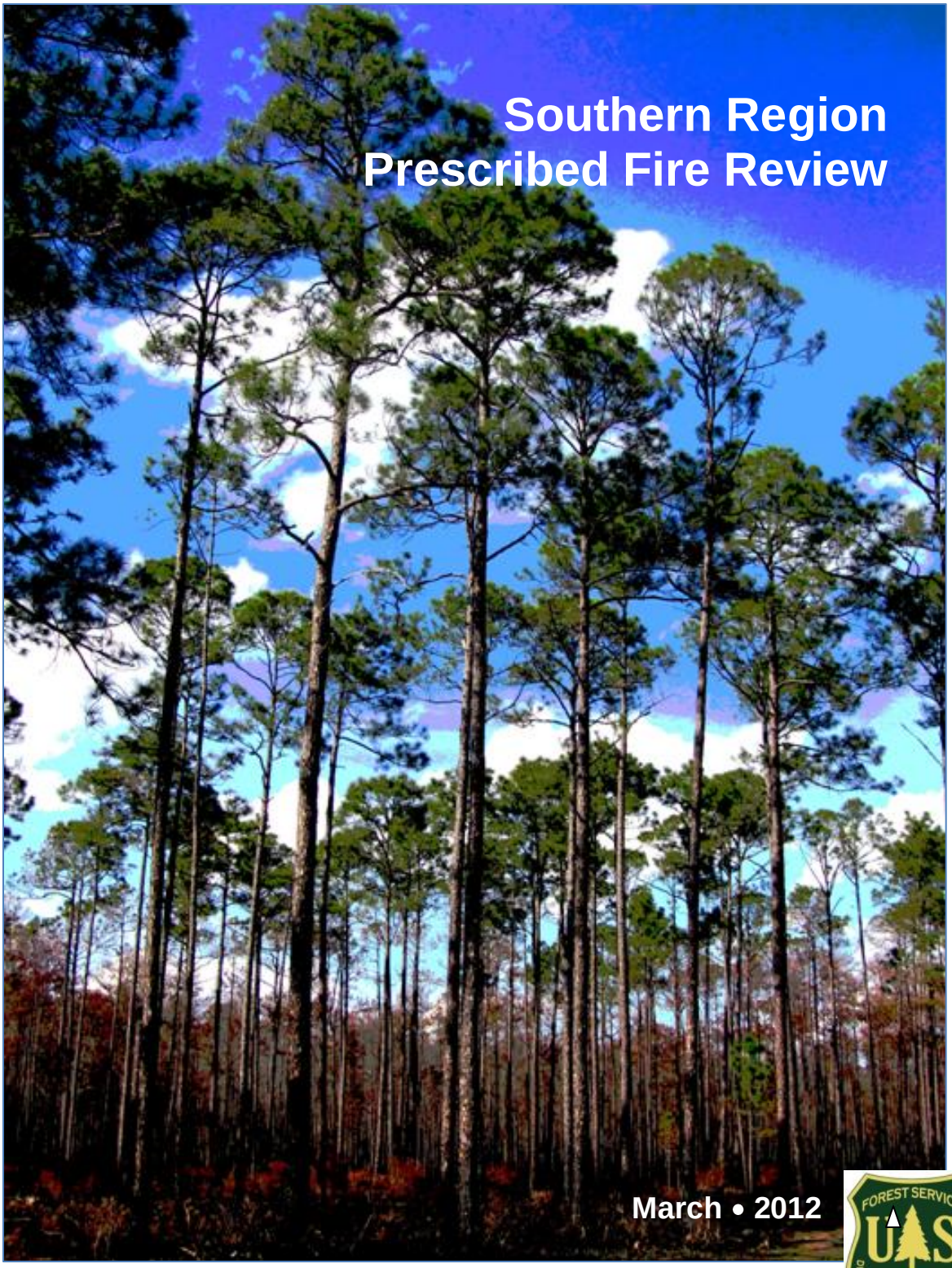
Southern Region
Prescribed Fire Review
March • 2012

This report will focus on the procedures that local managers have developed which have proved to be successful in continuing to implement prescribed fire despite drought conditions.

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Executive Summary

This February, the Apalachicola National Forest in Florida experienced a prescribed fire escape more than two weeks after ignition. Fire within the burn unit had smoldered in organic soils and then flared up due to extended drought conditions coupled with strong winds and low relative humidity on the day of the escape.

The escape was reviewed in accordance with FSM 5140. In addition to the local review, the Southern Region took this opportunity to assign a Review Team to assess the current drought conditions as they relate to prescribed fire control difficulties. The Review Team documented local and regional measures being implemented by fire managers and Line Officers to mitigate elevated risk associated with drought conditions. In addition, the Review Team assessed other escapes and near misses and the degree to which the Southern Region has adopted a "learning culture" and "shared risk management" in the prescribed fire program.

Fire danger indices and other factors were evaluated to determine the best predictor of problem fires in organic soil areas. Low ground water levels seem to provide a correlation with difficulties in controlling prescribed fires on or adjacent to organic soil areas. Assessments indicate that the Apalachicola and other areas of the National Forests in Florida—the Chattahoochee-Oconee, the Francis Marion, and the Croatan national forests—are all experiencing abnormally low ground water levels where organic soils are present. The seasonal forecast indicates that these abnormally dry conditions will persist throughout the spring of 2012. Consequently, we should expect these areas to experience greater difficulties than normal in implementing prescribed fire during the entire 2012 burn season. Information on current ground water levels and where to find these values are provided in this report.

Other high fire danger areas in the Southern Region without organic soils have experienced long duration burning/smoldering (see U.S. Seasonal Drought Outlook Figure 1). These areas may also experience difficulties with control of prescribed fire, especially where burn units contain heavy rough, large down woody fuel and areas with extended fire-free intervals.

Under these current elevated risk conditions, local fire managers have offered numerous risk mitigation techniques to achieve their prescribed fire objectrives. Some of these techniques are widely known and used while others are unique to specific Forests or Ranger Districts. This report includes a comprehensive listing of techniques with explanations of their relevance to specific hazards and elevated risk conditions.

Other escapes and near misses reviewed include inadvertent lighting outside the burn unit boundaries. Local managers identified the need to improve briefings and maps and are considering increased use of GPS units by lighters.

