1998 Florida Fire Studies - Results

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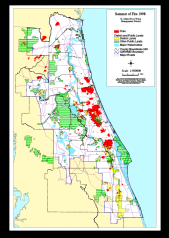
Background

- Unseasonably warm weather and copious rainfall during winter of 1997-1998 resulted in more plant growth than usual and less acreage treated by Rx fire than usual (El Nino)
- Quick switch to La Nina in March 1998
- Keetch Byram Drought Index > 650 statewide first time since records kept. Swamp were dry
- 10 – hr fuel moisture and line fuel moisture measurements at all time lows
- June 1 – July 22, 1998 2,300 fires burned 500,000 acres 350 homes/business damaged/destroyed

Introduction: The Situation (cont)

- 10,000 + firefighters from 47 states
- 25% of burned acres were industrial plantations
- Consumed vast amounts of fuel in normally wet depressions that rarely burn during more typical wildfire conditions
- Crowned through pine plantations & subdivisions forcing evacuation of an entire country
- Such extreme fire behavior is unusual but not unprecedented in Florida

Map of 1998 Florida Wildfires:



Interagency Team:

- **FEDERAL**
  - **USFS – SRS**
  - **USGS – BRD**
- **STATE**
  - **FLORIDA DIVISION OF FORESTRY – FIRE CONTROL BUREAU & FOREST MANAGEMENT BUREAU**
  - **FLORIDA NATURAL AREAS INVENTORY**
  - **ST. JOHN'S RIVER WATER MANAGEMENT DISTRICT**
  - **AUBURN UNIVERSITY**
- **PRIVATE**
  - **DYNAMAC CORPORATION**
  - **THE NATURE CONSERVANCY**
  - **GP-THE TIMBER COMPANY**

STUDY SITES

- **FEDERAL**
  - **Osceola National Forest**
  - **Lake Woodruff National Wildlife Refuge**
- **STATE**
  - **Tiger Bay State Forest**
  - **Lake George State Forest**
  - **Tosohatchee State Reserve**
  - **Buck Lake Wildlife Management Area**
  - **Seminole Range Wildlife Management Area**
  - **Heart Island Wildlife Management Area**
  - **St. Johns River Water Management District**
- **PRIVATE**
  - **Georgia Pacific Corporation**

STUDIES

- Fuel Treatment – Pat Brose
- Forest Structure – Ken Outcalt
- Fire Behavior Modeling – Jacoby Carter
- Predictors of Fire Behavior – Scott Goodrick
- Plant Response – Sue Grace
- Landscape Fragmentation – David Breininger
- Insect Response – Jim Hanula
- Home Protection Strategies – Jeff DeWitt
- Economic Impacts – Evan Mercer

Fuel Treatment

Pat Brose, USFS – Lead
Dale Wade, USFS
Steve Miller, SJRWMD

Title: Effects of silvicultural practices on extreme fire behavior
Objective:

Determine potential fire behavior following partial timber harvest, prescription fire and understory herbicide application

Results

- Prescription fire is best for immediate reduction in potential fire behavior but must be reapplied frequently
- Partial harvest also gives immediate short-lived reduction in potential fire behavior but too long between harvests
- Herbicides do not reduce potential fire behavior for about 2 years after application but then best
- Herbicides have little effect on forest floor buildup so drought season fires will kill overstory
- Combined fire and herbicide treatment untested but should provide both immediate and long term reduction in potential fire intensity and severity

Forest Structure

Ken Outcalt, USFS – Lead
Dale Wade, USFS

Title: Effect of fuel treatment on overstory mortality
Objective:

Determine effects of an array of prescribed burn intervals on southern pine mortality as affected by size class, stand density and stand origin

Results

- **Prescribed burn history significantly affected mortality**
  - **Mortality lowest in stands prescribed burned 1.5 years before wildfire (<10%)**
  - **Mortality highest in stands where fire excluded (89%)**
  - **Mortality higher on normally wet areas than elsewhere (65 vs. 30%)**
  - **Mortality took place over 2 years**
  - **Crown loss > 70% was a good predictor of overstory mortality**

Fire Behavior Modeling

Jacoby Carter, USGS

Title: Performance of the BEHAVE fire prediction model
Objectives:

1) Document how BEHAVE model was used operationally

2) Quantify BEHAVE model performance by comparing observed fire behavior to predicted fire behavior as recorded on fire reports

Results

- First objective could not be met. Copies of BEHAVE model runs not found in archived Fire Behavior Analyst (FBA) reports, nor was sufficient documentation provided to reproduce their BEHAVE runs.
- No single BEHAVE model worked so FBAs improvised to make predictions agree with observations
- Problems in data collection procedures described and solutions suggested

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Visit our website at http://flame.fl-dof.com/joint_fire_sciences/

Predictors of Fire Behavior

Scott Goodrick, FLDOF – Lead
Jim Brenner, FLDOF
Dale Wade, USFS
Don Haines – USFS Ret.

