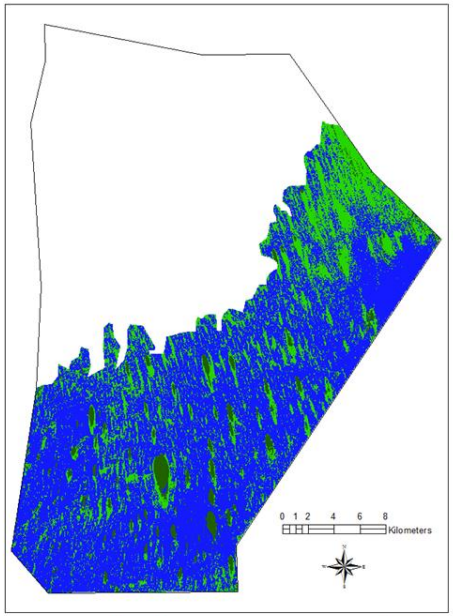
North 1988



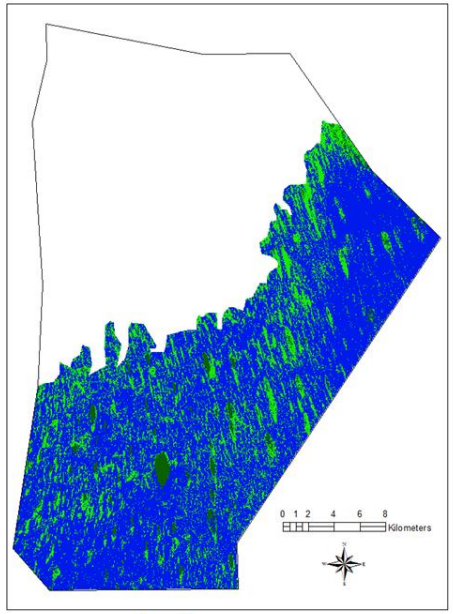
North 2002



South 1988



South 2002



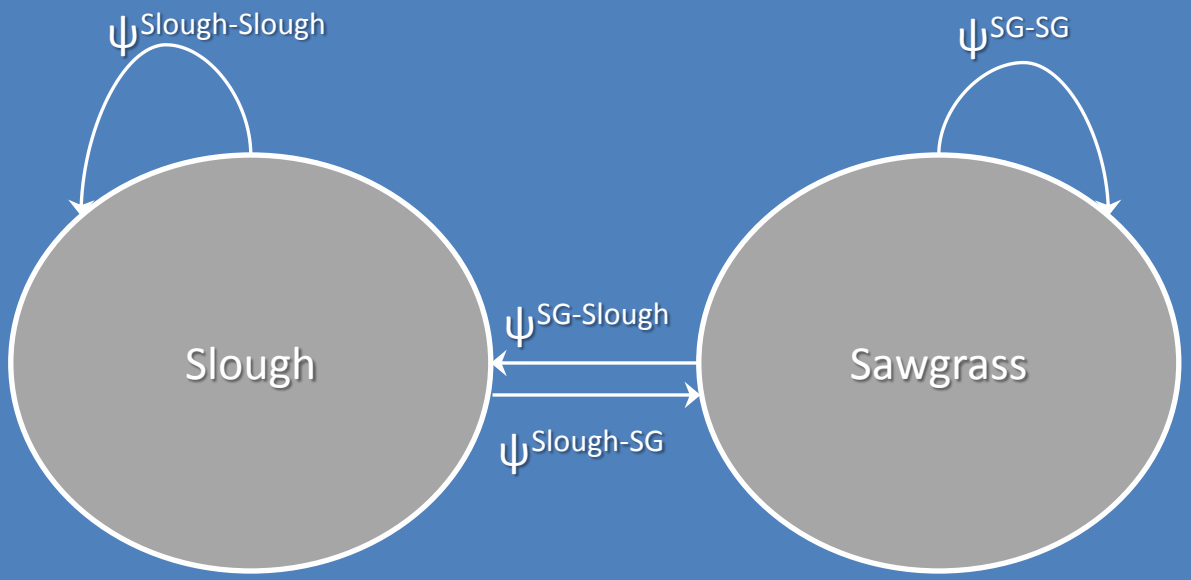
Sawgrass Tree Island Slough

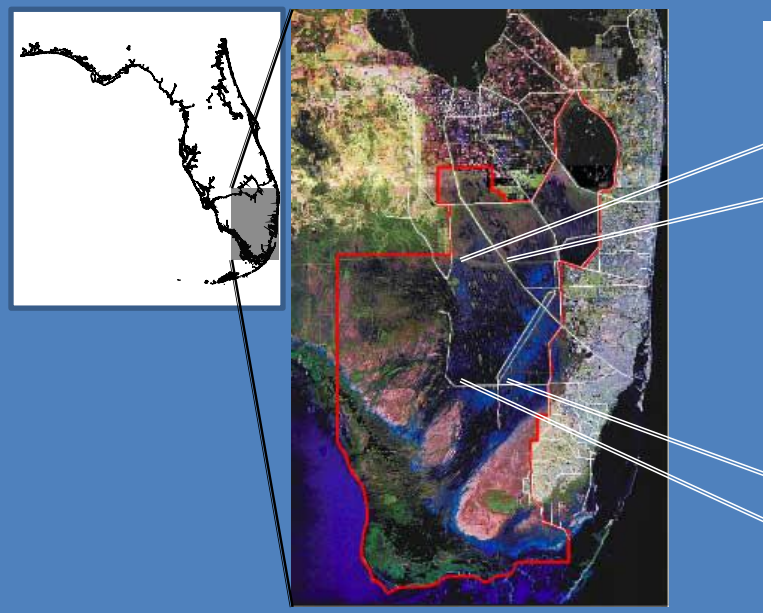