The Review Team found that, in general, the Southern Region has embraced learning culture concepts and shows evidence that local units are learning from reviews of undesired outcomes and near misses. However, in many cases, the learning is confined to the local unit and not widely shared across the entire region. Furthermore, there are local innovations not associated with undesired outcomes which could also be shared more widely.

There appears to be an opportunity to more fully share these innovations by developing a regional support system for communicating lessons learned.

1. Introduction

A. The Southern Region's Current Prescribed Fire Program

The Southern Region of the U.S. Forest Service conducts prescribed burns on more than 1.4 million acres annually. Each year, more than 1,200 individual burns are conducted within the Region's 16 administrative units in 13 states. This prescribed fire program has been highlighted as the state-of-the-art in application of fire to achieve resource management objectives.

The Southern Region's prescribed fire program is known as the most successful of all of the various land management agencies in the United States.

During the past two decades (1990-2011) in the Southern Region, 78 prescribed fires have been declared "escapes." However, in most cases, the outcomes have been relatively minor. During the last decade, only one escape (Impassable Bay Fire, March 2004) has resulted in high suppression costs and significant damage to non-Forest Service resources.

There have been several episodes in the last ten years when several escapes occurred in succession over a two- to three-week period. In retrospect, it is believed that more rapid analysis and determination of contributing factors, coupled with effective cross-region communication, could have prevented or limited these succeeding escapes.

During the 1990s, the rate of escapes in the Southern Region was 1 for approximately 170 burns. Since 2000, the rate of escape has fallen to 1 in 500 burns. Nationally, the rate of escape during the 1990s was about 1 escape per 100 burns. During the 2000s approximately 1 escape in 300 burns has occurred on a national scale.

The improvement in rate of escapes in the Southern Region can be attributed to enhanced training for Burn Bosses (including the Southern Region Burn Boss Workshop), improved weather and fire behavior forecasting, and practitioner-developed procedures in response to escapes and near misses.

While the number of escapes may seem troubling at first glance, the reasons for declaring them "escapes" may alleviate some of the concerns. Current FSM Policy allows for a great deal of discretion at the local level in declaring a prescribed fire "escaped." Key factors ***requiring*** an escape declaration are:

- Opening a "P-Code" to manage the fire.
- Inability to contain fire spread outside of the burn unit after more than one burn period following fire leaving the unit.

The Southern Region has moved toward a learning culture organization paradigm. However, it is believed that there is a need to more fully embrace learning culture concepts at all organizational levels.

In many cases, escapes were declared because local managers believed they were required to declare an escape—despite neither of the above-listed criteria being met. Some escapes were declared because:

- There was potential for a claim.
- Fire burned onto non-Forest Service lands.
- Cost of management exceeded locally available WFHF funds.
- State or other non-Forest Service resources were needed to implement contingency actions.
- Inability to pay for contingency resources without a P-Code.
- Long-term smoke problems.
- Significant resource damage.

None of these situations (above) ***require*** an escape declaration.

Prescribed Burns Becoming Long-Term Events May Be Increasing

Even though the rate of escapes is very low, the number of prescribed burns that are becoming long-term events may be increasing as the 2012 burn season progresses.

In most cases, fire managers know before ignition that the burn has the potential to persist for long periods. [The information provided in this review report's recommendations section addresses these long-term, drought-influenced burns, as well as declared escapes.]

The Southern Region has moved toward a learning culture organization paradigm. However, it is believed that there is a need to more fully embrace learning culture concepts at all organizational levels.

The Review Team has assessed practices and attitudes at all organization levels in the region to determine opportunities for improving learning culture characteristics. There is not full agreement among Line Officers concerning the need for disciplinary action following mishaps, especially where personnel did not adhere to policy.

It is clear that many, if not all, local units are routinely conducting After Action Reviews to assess performance and fine-tune practices. Many innovations in risk management, cost reduction, and enhanced ability to achieve prescribed fire objectives have been developed. Some of these have been widely shared throughout the region. However, many of these techniques have remained known only to local developers.

There appears to be an opportunity to more fully share these innovations by developing a regional support system for communicating lessons learned.

The Southern Region Headquarters Office determined that it would be prudent to review the circumstances associated with this escape—as well as other recent escapes—to see if there is a need to alter prescribed fire procedures, particularly given long-duration drought conditions.

The Southern Region is determined to continue improving prescribed fire management and reducing undesired outcomes. This review will provide suggestions on how to accomplish both objectives.

B. Learning Focus Put on Apalachicola National Forest Unit 208 Burn Escape

On Feb. 13, 2012, the Apalachicola National Forest declared the Unit 208 burn an escape. The burn was ignited on Jan. 28. The project's objectives were achieved and the burn had remained within the unit, exhibiting little activity. Sometime between the evening of Feb. 12 and the morning of the Feb. 13, strong winds and low RH caused smoldering organic soils to flareup and burn into an adjacent swamp.

The Forest moved quickly to reassess threats and determine appropriate actions. To avoid continued spread outside the unit, the most effective action was determined to be a firing operation to blacken a large area downwind of the slopover. However, due to the desire to wait for a favorable wind direction, this firing operation was not completed until more than one burning period following the spot fire development outside of the unit boundary.

Because the fire spread could not be contained within one burning period after fire became established outside of the burn unit, it was declared an escape.

To keep fire from burning the dry swamp and causing smoke management issues, District personnel determined that the desired course of action was to construct a fireline instead of burning out the entire adjacent compartment. All of the burned area was confined to National Forest lands. No significant resource damage occurred.

This escape was the 16th escape in the Southern Region since 2006. It occurred during the middle of the prescribed fire season with many burns yet to be conducted in both dormant and growing seasons.

The Southern Region Headquarters Office determined that it would be prudent to review the circumstances associated with this escape—as well as other recent escapes—to see if there is a need to alter prescribed fire procedures, particularly given long-duration drought conditions. In addition, the Region is interested in assessing the degree to which a "learning culture" has been adopted.

C. Review Team Direction and Parameters

The Southern Region Headquarters Office tasked the Review Team with two key inquiries/quests for specific information and recommendations. These two requested informational pursuits are summarized in the following two bullets.

Do Our Burning Practices Need to be Adjusted?

