National Key Deer Refuge

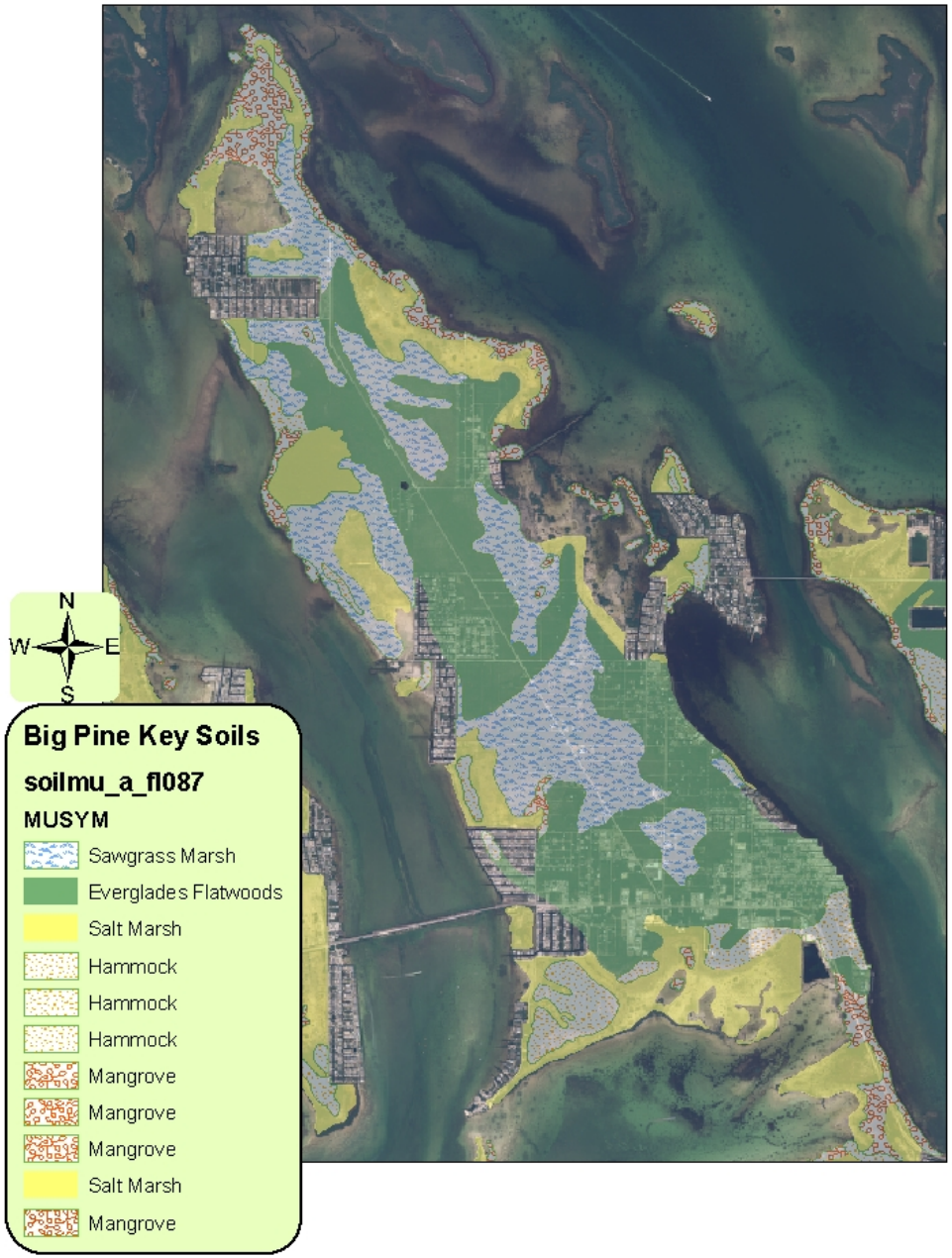
Fire Management Tools and Strategies

Forest Management Plan

- To develop this plan we will look at:
- Forest Soils
- Stand Density
- Fuels that will determine fire behavior

Forest Soils

- **Soils maps were analyzed in Arc GIS for clues as to why the pine mortality followed the patterns that it did.**


