1 **Fire Weather**
Page 5

2 "Knowledge of weather is the key to successful prescribed burning, and is mandatory for proper management of smoke produced by burning." *(Wade)*

3 **Fire weather**
- Temperature
- Relative humidity
- Wind
- Atmospheric Stability
- Mixing height
- Ventilation Factor
- Dispersion Index
- Sky Cover
- Drought
- Diurnal Cycle

4 **Season**
- Dormant
- Growing
  - Spring
  - Fall or late summer

5 **Temperature**
Ambient air temperature is probably the single most important factor affecting fuel moisture.

6 **lethal temperature**
145ºF

Mortality of some tissue may occur at 100 to 120°F if it is maintained for several minutes

7 **Plant tissue is more susceptible to mortality when it is actively growing rather than dormant.**

8 **Dwell time**
Page 5
The time a certain level of heat is maintained on living tissue as the flame front passes.

How fast is the fire moving?

9 **CAUTION ! Temperatures of 80 °F+ may result in a Probability of Ignition of 70%+ which may be very risky and not a good prescribed burning condition if control is a problem**

10 **Relative Humidity**
Relative humidity is the amount of moisture in the air, atmosphere, related to the amount of moisture that the air can hold at a given temperature and atmospheric pressure.

11 **Dew point**
The dew point, a related factor, is the air temperature at which water droplets would begin to form (100% RH) if the air temperature drops one more degree.

12 **Important!**
"Relative Humidity doubles with each 20° drop in temperature – and halves with each 20° increase in temperature."

VERY IMPORTANT
!!!

13 **Relative humidity 30-55%**
Burning when the relative humidity drops to or is forecast to drop to 25% or below is risky

14 **Diurnal Cycle**
15
16 **If the temperature is 40 F at 8 AM and the RH is 50%**
What will the RH be at
2 PM if the temperature is 60 F?

25%
17 **Wind**
Page 7
18 **Wind**
- Pressure or Gradient Winds
- Frontal Winds
- Local Winds
- Land and Sea Breezes
- Eddies
- Slope Winds

19 **Pressure or Gradient Winds**
With the wind at your back
the area of low pressure is at your left
20 **Frontal Winds**
Wind direction will also shift in a clockwise direction as the front passes.

21
22
23 **Cold front passage**
Typically several days of steady west wind
24 **Local Winds**
three types of local winds that are important to fire behavior in the southeast,
land and sea breezes,
eddies,
and
slope winds.

25 **Land and Sea Breezes**
26 **Eddies**
27 **Slope Winds**
Warmer lighter air rises along a slope with cooler air filling in from below

28 **Surface Wind**
- Eye level
- 20'
- In stand
- In the open

29 **Mid flame wind speed**
1 - 5 mph

NWS 20' wind speed
5-15 mph

30 **Surface Wind Direction**
- Away from SSA

31 **Transport Wind**
32
33 **Transport Wind Speed**
34 **Transport wind speed 9 – 20 mph**

35 **Transport Wind Direction**
- Away from SSA
- How far?

36 **Atmospheric Stability**
Page 14
an indication of the atmosphere's resistance to turbulence and vertical motion.
37
38 **Lows pressure cell or trough**
- Counter clockwise
- Converging air produces rising motion

39 **High pressure cell**
- Clockwise circulation
- Divergent flow
- Downward motion

40 **unstable**
41 **slightly unstable / neutral**
42 **stable**
43 **Mixing height**
the height to which relatively vigorous mixing of the atmosphere occurs
44
45
46 **Mixing height**

1,650' to 6,500'

47 **Ventilation Factor**
Transport wind speed
x
Mixing height
48 **Transport wind speed**
9 – 20 mph

Mixing height
1650' - 6500'

49 **Minimum ventilation factor**
9 MPH x 1,650 feet = 14,850 or 1
Max. ventilation factor
20 MPH x 6,500 feet = 130,000
or 130,000/14,850 = 8.7

50 **Ventilation factor:**

1 (14,850)
to
8 (130,000)

51 **Dispersion Index**
Page 16
The Dispersion Index is the most reliable predictor of prescribed burn smoke behavior.

It is used to predict how far down wind smoke might be a problem.

See table on page 59.