- *Have extended dry conditions/persistent drought created a "changed condition" in one or more national forests within the Southern Region that would suggest that normal prescribed burning practices be adjusted? If so, recommend what adjustments should be made.*

  Review the two prescribed fires where fire was inadvertently ignited well outside of the planned unit boundaries. Determine what actions have been taken and any additional considerations which would reduce the likelihood of a recurrence.

Do We Have a 'Learning Culture' that Effectively Gains and Shares Insights Into the Causes of Our Prescribed Fire Escapes?

- *Given the limited scope of this review, has the Southern Region made progress in creating a learning culture that effectively investigates the occurrence of escaped prescribed fires so that lessons learned from these events are meaningful and have a positive impact on organizational learning? Identify barriers—as well as the opportunities—for fostering a learning culture throughout the Southern Region's prescribed fire program.*

2. Background – Current Fire Danger and Drought Conditions

Recent moisture along the Gulf Coast has eased drought conditions. As of March 2012, this pattern was forecast to continue over the next several months. The Atlantic Coast, however, has seen little of this moisture. Drought conditions here are forecasted to persisit and intensify. Mountain forests can expect average to slightly above average fire conditions for the spring fire season.

Traditional fire danger measurments utilized in fire management do not always capture the full impact of drought conditions. Surface water levels measured by the U.S. Geological Survey (USGS) are utilized in many places to augment fire danger operating plans.

This is a particularly useful metric when managing fire on units that contain organic soils in the hystic soil series., These soils are likely to ignite when moisture conditions are low, which leads to long-duration burning which then becomes problematic and expensive in wildfire or prescribed fire scenarios.

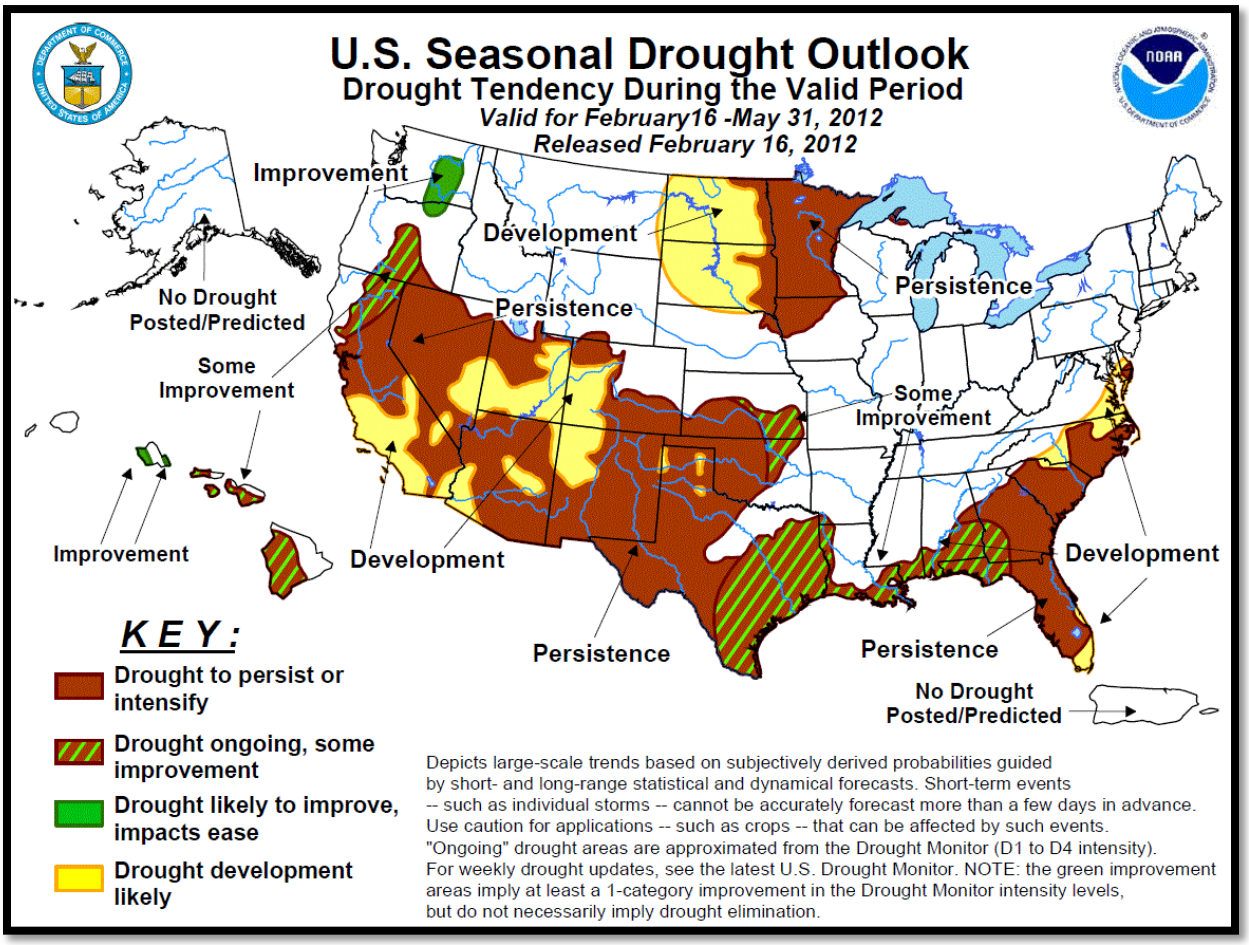

Figure 1. Seasonal Drought Outlook for the United States as of March 2, 2012.

Currently, areas of the National Forests in Florida—the Chattahoochee-Oconee, the Francis Marion, and the Croatan national forests—are experiencing abnormally low ground water levels where organic soils are present.This situation is not forecast to improve throughout the spring of 2012.

The Energy Release Component (ERC) is a fire danger metric used to show potential energy that may be released at the head of a fire. This component is a good indicator of long-term drying in wildland fuels. It is commonly used by fire managers to measure fire danger on a day-to-day basis.

The image in Figure 2 is a depiction of current ERC percentiles across the Southern Region. Due to the recent frontal passage and long duration of high humidity associated with this event, fire danger has decreased for much of the Southern area.