N
W
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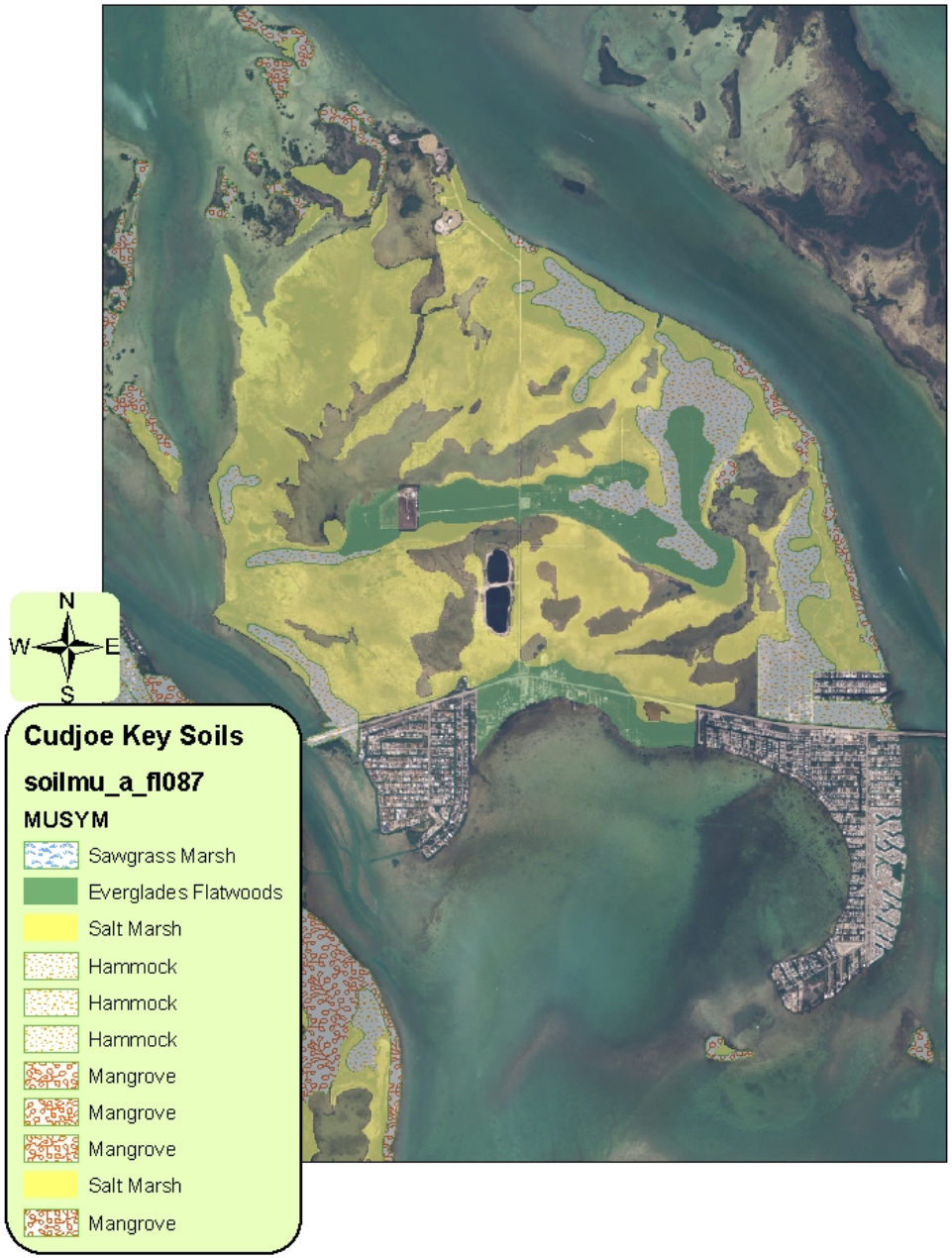
Big Pine Key Soils
soilmu_a_fl087
MUSYM
Sawgrass Marsh
Everglades Flatwoods
Salt Marsh
Hammock
Hammock
Hammock
Mangrove
Mangrove
Mangrove
Salt Marsh
Mangrove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Cudjoe Key Soils
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Salt Marsh
Hammock
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Mangrove
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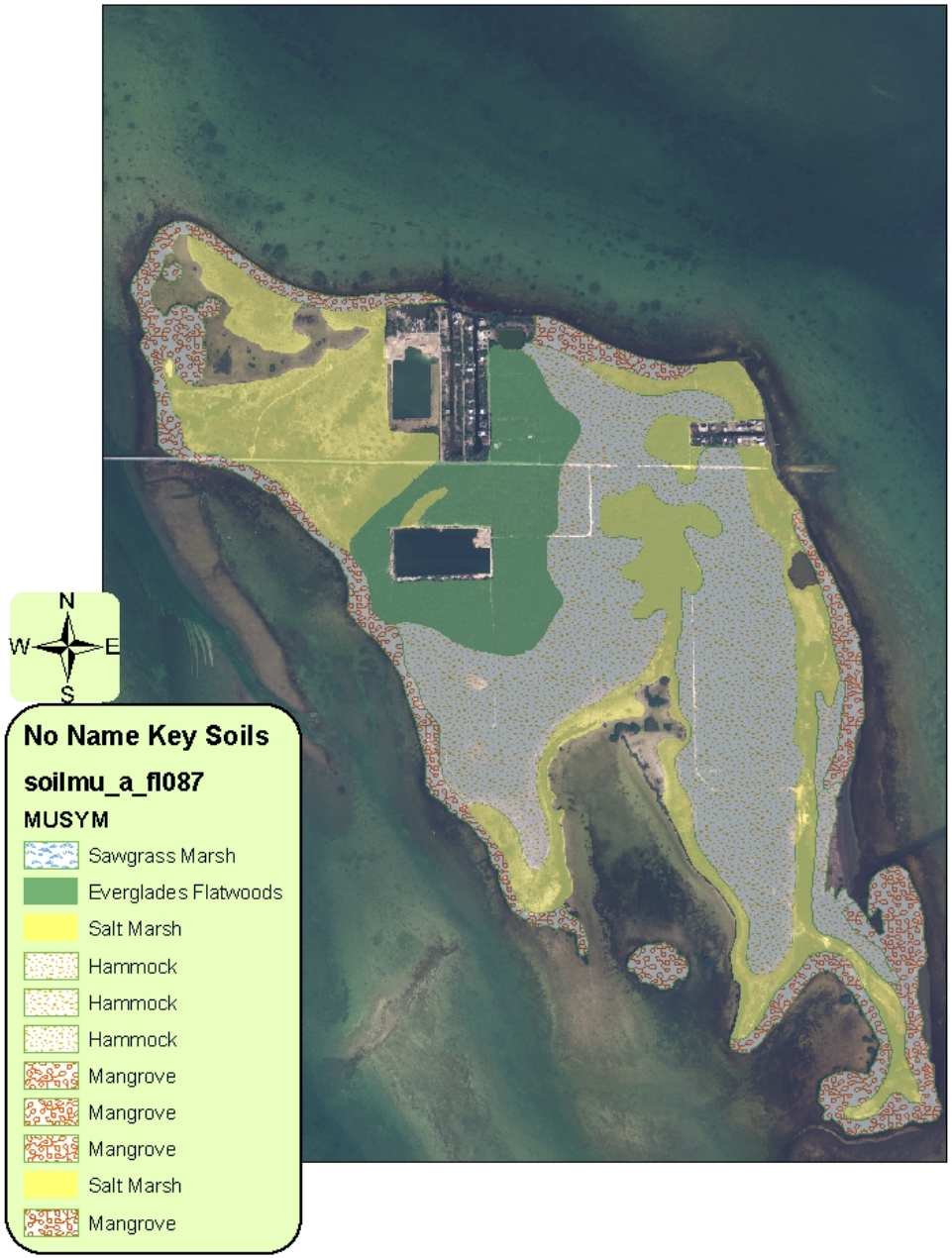
Salt Marsh
Mangrove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No Name Key Soils
soilmu_a_fl087
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Everglades Flatwoods
Salt Marsh
Hammock
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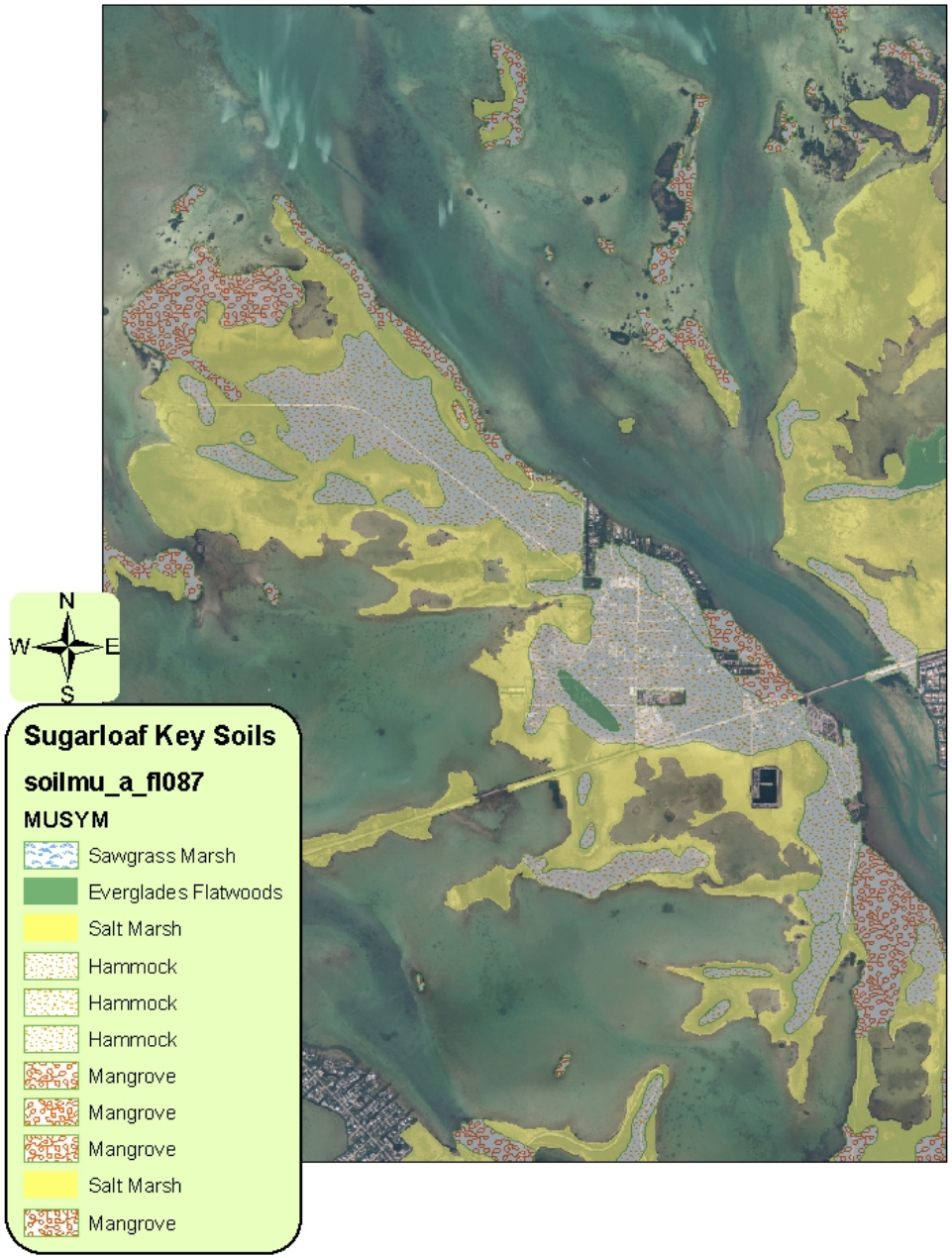
Hammock
Mangrove
Mangrove
Mangrove
Salt Marsh
Mangrove