Modeling vegetation communities change

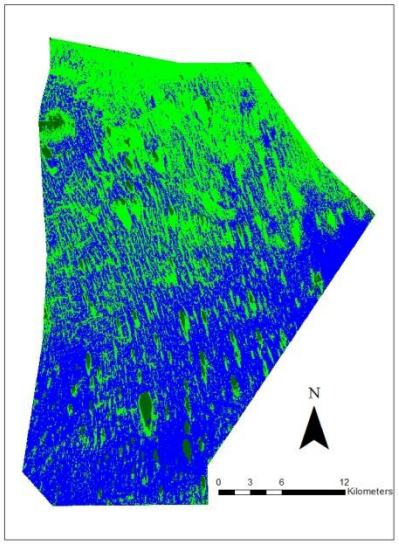
Multistate models

- Survival/movement(ϕ) and detection (p)
- Survival (S) detection (p) and movement (ψ)

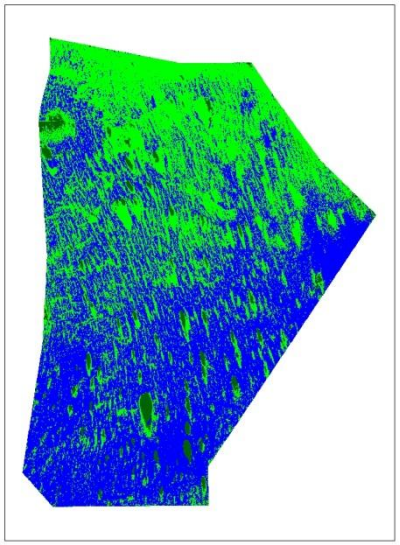
S(1)p(1)ψ(environmental factors)