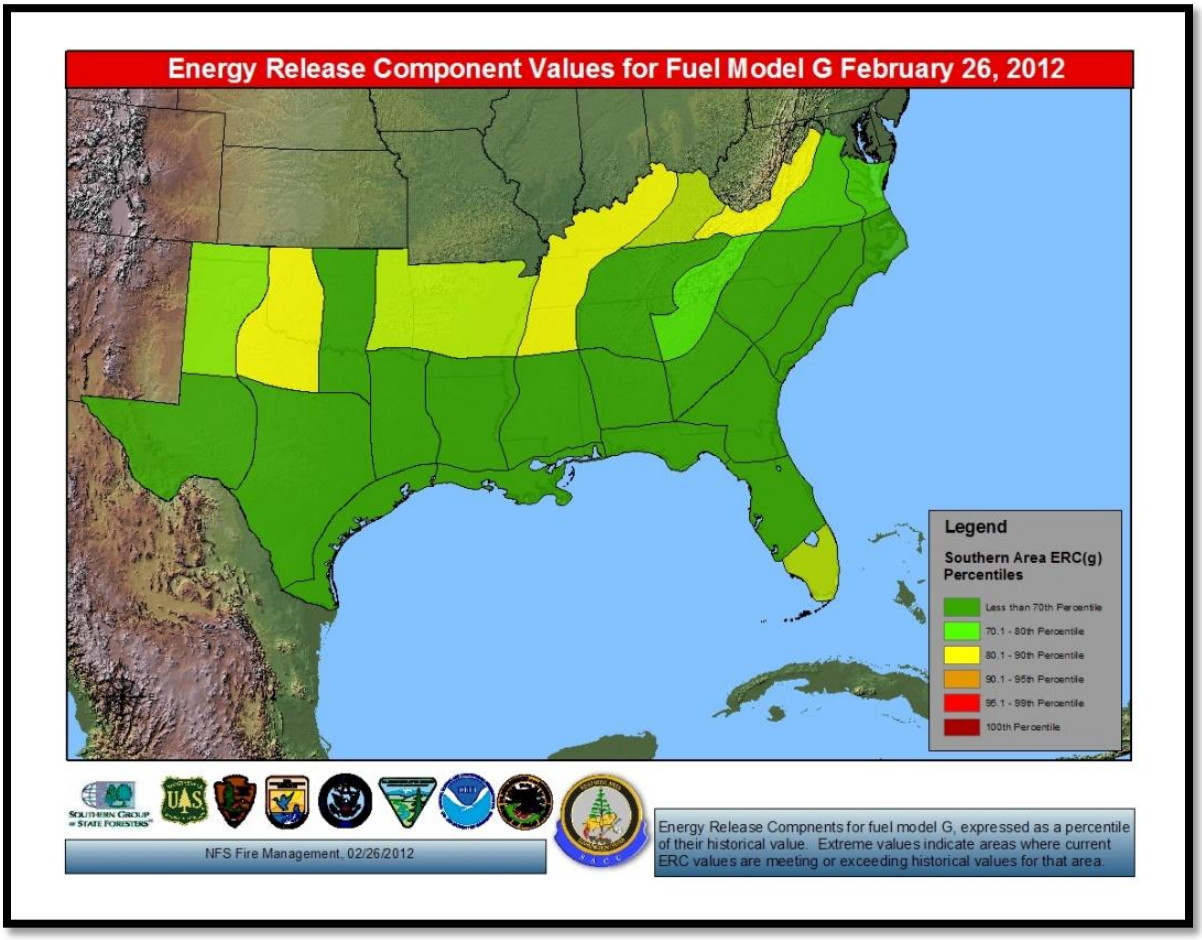

Figure 2. Energy Release Component (ERC) Percentiles for Southern Area.

	Organic Soil Fire Potential	Above Average Fire Potential	Average Fire Potential	Below Average Fire Potential
NF in Florida	XX	XX		
NF in Alabama			XX	
NF in Mississippi			XX	
Ozark-St. Francis NF			XX	
Ouachita NF			XX	
Kisatchie NF			XX	
NF in Texas			XX	
Francis Marion NF/Savannah River Site	XX	XX		
Sumter NF			XX	
Pisgah and Nantahala NFs			XX	
Croatan NF	XX	XX		
Uwharrie NF		XX		
George Washington and Jefferson NF			XX	
Daniel Boone NF/Land Between the Lakes			XX	
Cherokee NF			XX	
Oconee NF		XX		
Chattahoochee NF			XX	

Figure 3. Fire Danger by Forest as Determined by Ground Water Levels.

The Seasonal Significant Wildland Fire Potential Outlook is a national predictive services product produced several times a year. This outlook also highlights the same problem areas for the Southern Region for the upcoming spring fire season.