N
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Sugarloaf Key Soils
soilmu_a_fl087
MUSYM
Sawgrass Marsh
Everglades Flatwoods
Salt Marsh
Hammock
Hammock
Hammock
Mangrove
Mangrove
Mangrove
Salt Marsh
Mangrove

Stand Densities and Pine Regeneration

- The desired Stand Density or “Basal Area” for a pine rockland has been determined to be between 25 and 35 square feet of Basal Area per Acre.
- In pine site stands that were not damaged severely by Hurricane Wilma the average basal are is averaging 32 sq feet per acre.
- Regeneration is greater in stands that have been burned or had wildfire in them.
  - Compartments 17,18,19,20,21 No Fire---Regeneration found on 38% of plots.
  - Compartment 6,7,24,25,12 45% of plots had regeneration (older regeneration).
  - Compartment 8 17 Acre wildfire in 1992 60% of plots had regeneration.
  - Compartment 9 Prescribed fire in 2001 56% of plots had regeneration.

Fuels

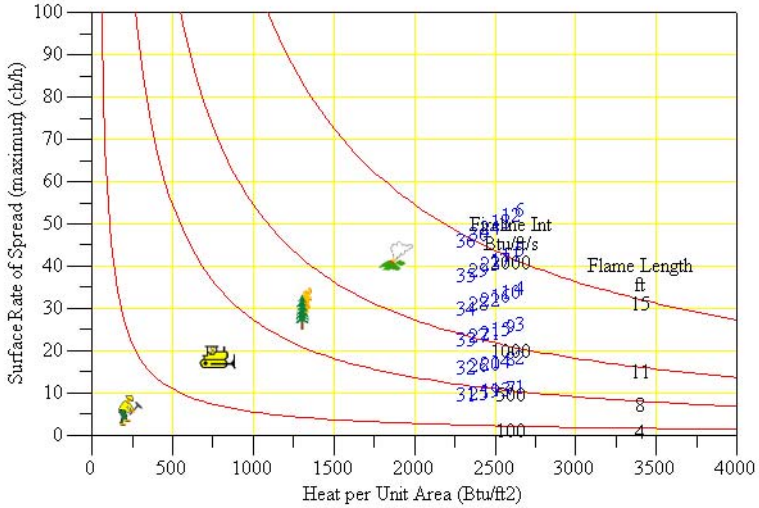
- Fuel Loadings here are off the charts.

- The US Forest Service National Fire Science Lab is going to assist me to construct new fuel models designed for here. These will give us a better ideal of potential flame lengths, fire spread rates, and moistures of extinction.
- This data will help us refine burn plans further—it may make us realize that in some areas with no fire history mechanical treatments are required pre-burn.

What Makes up Fuel Model SH5?

- 1 hour fuels—3.6 tons per acre
- 10 hour fuels—2.1 tons per acre
- 100 hour fuels—0 tons per acre
- Live Herbaceous Fuel Load—0 tons per acre
- Live Woody Fuel Load—2.9 tons per acre
- Moisture of Extinction 15%
- Fuel Bed Depth 6 feet