52 **Dispersion Index (Lavdas)**
- 1 – 6 very poor dispersion
- 7 – 12 poor dispersion
- 13-20 generally poor dispersion
- 21-40 fair dispersion
- 41-60 generally good dispersion
- 61-100 good dispersion
- 100+ excellent dispersion

53 **Category Day/Dispersion Index**
- 0 1-6
- I 7-12
- II 13-20
- III 21-40
- IV 41-60
- V 61-100
- VI 100+

54 **Drought**
Page 16

- KBDI
- Drought Monitor/Palmer

55 **Alabama KBDI 4/14/06**

56 **KBDI**
The Cumulative Severity Index (CSI) or Keetch-Byram Drought Index (KBDI) is a continuous reference scale for estimating the dryness of the soil and duff layers. This

system was originally developed for the southeastern United States and is based primarily on recent rainfall patterns.

KBDI

- Soil moisture
- 0 - 800

0 - 200 Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.

200 - 400 Fires more readily burn and will carry across an area with no "gaps". Heavier fuels will still not readily ignite and burn. Also, expect smoldering and the resulting smoke to carry into and possibly through the night.

400 - 600 Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.

600 - 800 Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn through the night and heavier fuels will actively burn and contribute to fire intensity.

The USFS in Alabama uses the following KBDI guidelines:

Growing season MAX KBDI = 450

Dormant season MAX KBDI = 300

Site preparation MAX KBDI = 500

The Drought Monitor

Diurnal Cycle

Page 19

- Temperature
- Relative humidity
- Atmospheric stability
- Mixing height
- Ventilation factor
- Dispersion Index
-
-

Sources of Fire Weather Information

http://www.fs.fed.us/land/wfas/kbdi.gif

http://www.boi.noaa.gov/FIREWX/

http://www.forestry.state.al.us/Weather.htm

Or

Just do a search on fire weather

67 **ALZ011>015-022>025-010932- TUSCALOOSA-JEFFERSON-WINSTON-WALKER-MARION-LAMAR-FAYETTE-PICKENS- SHELBY- INCLUDING THE CITIES OF...TUSCALOOSA...BIRMINGHAM...HOOVER... DOUBLE SPRINGS...JASPER...HAMILTON...VERNON...FAYETTE... PICKENSVILLE...COLUMBIANA...PELHAM...ALABASTER**

332 PM CST THU MAR 31 2005

	TONIGHT		FRI	FRI NIGHT		SAT	
CLOUD COVER			**CLOUDY**	**CLOUDY**	**MCLDY**	**MCLEAR**	
PRECIP TYPE	**TSTMS**		**TSTMS**	**RAIN**		**NONE**	
CHANCE PRECIP (%)			**40**	**70**	**20**	**0**	
TEMP	**59**	**67**	**41**	**63**			
RH %	**100**	**66**	**100**	**29**			
20FT WIND-AM(MPH)				**S 5**		**NW 10**	
20FT WIND-PM(MPH)			**NE 4**	**SW 11**	**W 9**	**NW 12**	
PRECIP AMOUNT	**1.59**		**0.27**		**0.01**	**0.00**	
PRECIP DURATION			**7**	**9**	**1**	**0**	
MIXING HGT(AGL-FEET)					**4600**	**8600**	
TRANSPORT WIND (MPH)	**S**		**W 31**			**NW 37**	
DISPERSION INDEX			**N/A**	**80 GOOD**		**N/A**	**100+ VERY GOOD**

REMARKS...SOME AREAS WILL RECEIVE LOCALLY HEAVIER RAINFALL AMOUNTS.

68 **the fire weather reported by the NWS is a forecast**
NOT
the actual weather
or
a prescription !!

69 **Actual Fire Weather**
70 **anemometer**
71 **Sling psychrometer**
72 **Kestral**
73 **Belt weather kit**
74 **Weather station**
75
76 **Weather conditions change continuously**
Stay updated
Stay alert
Keep the burn crew informed
77 **TOPOGRAPHY**

Page 21

78

79 **Natural boundaries**

rivers, open fields, highways, swamps, and creek bottoms, may serve as passive fuel breaks.

Open edges may have faster fuel drying rates due to direct exposure to the sun.

80 **Gaps, chimneys, chutes, draws, ridge lines and other landforms can funnel air flows that result in updraft winds.**

81 **Questions – Comments ?**

82