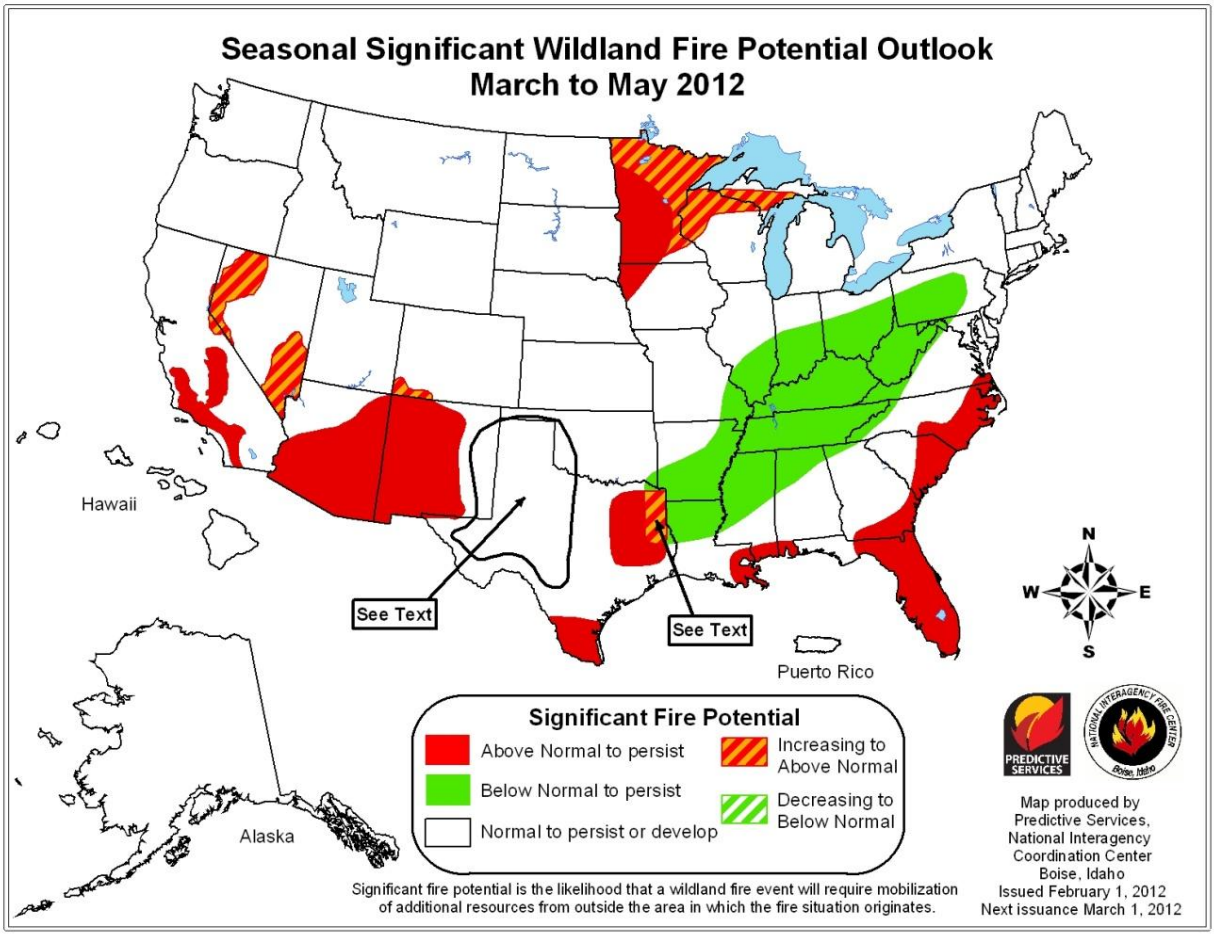

Figure 4. Seasonal Wildfire Potential for the United States as of March 2, 2012.

A closer look at the national forests across the region reveals the same pattern in greater detail. In the following graphs, fire danger is depicted utilizing the Energy Release Component and the 1000-hour fuel moisture. These are both indicators of long-term drying. (See graphs in Appendix B. In areas where fire danger has recently been high, these graphs are presented by national forest within a state. Where fire danger has been average, or where all national forests within a state have similar fire danger, the data has been combined into a state level graph.)

3. Do Our Burning Practices Need to be Adjusted?

In this chapter, the Review Team focuses on the following queries that they were tasked with by the Southern Region Headquarters Office:

- ***Have extended dry conditions/persistent drought created a "changed condition" in one or more national forests within the Southern Region that would suggest that normal prescribed burning practices be adjusted? If so, recommend what adjustments should be made.***

  Review the two prescribed fires where fire was inadvertently ignited well outside of the planned unit boundaries. Determine what actions have been taken and any additional considerations which would reduce the likelihood of a recurrence.

The Review Team interviewed fire managers and Line Officers from national forests throughout the Southern Region to collect their stories that describe how they have successfully managed prescribed fire under extended drought conditions.

A review of prescribed fire escapes and discussions with forest managers indicate that a high percentage of escapes in the Southern Region occurred well after the ignition phase. A large percentage of these post-ignition phase escapes occurred on or adjacent to deep organic soils (or areas of heavy fuel accumulation or southern rough areas which have not been burned in many years).

These escapes usually occurred when normal intervals between precipitation events extended, allowing water tables to lower, making much more fuel available to burn. Longer dry periods also resulted in continued smoldering (especially at the edge of swamps where duff and organic soil layers thickened).

In many cases, the smoldering did not produce detectable smoke for several days. Occasionally, strong winds and lower humidity caused flareups. In most instances, fire managers have been able to respond quickly and effectively and have kept the burns from escaping the unit or burning within the unit at unacceptable levels of severity.

Very rarely did these flareups require more resources to control than local managers had available and escapes were declared. In fact, during the last decade, only one of these escapes caused significant damage or cost (Impassable Bay, March 2004).

Managers Implement Procedures to Lower Risk Associated with Dry Periods
Managers interviewed for this review indicated that they knew current conditions were droughty and that risks were elevated. These were neither necessarily unexpected nor unwanted outcomes at the local level. They also identified numerous tactical and strategic procedures that they implemented to lower risk associated with extended dry periods. In almost all cases these procedures have worked very well.

When reviewing the many factors associated with why we use prescribed fire and risks associated with that tool it becomes clear that:

- Risk is elevated when extended dry periods occur prior to and following prescribed fire application.
- Deferring burn implementation does not necessarily alleviate overall risk because fuel continues to accumulate and burns become more difficult, even under moisture conditions. This, in fact, could increase risk for future burns.
- Some parts of the Southern Region are in their fifth year of drought. A five-year fire-free interval would result in drastic increases in fuel accumulation/hazard and substantial changes to ecosystem properties. It is clear that burning must continue (even under drought conditions) if ecosystem integrity/resilience/sustainability is to be maintained and if we want to avoid the much more difficult/costly task of restoration or suppression.
- In some cases, burn objectives can be achieved only under abnormally dry conditions (for instance, reducing woody species encroachment into swamps/wetlands and wetland shrub encroachment onto uplands).

While deferring the burning of very high risk areas—such as major highway corridors and the wildland urban interface—may be one approach to managing risk of prescribed fire escapes, this report will focus on the procedures local managers have developed which have proved to be successful in continuing to implement prescribed fire despite drought conditions.

A. Recommendations

Recommended Adjustments to Prescribed Burning During Persistent Drought Conditions

The following topics were suggested by Fire Management Officers, Burn Bosses, and other Southern Region fire personnel. These recommendations are subjective and may not be applicable in all places.

1. Select or defer burn blocks based on:

A. Presence or absence of organic soils and heavy fuels that will continue to burn after completion of fire.
B. Heavy rough areas that have not been burned in several years.
C. Proximity to smoke sensitive targets.
D. Potential of escaped fire impacting high values.
E. Burn prioritization may have to be adjusted given the above conditions. Have enough burn units ready to allow projects to be “shuffled.”
F. Strategically plan burn program to set yourself up for success, i.e. treat units around heavy rough first—to ensure that areas adjacent to heavy rough have been treated before applying fire.
G. Follow National Fire Plan and Regional direction to prioritize WUI.