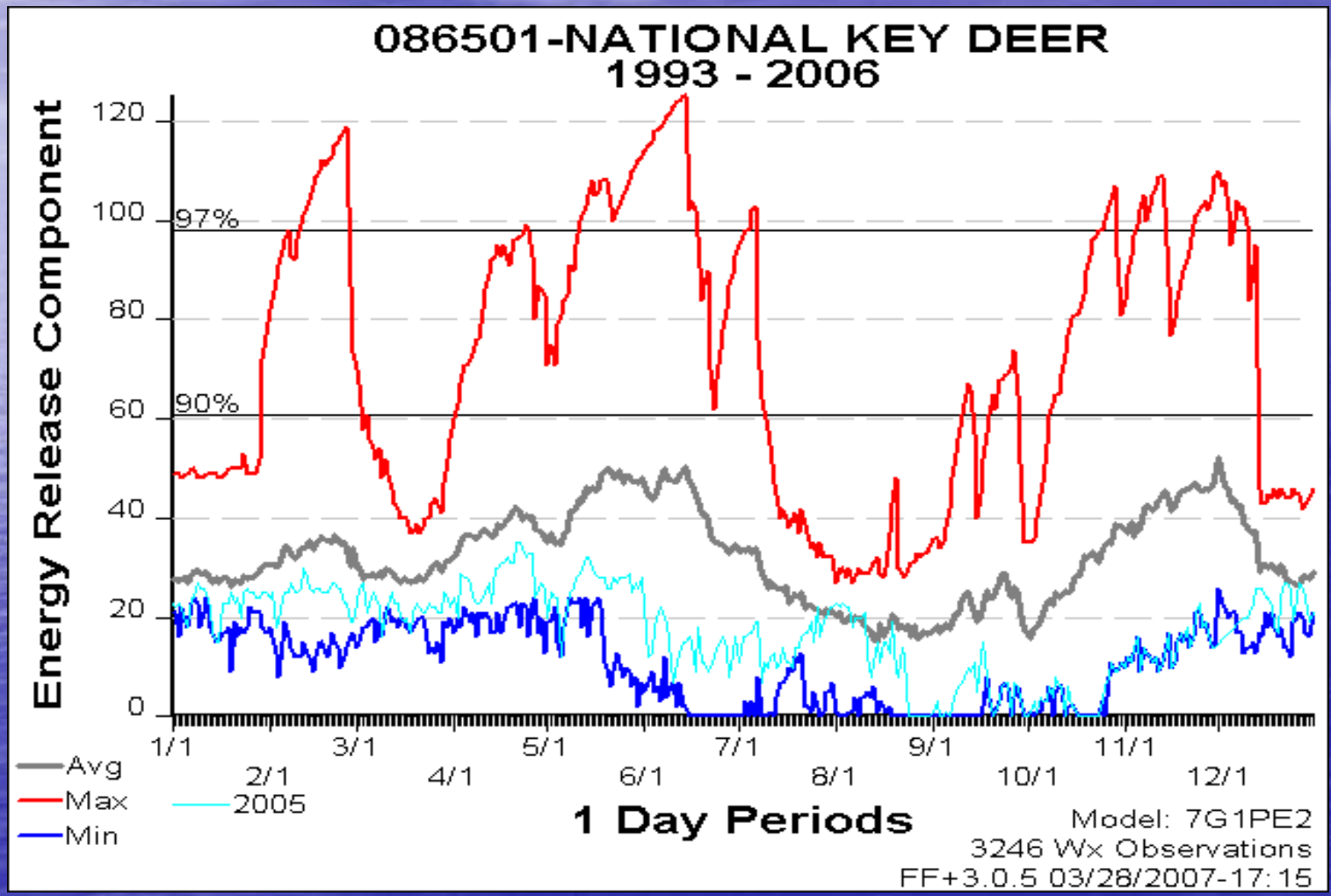
Fire Characteristics Chart

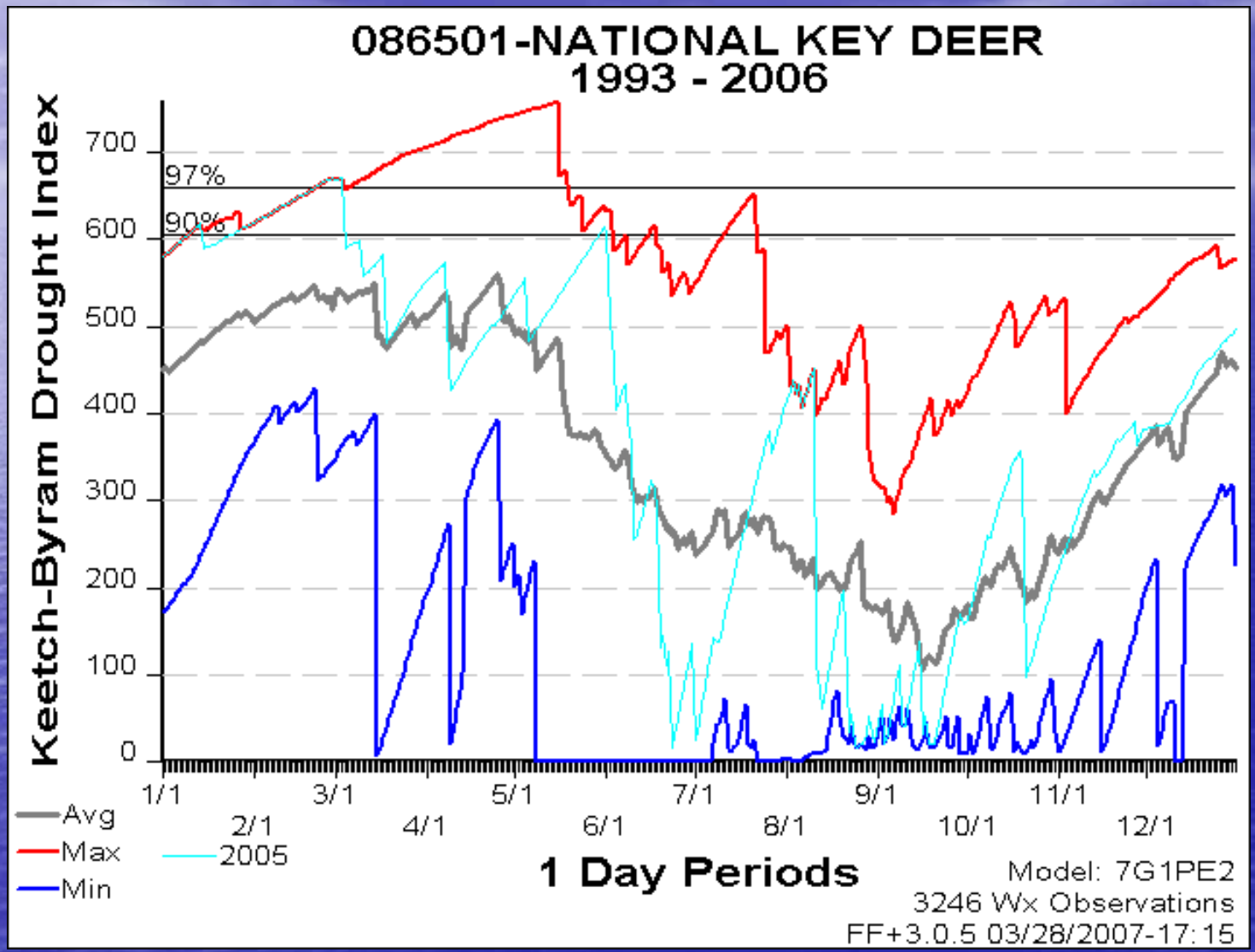


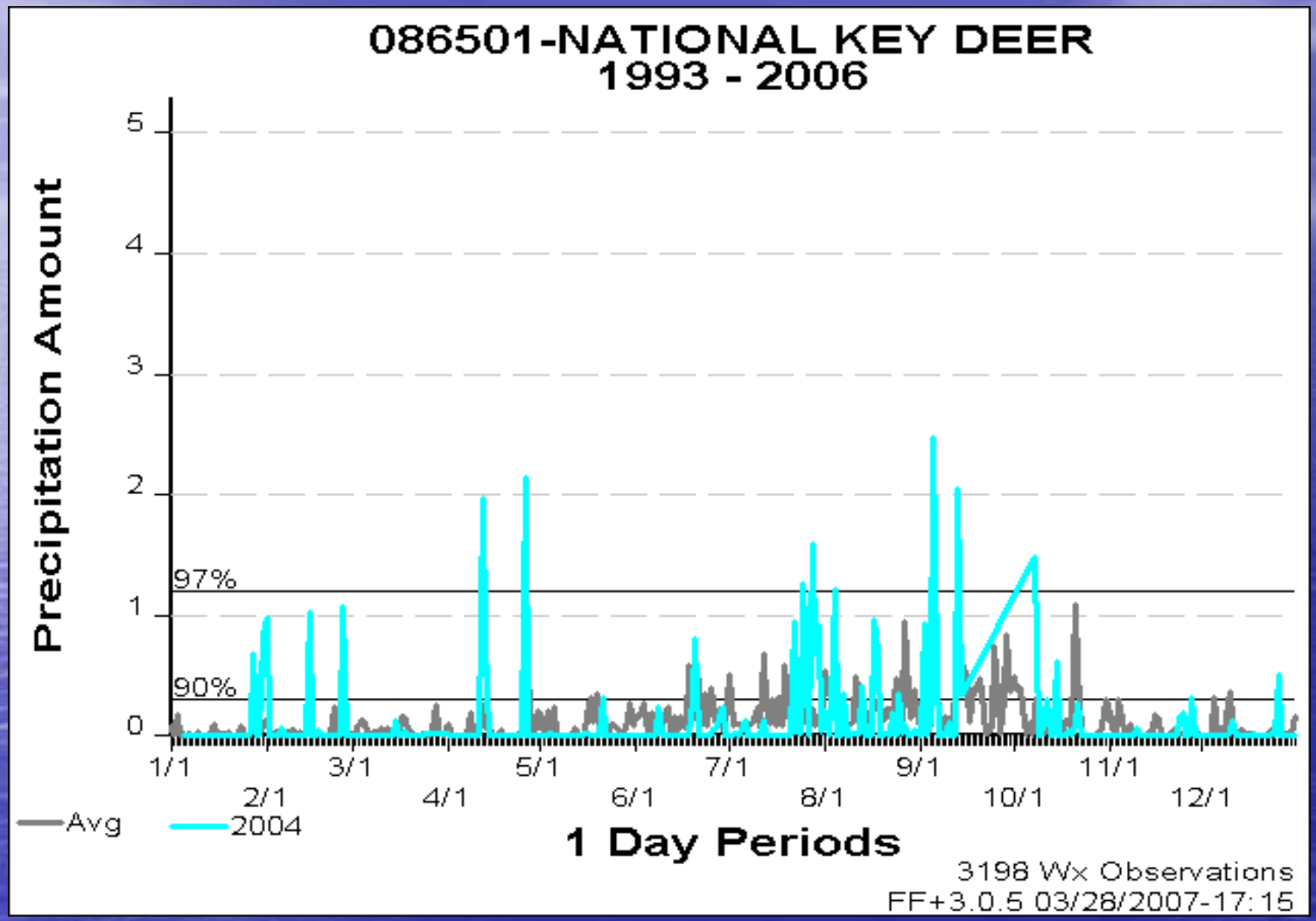
Other Tools

- Behave 3.0:
  - Fire Behavior modeling program.
- Fire Family +:
  - A tool that allows analysis of climatology versus actual fires to determine when fires will burn in a controllable and undamaging manner and when fires will be harder to manage.
- Rerap:
  - Program traditionally utilized to determine fire spread over distance. Term module of the program looks at climatology to create probabilities of rain over a given time frame.
- Remote Automated Weather Station
  - Provides real time fire weather/fire danger indices 24 hours a day via satellite communications.

Fire Family + Exercise




086501-NATIONAL KEY DEER
1993 - 2006
Keetch-Byram Drought Index
700
600
500
400
300
200
100
0
97%
90%
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
Min
2005
1 Day Periods
Model: 7G1PE2
3246 Wx Observations
FF+3.0.5 03/28/2007-17:15


