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A Brief Overview of the Southern United States Fire Situation January - July 1998

Unusually wet conditions associated with El Niño-Southern Oscillation (ENSO) this past winter had a significant negative impact on prescribed burning operations. In spite of the high rainfall, natural resource managers in Florida still succeeded in treating more than 500,000 acres during the first three months of 1998. (In a typical year about 2,000,000 acres are treated, about 75-80% during this time period.) Many of these burns were, however, more patchy and consumed less fuel than usual because of high dead-fuel moistures. Average ambient temperatures were also higher than normal which resulted in a significantly earlier spring green-up and increased growth of the herbaceous groundcover and woody understorey. Many of these planned dormant-season burns were thus actually conducted during the transition period or early growing-season. This in turn, pushed planned growing-season burns back further into the spring.

Weather patterns switched rather abruptly in late March and by the end of May the deep south was experiencing abnormally high maximum daily temperatures and extended drought. A commonly used measure of relative dryness, the Keetch-Byram Drought Index (also called the Cumulative Severity Index) which ranges from 0 (saturated) to 800 (bone-dry), was already over 600 in some areas. The vast majority of growing-season prescribed burns on the southern coastal plain are conducted between late April and early June. However, many fire managers defer scheduled prescription burns when the KBDI surpasses about 450. The result was a substantial reduction in the number of acres treated during May and June. My guess is that by the end of the year, only about 1 million acres (ca. 400,000 ha) will have been treated, half of the number treated during an average year.

During a typical year, wildfire activity on the southern coastal plain begins to increase in February, and peaks in March as green-up occurs and the winter weather, which is characterized by rain every 5 to 7 days associated with the passage of cold fronts, gives way to our hot steamy summers dominated by afternoon thunderstorms. In Georgia, about 25% of the total number of wildfires occur in March. This year the wet winter resulted in fewer wildfires and dramatically less acreage burned over during this time period in Georgia (Tab.1). The same held true for Florida.

The Central Pacific Ocean was about 4.5°C above average in March when it began to cool. The drop in average sea temperature continued, reaching an unprecedented rate in June before levelling off in July slightly below the norm. As the ENSO effects on synoptic weather patterns weakened, a large area of high pressure formed over the southern US blocking the normal flow of moisture-laden air from the Gulf of Mexico over the southeastern US. Instead hot dry winds from the northwest were the norm. Subsidence, the process that brings dry air aloft down to the surface was also taking place. This resulted in very few convective showers, high temperatures, unseasonably low relative humidities and a concomitant increase in the KBDI with many locations approaching 800. This weather pattern translated into a predictable increase in wildfire activity throughout June and early July. This area of high pressure then shifted west in July resulting in the return of afternoon showers over Florida, but hot, dry, windy weather over Texas and Oklahoma. Texas is experiencing the driest spell in 104 years with temperatures exceeding 100°F (38°C) for the 29th consecutive day on 4 August 1998.

Humans cause the vast majority of the 45 to 50,000 wildfires in the 13 southern states each year, with about 40% of the total due to arson. Less than 10% are attributed to lightning although many more are caused by this source but are not included in the database because they are not reported, or go out without human intervention. Lightning generally causes more fires than humans during the summer with most of the acreage burned between late April and early June. Between 500,000 and 600,000 acres (ca. 200,000 to 240,000 ha) are subjected to wildfires in a typical year although about 1 million acres (ca. 400,000 ha) burned over during each of the extremely bad years of 1989 and 1996. As of August first, 28,000 wildfires had already burned over 1,100,000 acres (445,000 ha) including 580,000 (235,000 ha) in Florida and 318,000 (130,000 ha) in Texas. The fall wildfire season is still months away. Not a single southern wildfire burned more than 5,000 acres (2,000 ha) last year. The first of numerous fires to do so this year was discovered 25 May 1998 in a swamp on the Apalachicola National Forest in Florida and reached 7,000 acres (2,800 ha) on 12 June. The largest fire on private lands in Georgia in 40 years burned 16,000 acres (6,500 ha) in June, while a fire on the nearby Okefenokee National Wildlife Refuge reached 7,000 (2,800 ha) acres on 15 July and was finally controlled after more than 4 inches of rain in a 4-day period.

Although major fire activity in the southern US has so far been pretty much confined to Florida and west Texas, brief periods of high activity also occurred in the mountains of western North Carolina and Kentucky, along the Gulf Coast of Alabama, Mississippi, and Louisiana, in Georgia and in Oklahoma. Most of this region is now receiving shower activity but the KBDI is still above 600 in many places. During the first 3 days of August, 200 more fires were reported that burned 19,100 acres (7,700 ha). Toward the end of July, measured live fuel moistures in Texas were 45% in *Juniperus*, 50% in grass, and 80% in the leaves and small branches of *Quercus*. Its no wonder drought-related tree mortality has been reported across the region. Precipitation is 6-25% of average and fine dead fuel moistures are still in the 2-4% range in many areas as of 3 August. Complete consumption of down woody fuels during passage of the flame front was a common occurrence. Firebrands were igniting the grass fuels a mile or more ahead of the main fires. The situation was even worse in Florida because of the large area of urban/wildland interface that was impacted.