2. **Alter the size of burn blocks in order to leave out areas where control would be difficult.**

   In some cases, this would mean reducing acreage. In others, it would mean increasing size in order to use roads or other barriers as control lines instead of bays or "wet" areas that may have held fire during normal seasons. Larger burn blocks would also reduce the overall perimeter versus several small units located near one another.

3. **When burning beneath a pine over story, limit scorch as much as possible adjacent to control lines, swamp or bay areas.**

   This could be accomplished by utilizing only a backing fire in those areas in order to reduce needle cast and the potential for re-burn.

4. **Areas that are made up of organic soils should be allowed to burn when conditions are favorable.**

   This would help to get the organic layer down closer to the water table. In some cases, favorable conditions for meeting burn objectives in organic soils are provided by extended dry periods. This may mean that burning under drought conditions is necessary to achieve long-term ecological objectives.

5. **Intentionally burn or allow fire to get into the bays and swamps when the water level permits in order to remove that fuel and make it unavailable.**

   If this is done in conjunction with the previous recommendation (#4 above), the lower level of fire intensity would make the burn easier to hold within those areas. This also meets ecological needs for periodic fire in the wetlands.

6. **Treat bays, swamps, and heavy roughs as if they were Wildland Urban Interface (WUI) areas.**

   For instance, burn the uplands around them to keep fire from coming out with high intensity when it does get into them.

7. **Consider availability of contingency resources to implement long-term patrol and monitoring of burns during periods of drought and to control escapes.**

   Consider using cooperative and participating agreements with state agencies and other partners to set this up in advance. Keep in mind that the availability of these resources may need to be considered for longer than just the day of the burn.

8. **Work with local law enforcement (appropriate to your area/state) pre-season to discuss mitigating smoke impacts to high traffic areas.**

   Have a plan in place to take necessary steps (patrol, pilot cars, road closures) if smoke becomes an issue. Add these contacts to the burn notification section of burn plans and then provide periodic updates throughout the burn period. Know who will do what/when *before* the need arises.

9. Use any technology, applicable to your area, to predict conditions trending toward extreme.

In addition to predictive services available through the Southern Area Coordination Center (SACC) (such as drought indices, ERC and 1000-hour fuel moisture):

- Districts with high levels of organic soils should monitor USGS stream gauges. Many of the escaped prescribed fires occurred when these levels were below the 10th percentile.
- Districts and Forests could also monitor the Nelson Dead Fuel Moisture Model. [See article on application of the Nelson Model at: http://www.fs.fed.us/rm/pubs_other/rmrs_2007_carlson_j001.pdf.]
- Districts could monitor their duff moisture levels. They would have to first establish some baseline numbers, but could then track moisture levels related to their own fire behavior observations. Soil moisture meters are readily available.

10. Realize that opportunities may be limited or that additional mitigation measures must be put in place during drought conditions.

Also, burning may have to be deferred temporarily until conditions improve.

11. After several consecutive days of burning, take a day off from starting any new burns and go out and thoroughly check the existing fires.

12. Each Forest or District could purchase a FLIR (handheld infrared) unit to assist with locating hot spots/holdover heat near perimeters or in areas of heavy fuels.

Managers could then send in a crew or engine to mop-up or monitor specific problem spots.

13. Forests could develop a checklist for patrol resources to use.

This would include District or site-specific items deserving special attention when checking burns. Such a patrol checklist could also serve as documentation that the burns were being monitored on a regular basis. (For example, see Appendix E.)

B. Other Considerations

1. Pressure to meet objectives or accomplish resource management and hazardous fuels goals may drive some personnel to take needless risks and either ignite a burn or continue burning when the conditions dictate otherwise.

These conditions may change slowly, making it easy to miss trigger points. Fire personnel should have some definite trigger points established for their area. Then, Burn Bosses must have the fortitude and be supported by Line Officers when calling off a burn—if parameters and resources are undesirable and cannot

be properly mitigated. Caution must also be used when multiple parameters are being mitigated on any single burn.

2. **Fire management personnel spend considerable time analyzing the weather and fuels conditions *before* a burn, but are we looking at what the weather pattern and fuels conditions will be for an extended period *after* ignition? Are the tools and projections provided by Predictive Services understood and utilized?**

   All fire management personnel must have a clear understanding of the basics of the National Fire Danger Rating System (NFDRS). A brief webinar on the NFDRS should be developed and presented to all fire management personnel.

3. **Consider use of a Highway Visibility Guide** (such as is included in Appendix F).

4. **Line Officers and Burn Bosses have ownership of a prescribed burn until it is declared out. We must ensure that decisions to patrol/monitor a burn are based on current and predicted conditions and not on a lack of funding or a reluctance to use funding for overtime.**

   Consideration must also be given to the number of burns that can be in a patrol status at any given time, and if there are sufficient resources to both patrol existing burns and ignite new burns. If funding is an issue, Line Officers, fire managers, and Burn Bosses must understand and utilize the process to request additional funding.

5. **All burns should be started as early in the day as possible.**

   Units should take the necessary measures to have crews in place to start ignition as soon as the fines will support ignitions (especially in the coastal plain). This will help to get things burned out before temps max out, humidity levels bottom out, and fuel moistures bottom out—keeping the fires from burning into organic soils. This is another good reason to expand the use of UTVs with torches to expedite the ignition operations. It will also help with smoke management.

6. **Utilize these small-amount rain events to burn, but, to avoid over-extending local resources, don't go as many days after the event.**

7. **Mop-up standards should be evaluated. More measures than normal may be required during these dryer seasons.**

8. **Document the thought process and the parameters considered before the ignition.**

   This may help pattern some common denominators of things to avoid.

9. **Escapes and unintended outcomes can occur on any burn—even when all the decisions are made correctly.**

   Units should continue to burn and be mindful of their local conditions, but don't lose the aggressive edge when conditions are favorable.

10. Know what all your fire danger indices mean.

Pull up historical data on all values and see what the trends are, including the threshold values when the little things start occurring (such as more spots when the 1000-hour fuel moisture goes below 15).

11. Utilize the older generations of your personnel who are still working on the unit—or even your retirees.

You don't have to know everything, you just need to know where to get it when you need it.

12. Consider evaluating the need for motorcycle-type helmets for personnel driving or riding in UTVs that are equipped with seatbelts and roll-over protection.