Title: Predictors of extreme fire behavior

Objective:

Correlate daily fire behavior to the Atmospheric Dispersion Index(Lavdas Index) and the Lower Atmospheric Stability Index (Haines Index)

Results

- Both indexes preformed well in predicting large fires in 1998 but not in 1999
- Lavdas Index had much larger number of flase alarms (but easily fixed)
- New index using the ratio of the Lavdas stability component to the transport wind speed was best both years and had fewest false alarms

Plant Response

Sue Grace, USGS- Lead
FNAI Staff
Dennis Hardin FLDOF

Title: Short-term response of plant species of special concern including exotics

Objective:

Assess status and response of known populations of plant species of special concern including exotics

Results

- Known populations of special concern all appeared to benefit
- New populations of several species were found and mapped
- Benefits exemplified by the federally endangered Rugel's pawpaw which increased from 200 to 2000 individuals with increased flowering (80%)
- No exotics found on the burns but stable reproducing populations noted nearby

Landscape Fragmentation

David Breininger, Dynamac Corp. – Lead
Mike Legare , Dynamac Corp.
Brean Duncan, Dynamac Corp.

Title: Determine habitat fragmentation at the landscape level

Objectives:

1) Develop GIS-based maps showing selected fuel conditions useful in assessing fragmentation and wildfire effects at the landscape scale.
2) Assess effects of fragmentation on the federally listed T&E Florida Scrub-Jay

Results

- **GIS maps of landcover and fire boundaries too coarse to predict and interpret effects of wildfire**
- **Habitat mapping applications do not provide information needed for managing and predicting population responses**
- **Forest barriers between occupied and restored habitat should be eliminated where the forests are artifacts of human activities**
- **Florida-Scrub-Jays cannot persist in habitat subjected to infrequent fire**
- **Atlantic coast populations need more frequent fire than previously believed because vegetation recovers faster near the coast**

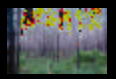
Insect Response

Jim Hanula, USFS – Lead
Dan Miller, USFS
Ed Barnard, FLDOF

Title: Effects of wildfire on pinebarkbeetles, repoduction weevils, and their associates

Objective:

Determine relative abundance of foraging pests along a fire intensity gradient over time and correlate to tree mortality



Results

- **Strip cruises in January 1999 showed tree mortality related to fire intensity ranged from 9% in low fire-intensity stands to 64% in high fire-intensity stands. Less than 2% of trees in unburned controls dead**
- **Predicted mortality increase during summer of 1999 did not materialize**
- **Re-survey of permanent plots in Oct. 1999 showed an additional 31% mortality in high fire-intensity stands and 2% in low intensity stands since Oct. 1998. Two percent of the unburned control trees died during this 1-year period. Little additional mortality has occurred since then**
- **No healthy roots found in high-intensity stands**
- **> 75% of live trees in high-intensity stands had roots infected with Leptographium spp. No trees in control plots were infected**
- **15-20% of sampled roots in moderate- and high-intensity stands had reproduction weevil larval galleries. Less than 4% of sampled roots in controls and low-intensity stands had galleries**

Home Protection Strategies

Jeff DeWitt, USGS – Lead
Sue Grace, USGS
Rhett Johnson – Auburn University
Dale Wade, USFS

Title: Analysis of the utility of wildfire home protection strategies

Objective:

Evaluate the utility of commonly recommended home protection strategies

Results

- **Use of metal soffits and adequate tree and brush clearance around a home provided the best protection**
- **Block construction (but not type of exterior), tile roof, lack of roof and yard debris, and defensible homeowner or fire department actions also significantly increased likelihood of home survival**
- **Wooden privacy fences increased potential for home damage**
- **Only 16% of the 75 homeowners interviewed were aware of wildfire protection strategies. Only 8% had actually implemented one or more protection measures**
- **Many of the interviewees were from a subdivision that had also lost several hundred homes to wildfire in 1985**
- **The use of prescription fire at the WUI was effective in protecting homes from subsequent wildfire. Only 1 of 32 was damaged**

Economic Impacts

Evan Mercer, USFS - Lead
Jeff Prestemon , USFS
John Pye, USFS
Tom Holmes, USFS

Title: Assess effectiveness of fuel reduction programs to reduce economic impacts of catastrophic forest fire events

Objective:

To use the recent history of wildfire in Florida to evaluate the efficacy of fuel reduction treatment policies and programs to reduce the economic impacts of catastrophic forest fires

Results

- **Estimates of total damage ranged from $622 to 888 million**
- **Coniferous stands in or near wetlands, especially bald cypress at greatest risk under this severe drought.**
- **Fragmentation of the forest appeared to increase wildfire risk**
- **Urbanization was positively correlated with area burned during 1998 in contrast to previous years**
- **The 1998 fires did not behave in the same fasion as fires in previous extreme fire years. In prior extreme years, the number of small fires increased with a relative reduction in large fires. In 1998, there was a preponderance of large fires relative to small fires.**
- **This ecoprovince was accumulating a very large wildfire "deficit" in the nine years before 1998**
- **The 1998 wildfire more than consumed this deficit leaving the region with a wildfire "surplus". This has not happened in other ecoprovences**
- **Prescription fire had no affect on acres burned by wildfire in this study. Its affect on fire intensity was, however, not addressed**