086501-NATIONAL KEY DEER
1993 - 2006
Precipitation Amount
5
4
3
2
1
0
97%
90%
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
2004
1 Day Periods
3198 Wx Observations
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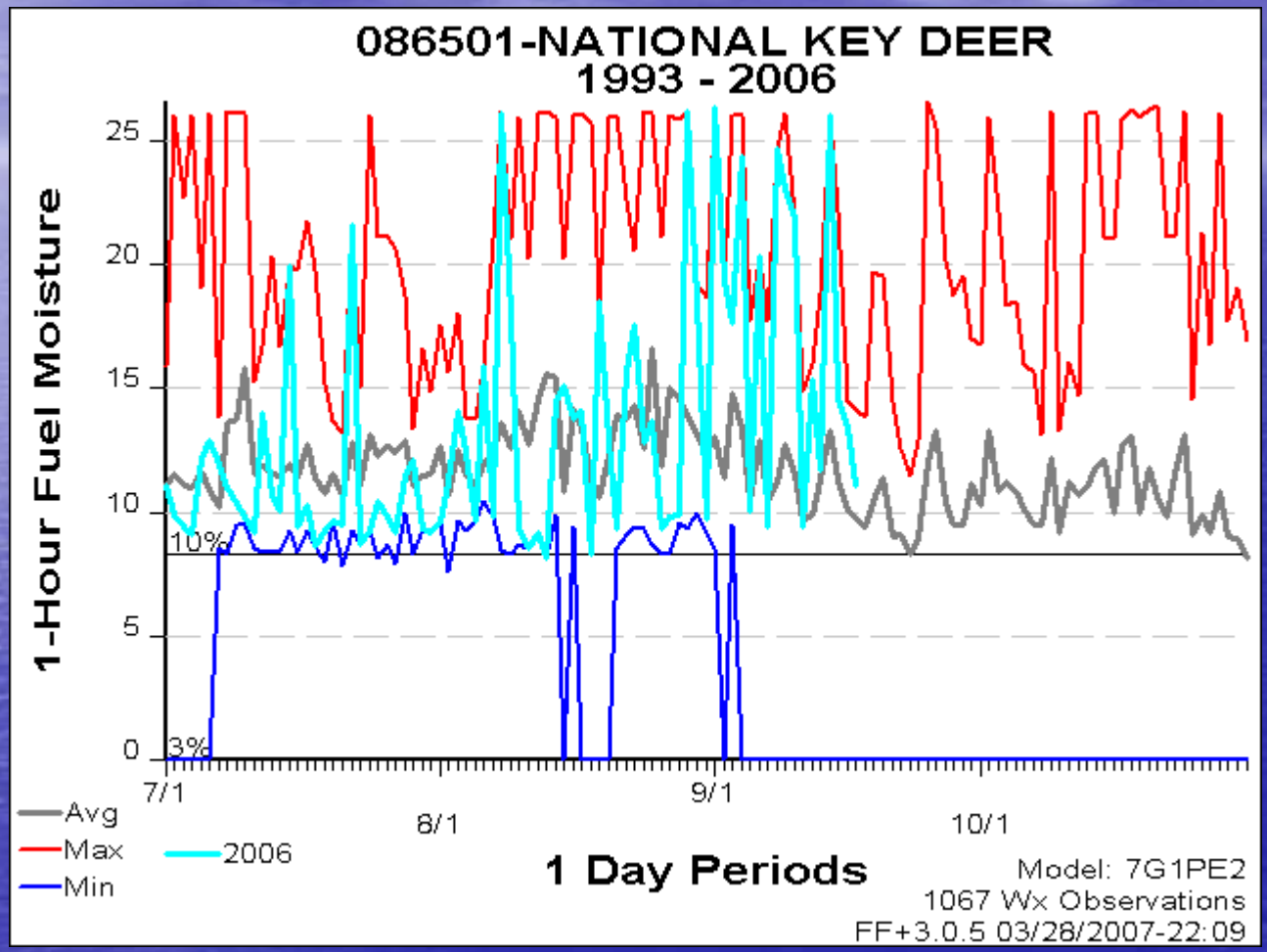
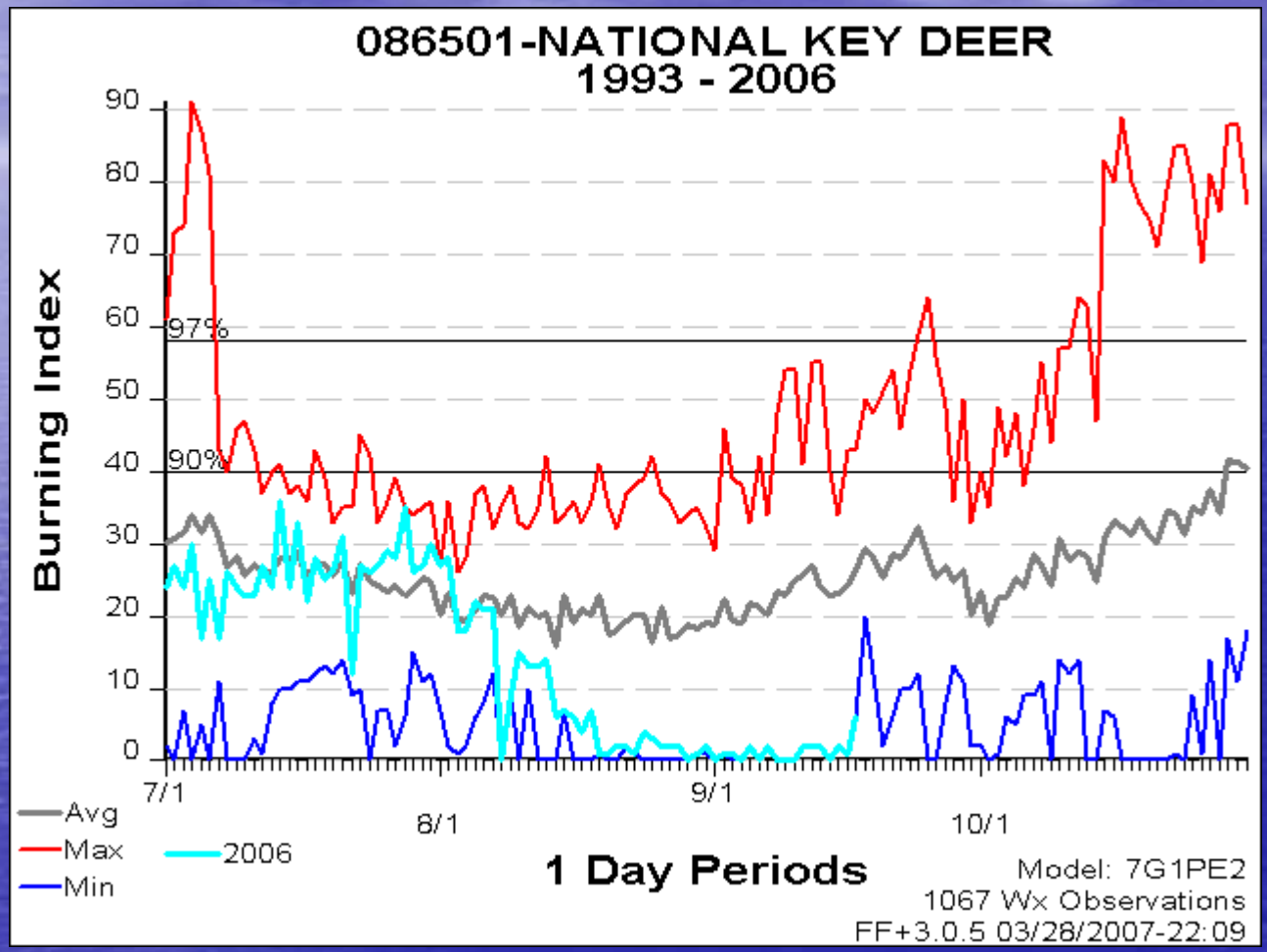
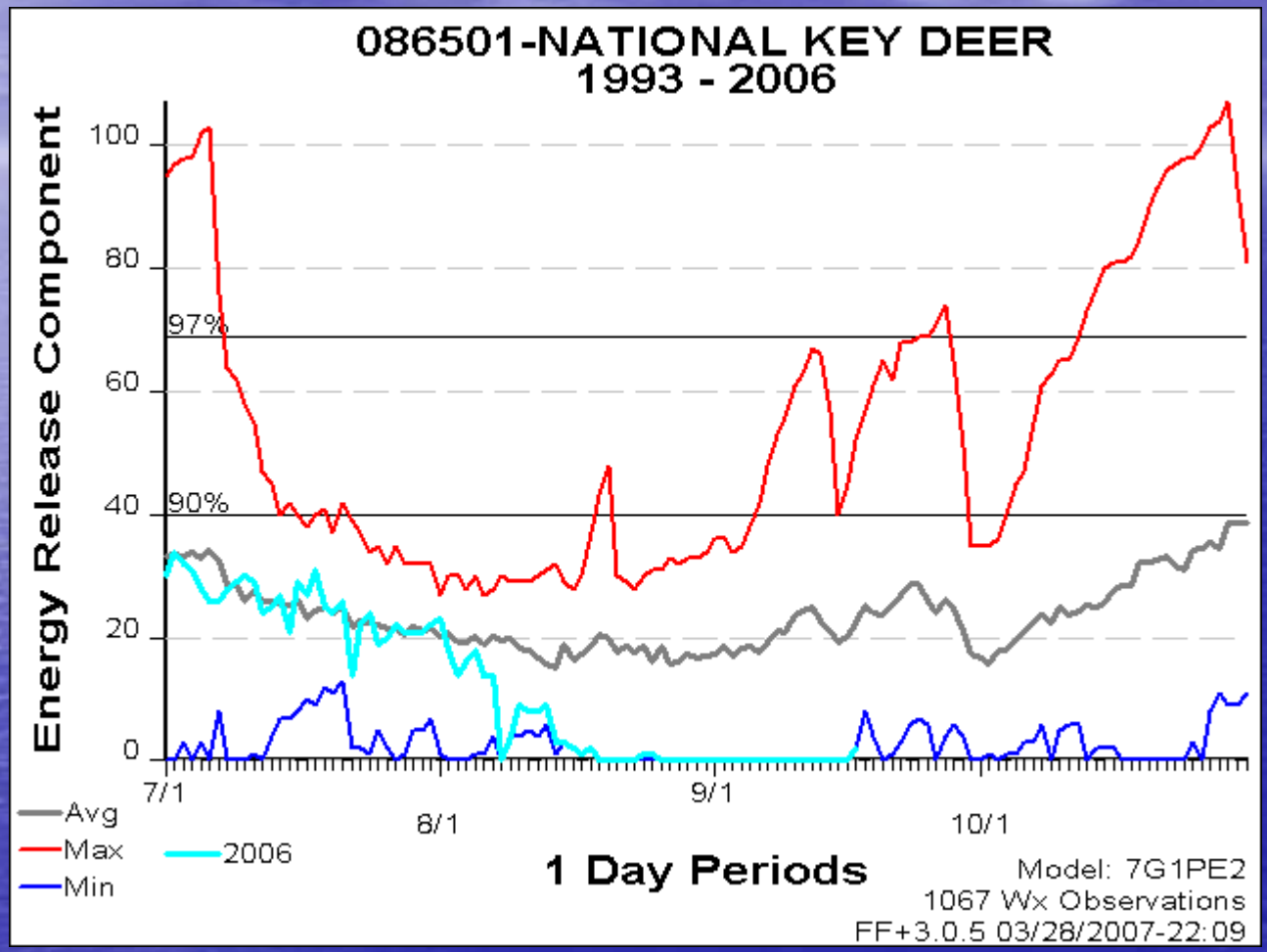
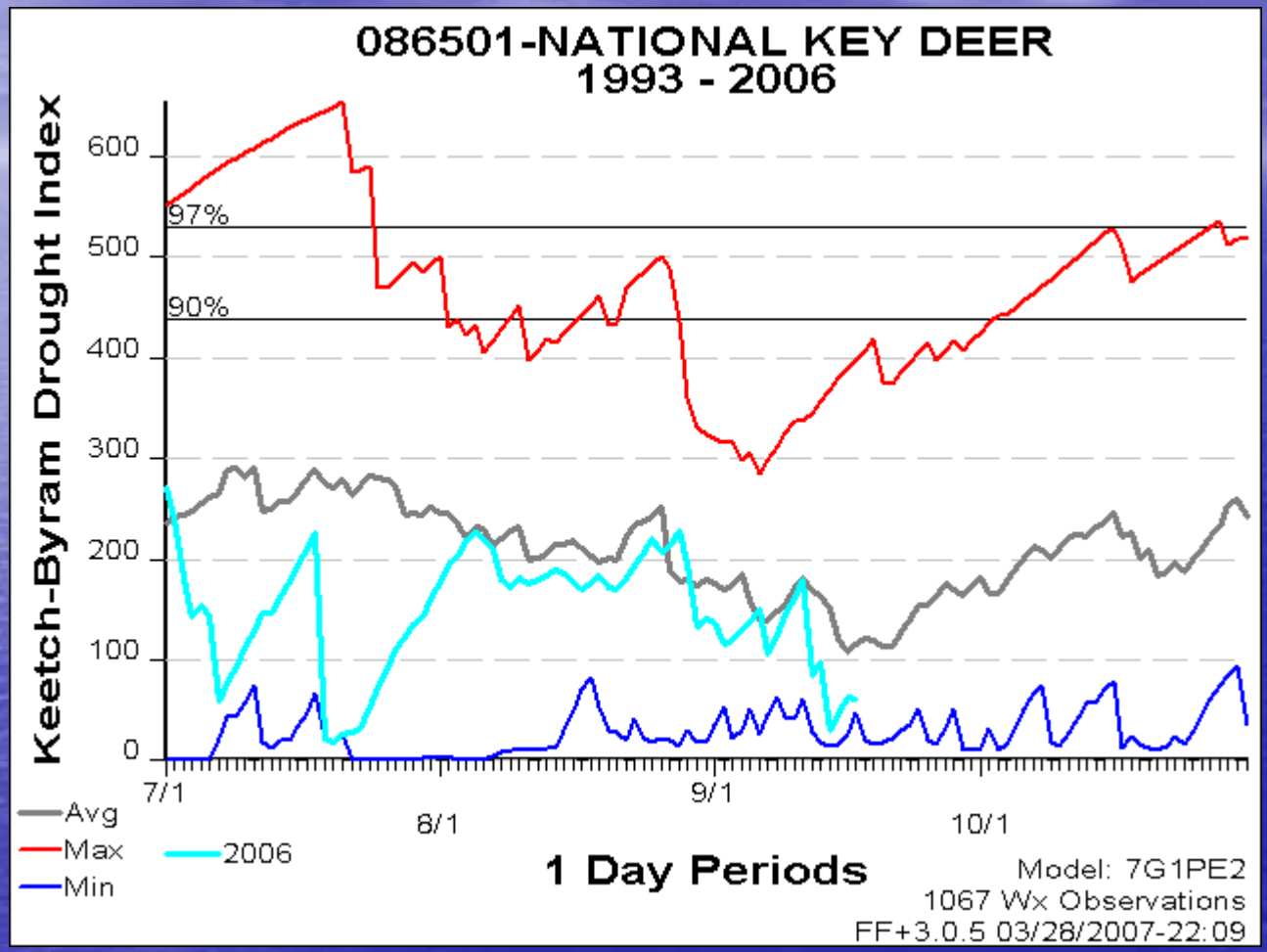