Some personnel have reported that the motorcycle helmets reduce their ability to monitor radio traffic and ambient conditions on the prescribed burn.

C. Review Prescribed Fires Where Ignitions Occurred Outside Unit Boundaries and Determine Future Mitigation Actions

The Review Team was also asked to review two Southern Region prescribed fires in which fire was inadvertently ignited well outside of the planned unit boundaries in an effort to determine what actions have been taken and any additional considerations which would reduce the likelihood of a recurrence.

On two separate burn units in 2011 and 2012 fire was ignited outside of planned unit boundaries because the lighters believed they were inside the unit when they were actually outside its boundaries. On one occasion, a lone lighter was instructed to initiate firing on a portion of the unit remote from the briefing area. The lighter traveled by vehicle to a site he believed to be the edge of the unit and initiated firing. He soon realized that he was outside the unit, ceased firing and moved closer to the unit (still outside the unit). He commenced firing again and burned a small area before realizing that he was still outside of the unit.

The second instance occurred when a single lighter was instructed to burn the east flank of a unit, firing cross-slope lines as he moved downslope. A trail marked the unit boundary for several hundred feet and then the boundary followed a dry creek bed. The lighter remained within the unit until the trail ended. Below the end of the trail, intersecting drainages may have contributed to the lighter making a turn to the east and outside of the unit. The lighter ignited about one mile of fire outside of the unit before realizing he had departed the unit's boundary.

Local reviews indicated a need to provide better maps and briefings, as well as greater frequency of unit boundary flagging (especially where well-defined control lines are absent). These enhancements have been implemented at the host units where the above-mentioned events occurred.

It is apparent to the Review Team that the risk of inadvertent ignitions outside of unit boundaries is not confined to a single forest or state in the Southern Region. The large unit size, homogenous cover and flat topography characteristic of prescribed burn units in much of the region, create conditions which may make it difficult for a single lighter to stay on course within a unit boundary.

An additional suggestion which might reduce the likelihood of lighting outside of unit boundaries is to equip lighters with GPS units programmed with unit boundaries. Some GPS units offer a means of alerting the operator when the unit is moved outside of a predefined polygon (in this case the burn unit boundary). Some timber sale contractors in the Eastern Region have adopted this technique to avoid cutting trees outside of unit boundaries.

4. Do We Have a 'Learning Culture' that is Helping to Mitigate Prescribed Fire Escapes?

In this chapter, the Review Team focuses on the second information pursuit they were tasked with by the Southern Region Headquarters Office that surrounds identifying barriers and opportunities for fostering a "learning culture."

- *Given the limited scope of this review, has the Southern Region made progress in creating a learning culture that effectively investigates the occurrence of escaped prescribed fires so that lessons learned from these events are meaningful and have a positive impact on organizational learning? Identify barriers—as well as the opportunities—for fostering a learning culture throughout the Southern Region's prescribed fire program.*

During the last five years, the Southern Region has moved entirely from formal investigations to After Action Reviews (AAR) and Facilitated Learning Analyses (FLA) when responding to an escaped prescribed fire. Almost all of these reviews and analyses conducted during the last five years include mention of the "candid" answers and discussions provided by the participants.

There is a need to record and make accessible all of the techniques, processes, and procedures (tricks of the trade) which have been developed locally to address control problems—which are not incorporated into Forest Manual Supplements or Fire Management Plans.

In some cases there may be a need to provide background information and scientific support for the technique (such as: "We don't burn in March because we experienced too many escapes in March AND we have found through weather analysis that likelihood of frontal passages with strong winds and low RH is substantially higher in March.").

The Region-wide Burn Boss refresher/workshops are viewed by many as a positive forum for shared learning. Most personnel interviewed would like to see these continued.

It is recommended that the Southern Region provide a forum for fire managers who have been on the receiving end of a learning review/FLA to discuss it on a conference call or other public or private venue. This could provide meaningful feedback on how to conduct the reviews/FLAs, as well as potentially alleviating fears for people who may be apprehensive. (One of the primary observations identified in the recent *"Using Escaped Prescribed Fire Reviews to Improve Organizational Learning"* Joint Fire Science Program national workshops was that it seemed helpful for people to be able to talk openly about their experience with reviews.)

"Credit risk, market risk, and operational risk must be determined at the business level and then calculated into the overall risk faced by the enterprise. Only an enterprise-wide focus on risk allows institutions to understand how interrelated risks can impact the organization."

Bill Githens
Risk Management Associates

Program Organize lessons learned more effectively. Post strategic and tactical innovations for managing risk to an accessible site with a robust search engine.

Adhere to standard format/file type (searchable abstract with key words).

A. Communication

Establish monthly regional FMO calls (or weekly during Rx fire season) to discuss conditions, local responses to conditions, burns with increased risk and what local units have done to mitigate elevated risk, as well as the potential need for assistance at a later date if conditions worsen).

Assign an individual to manage prescribed fire information/lessons learned/risk condition information. This Individual would be responsible for:

- Recording minutes of weekly conference calls.
- Organizing and making accessible (website/ezine/blog?) lessons learned/innovations, etc.
- Staying current on risk conditions on all Forest/Districts in the Southern Region and ensuring that this information is conveyed to all who need to know. (For instance: five landscape scale burns that are not out on the Osceola; two weeks without rain and forecast for at least two to three weeks more without rain; Forest has established procedures to limit likelihood of escape.)
- Providing targeted messages to individual Forests on emerging higher risk conditions and the tools/techniques/procedures which have been successfully implemented by other units with similar conditions

While this individual should be thoroughly familiar with the Rx fire program in the Southern Region, they could be working from a detached location.

B. Shared Risk Management

Many organizations have recently been emphasizing the merits of "shared risk management." When risk is shared across all organization levels, potentially negative outcomes are reduced in frequency and severity.

"As long as I followed policy and direction I would expect to be backed by the RO and supported if I had an escape."

"We are moving in the right direction but we just gotta keep giving the message until people get it and see we mean it."

"I would love to feel like someone else was sharing the risk…but I really don't feel like that anymore."

Various Line Officer Comments to Review Team

Clear communication of risk versus benefit and risk mitigation planning provides understanding, acceptance, and support (both political support and substantive support) by higher organization levels for local level projects.