Every county in Florida has been subjected to major fire activity since the beginning of June, but the news media have focused on those counties from the centre of the peninsula east to the coast, and north to the Georgia line because of the extensive urban/wildland interface. Evacuation of homes began on 16 June and was a daily occurrence until 11 July. Numerous communities were evacuated in several counties and for the first time to my knowledge, virtually a whole county (approximately 45,000 people) was evacuated and put under a dusk to dawn curfew. Well over 100,000 people were evacuated during this time period in Florida, some more than once as fires were controlled and flared back up, or new ones started. The good news is that less than 100 homes and businesses were destroyed and only about 250 were damaged. Miraculously I am aware of only one firefighter fatality, an Alabama Forestry Commission employee died of a heart attack while constructing fireline in his home state. Three "civilians" in Florida were also claimed by heart attacks attributed to the fires. Resource damage (primarily timber) will likely approach US$100,000,000. Suppression costs are still incomplete, but will be astronomically high. The pulp and paper industry pretty much abandoned the use of prescribed fire over the past decade in favour of herbicides which predisposed their plantations to higher levels of damage because of the increased dead fuel loads that exacerbated fire behaviour.

To help put these fires in perspective, consider the following: 158 aircraft were committed to the Florida fires, 1½ times the number on the Yellowstone fires; virtually every heavy helicopter available was in Florida - the other 3 were fighting fires in Alaska; over 5,200 fire fighters were in Florida; 80 to 100 new fires were occurring each day at the peak; live fuel moistures were in the 70 to 80% range and 10-hour dead fuel moistures were hovering between 3 and 4%; the military airlifted fire engines from California and the Pacific Northwest to Florida (a distance of about 4,000 km); the airports at Ormond Beach and Daytona were closed for several days; wells were dug and a 1-mile hose lay was constructed to get water where it was needed; ground fires were consuming 4-5 feet (1.2-1.5 m) of organic soil; 1, 10, and 100 hour fuels were being completely consumed; a number of fires were plume-dominated; three major fires burned to the Atlantic Ocean; 2-yr roughs were supporting 20 ft (6 m) flame lengths; in some areas the needle cast was heavy enough to obscure the "black" and supported 2-3 ft (60-90 cm) flame lengths during reburns; in some instances the crowns of heat-killed brush were burning and carrying fire into the overstory crowns, and; fires made runs with humidities in the mid sixties.

Fire danger was about the same throughout the southern coastal plain so why did Florida get hammered so much worse than surrounding states? The answer is lightning; Florida has one of the highest concentrations of lightning strikes in the world exceeding 120 strikes per acre per year in some areas. Most of the activity occurred ahead of the daily sea breeze front as it moved inland. The fires were concentrated in peninsular Florida and on at least one occasion, the east and west sea breeze fronts collided over the centre of the state with the increased convective activity causing a large number of lightning fires. Very little rainfall accompanied this lightning. Georgia also had a high number of lightning fires but their initial attack was more successful.

The two suppression organizations are both well organized with state-of-the-art equipment and highly trained personnel so that is not the answer. Both states advocate and facilitate the use of prescribed fire and indeed, many instances were recalled where fires were held only because they happened to run into recent prescribed burns. Downdrafts from thunderstorms, which are more numerous in Florida, result in strong erratic winds that can produce sudden changes in the direction of fire spread. Access to lightning-caused fires can be more of a problem in Florida because growing conditions are better which results in heavier fuels. The difference in initial attack success can be attributed in large part to the extensive urban/wildland interface in Florida meant that initial attack forces often had to protect structures while a fire continued to gain momentum. The large

number of daily fire starts in Florida also was a contributing factor, tractor-plow units would put a plow line around one fire and then race off to the next without having time to mop-up.

Can another disaster like this one happen again in the future? The answer is not only that it can happen, but that it almost assuredly will happen. For whatever reason, the loss of life and property was much less than expected but there is no reason to expect it will be so low the next time. Im sure the extensive review and studies that will be conducted over the next few months will address steps that can be taken to decrease the destruction in future wildfire disasters. Pulp and paper companies will undoubtedly reassess their decision to abandon the practice of underburning to control woody competition and for hazard reduction. The only known practical method of reducing wildfire damage is the frequent use of prescribed fire. Yet prescribed underburns will in all likelihood become increasingly difficult to conduct in the future as the urban/wildland interface continues to expand. It remains to be seen whether fire managers will be able to garner and sustain the needed public support to assure the increased use of prescribed fire necessary for ecosystem health and to minimize the threat of catastrophic fire.

Information supplied by numerous state and federal agency personnel in Florida and Georgia provides the data base for this report.

Dale Wade
Research Forester
USFS Southern Research Station
320 Green Street
USA - Athens, Georgia 30602-2044

Tab.1. Georgia wildfire statistics

Month	Number of Fires 1998	Area burned (ha) in 1998	Number of fires 5-year average (1993-97)	Area burned (ha) 5-year average (1993-97)
January	234	207	513	667
February	498	587	1,108	1,895
March	909	1,692	1,576	3,047
April	426	550	1,124	1,498
May	492	557	677	779
June	1,264	8,784	434	646