086501-NATIONAL KEY DEER
1993 - 2006
1-Hour Fuel Moisture
25
20
15
10
5
0
10%
3%
7/1
8/1
9/1
10/1
Avg
Max
Min
2006
1 Day Periods
Model: 7G1PE2
1067 Wx Observations
FF+3.0.5 03/28/2007-22:09


086501-NATIONAL KEY DEER
1993 - 2006
Burning Index
90
80
70
60
50
40
30
20
10
0
97%
90%
7/1
8/1
9/1
10/1
Avg
Max
Min
2006
1 Day Periods
Model: 7G1PE2
1067 Wx Observations
FF+3.0.5 03/28/2007-22:09


086501-NATIONAL KEY DEER
1993 - 2006
Energy Release Component
100
80
60
40
20
0
97%
90%
7/1
8/1
9/1
10/1
Avg
Max
Min
2006
1 Day Periods
Model: 7G1PE2
1067 Wx Observations
FF+3.0.5 03/28/2007-22:09


086501-NATIONAL KEY DEER
1993 - 2006
Keetch-Byram Drought Index
600
500
400
300
200
100
0
97%
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7/1
8/1
9/1
10/1
Avg
Max
Min
2006
1 Day Periods
Model: 7G1PE2
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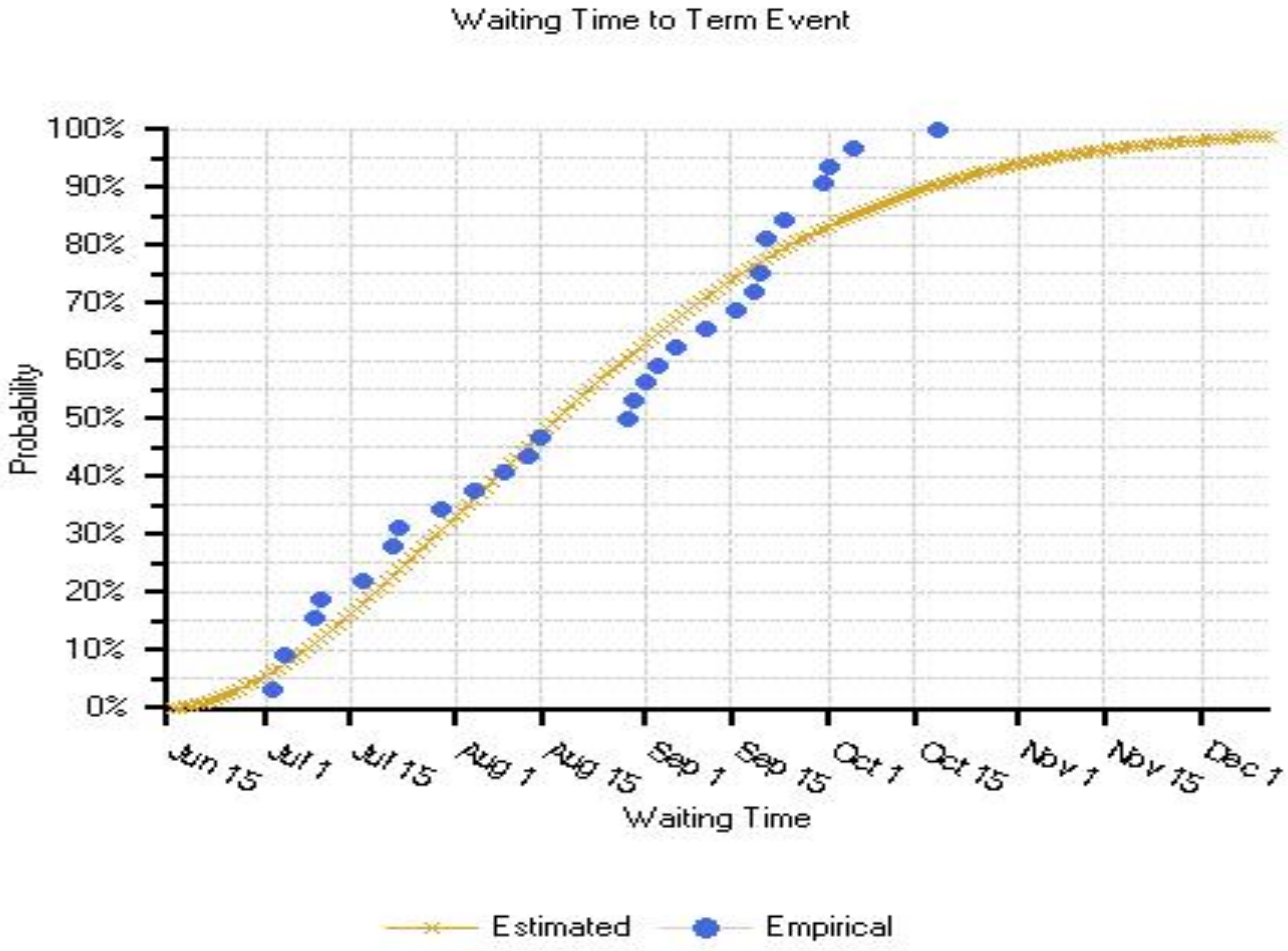
FF+3.0.5 03/28/2007-22:09


Waiting Time to Term Event
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Probability
Jun 15
Jul 1
Jul 15
Aug 1
Aug 15
Sep 1
Sep 15
Oct 1
Oct 15
Nov 1
Nov 15
Dec 1
Waiting Time
Estimated
Empirical

Strategies

- Smaller Burn Units and/or units that can be easily broken into smaller units with mechanical fuel reduction tools.
- Better monitoring of fuel moistures through the use of RAWS and Firefamily Plus.
- More ground ignition in areas that *have previously been burned.*
- Recognition of different vegetative/soils types and shaping management objectives to best address those different types.
- Implementation of a 7-10 year burning cycle, on pine rockland sites. Analysis and input needed on burning cycles on areas to be managed as marshes, or transition areas.
- Fire qualified employees on site to help prep burn units, assist with wildfires and monitor fuels.
- More public outreach/involvement. If people are tolerant of smoke we can broaden burning windows to include limited night time burning. Lower temperatures and higher humidity significantly reduces potential negative fire effects on pine overstory.


0
0.5
1
2 Miles
N
W
E
S