ψSlough-Slough
ψSG-SG
Slough
Sawgrass
ψSG-Slough
ψSlough-SG

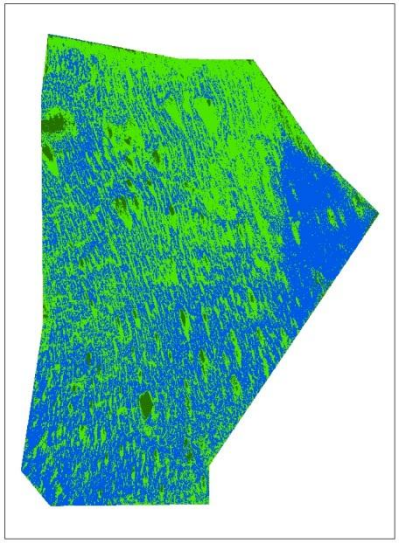




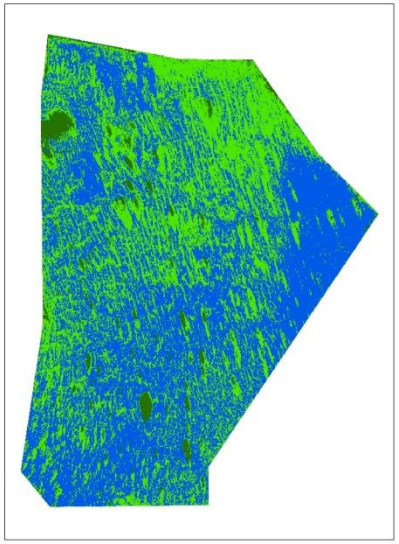
1988



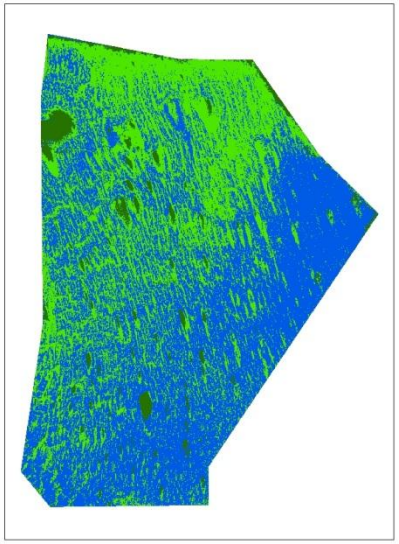
1993



1999



2003



2007

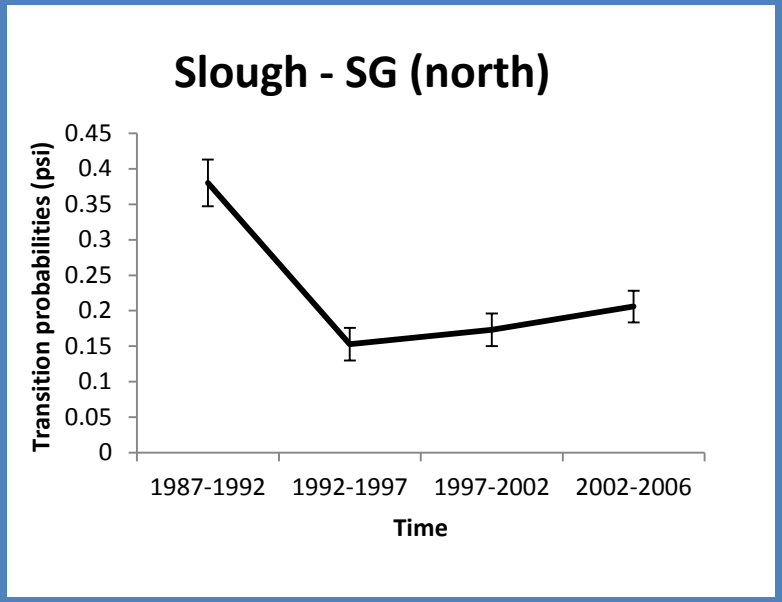
Hypotheses

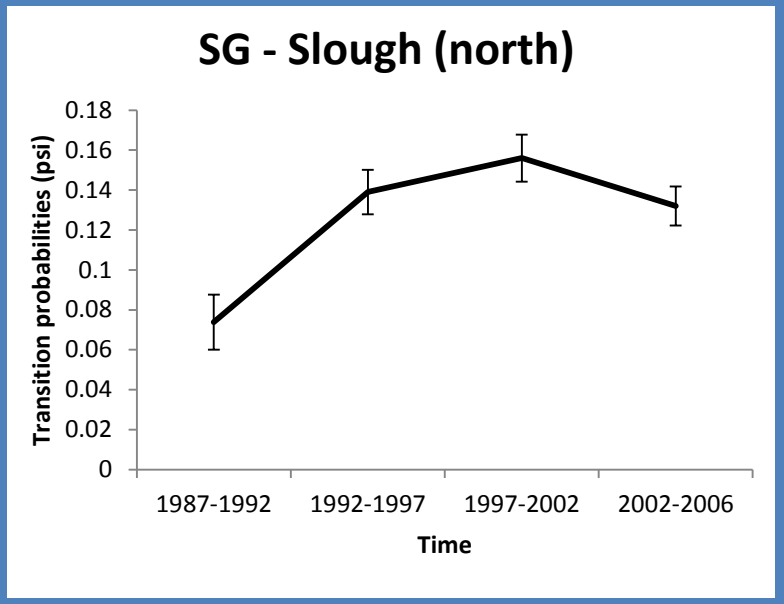
S(1)p(1) Ψ(g), S(1)p(1) Ψ(t), S(1)p(1) Ψ(g*t)

- Ψ(Avg Maximum of previous 5,10,20,30 years)
- Ψ(%iles of previous 5,10,20,30 years)
- Ψ(Maximum of previous 5 years)
- Ψ(Moderately dry conditions of previous 5 years)

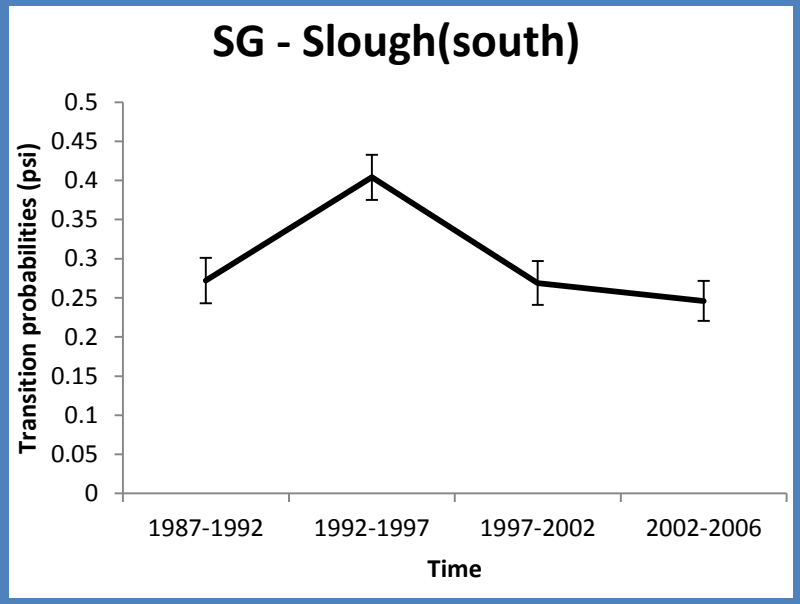
Final Model

S(1)p(1)Ψ(Maximum of previous 5 years * t)


Slough - SG (north)
Transition probabilities (psi)
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1987-1992
1992-1997
1997-2002
2002-2006
Time


SG - Slough (north)
Transition probabilities (psi)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
1987-1992
1992-1997
1997-2002
2002-2006
Time

Slough - SG (south)
Transition probability (psi)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
1987-1992
1992-1997
1997-2002
2002-2006
Time


SG - Slough(south)
Transition probabilities (psi)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1987-1992
1992-1997
1997-2002
2002-2006
Time

Future directions:

- Predictive model/map
- Other predictors such as peat, elevation, etc.

Acknowledgements: Wiley Kitchens, Franklin Percival, US Corps of Engineers, Zach Welch, Brian Reichert, and Kyle Pias.