Fire managers at the District level are effective at communicating risk to their District Rangers. This is fostering a "shared risk" effort at that level. When local prescribed fire managers implement prescribed burns with full knowledge of elevated risk due to extended dry periods or other factors it is important that the project's level of increased risk and mitigation actions be communicated to higher organization levels (Forest and Region).

Communicating this risk enables the Forest and Region to offer assistance and support in risk mitigation prior to implementation. In addition, the higher organization levels are able to consider collective and cumulative risk across the Forest and Region and to develop contingencies which could be implemented should conditions become adverse.

Should conditions become severe in multiple areas, some level of "risk sharing" with the national office is appropriate to ensure that national resources can contribute..

C. Line Officer Summary Input

Line Officers (predominantly District Rangers) throughout the region were interviewed to assess the degree to which the region has adopted learning culture concepts. The following questions were asked in the interviews:

1. Have you ever experienced an escape?

    A. What was your response?
    B. Were disciplinary actions taken?
    C. Should disciplinary actions be taken?
    D. Should disciplinary actions be taken if any policy or standard procedures were not followed?
    E. What are your criteria for declaring an escape?
    F. Do you feel there is a stigma attached to having an escape?

2. Do you have any thoughts on how to improve as a learning organization—locally, Forest-wide, regionally?
3. What is the current condition locally, Forest-wide, and regionally regarding the sharing of risk associated with implementing prescribed fire?

Escapes

Out of the nine Line Officers interviewed, five have experienced escapes. Only one Line Officer stated that disciplinary action resulted from the findings of the review. When asked if disciplinary action should be taken, most Line Officers said no—unless "gross negligence" was a factor. However, many said that they feel that any violation of policy justifies disciplinary action.

In declaring an escape, the majority of Line Officers interviewed said that resource damage to private land was the primary factor in their decision, particularly if that damage was significant or was likely to result in a claim. Line Officers appreciate having the flexibility the current policy allows in declaring an escape.

As for the stigma of having an escape, many Line Officers don't feel it would be a career-ending or damaging event, but nearly all acknowledge that the stigma is still there.

It seems that Line Officers with the longest tenures are less concerned about stigma. Two District Rangers made comments to the effect of: *"If we do it long enough and burn a lot, it will happen eventually."*

One Line Officer remarked that when she and her Forest FMO were discussing declaring an escape, she asked: *"Why are we so averse to declaring wildfires?"* Then, when her subsequent decision triggered a review she remembered the hesitancy and realized that declaring an escape brings on a lot of external scrutiny and additional work in explaining what occurred and why it occurred *"all of a sudden more people are involved in your decisions"*.

Learning Organization

All of the Line Officers interviewed feel strongly that we are making progress as a learning organization, but, at the same time, nearly all of these people concede that we can *"do better."*

Their primary concern seems to center around sharing our lessons.

One District Ranger admitted that she probably had not done a good job of sharing lessons even with the other Districts on her same Forest. Another ranger said: *"We need to do better at sharing the information. Telling the story and getting it out will help build trust."*

As previously mentioned, the widespread use of After Action Reviews and the movement toward Facilitated Learning Analyses are two important practices in cultivating a learning organization.

Another common theme that surfaced in this review process was that if learning is supported at the Forest level, then it typically translates to the District level. One District Ranger remarked: *"We need line leadership at all levels to be supportive."*

An indication of how far we still to need to proceed as a learning culture is a prevailing attitude still exists from many Line Officers that fear of "witch hunts" is still very real. Because we did things the old way for so long it's easy and expected to revert back to the "bad ol ways" of castigating blame/fault.

There are Districts where FLAs are becoming commonplace. Units that use FLAs often seem to feel more positive about them and view them as a useful tool for getting at and sharing lessons learned.

One District Ranger remarked: *"We (the District) live in a world where we do FLAs on a regular basis."* Moreover, this ranger is working with local cooperators to go that route as well.

Shared Risk

All Line Officers said they share the risk with their Burn Bosses and FMOs. Most said that's how it should be. Many felt the risk ultimately lies on their shoulders, but a couple did say it should be solely on the Burn Boss, The attitude of shared risk upwards in the organization changes at the varying unit levels.

Almost overwhelmingly, Districts felt the risk was shared less at the Forest and even less at the Regional levels. Most felt *some* level of shared risk at the higher levels, but the feeling that it "diminished" up the line was prevalent.

A few District Rangers even mentioned that they felt no risk sharing took place between their District and the Forest or Regional level.

The burn prescription variance process was often cited as "sharing risk" with the Forest and Regional Office. Two District Rangers said that there is a "disconnect" at the Regional Office with shared risk. Rangers do feel that the risk is shared more from the fire organization than from line at both the Forest and Regional levels. One District Ranger remarked: *"I would love to feel like someone else was sharing the risk…but I really don't feel like that anymore."*

Recommendations by Line Officers for improving sharing/learning:

- Each unit add local lessons learned to their annual fire refreshers. Random FLAs from somewhere else don't mean as much as lessons learned locally.

- Provide shadow assignments for Line Officers on Rx burns. This is done for wildfires., The experience and skills are also needed for the prescribed burning programs.

- Bring Law Enforcement into the "learning culture." There have been instances of Law Enforcement "investigating" burns that have gotten onto private land and damaged resources. Unfortunately, these were not done in the spirit of learning, but were more punitive in nature and did not provide the employees with a positive learning experience.

D. Specific Line Officer Commentary and Insights

The following is from the Review Team notes from interviews with Line Officers representing most of the Forests in the Southern Region.

Line Officer 1

1. Escapes

- Has had no escapes as ranger. It would absolutely matter on what action is taken depending on if policy were violated.
- If someone chooses to "game" and make a gamble violating a guideline it could potentially result in disciplinary action.
- Criteria to declare an escape – if fire presents a hazard to public or FF safety e.g. smoke.
- Stigma – *"Yeah. I don't know how we'll ever get away from that."*

2. Learning Organization

- AARs should be conducted on all Rx burns regardless of outcomes. There's something you can learn on every one of those.

3. Shared Risk

- Comfortable with shared risk.
- Variance process is best example for that up the ladder.
- Ultimately it's the person on the ground who strikes the match; that's where the risk responsibility belongs.
- The Go/No-Go checklist for the DR is sharing risk; makes sure parameters in place are good.
- The RO could work a little harder to take the target pressure off.
    - Feels like the pressure from RO comes down from other areas, not fire such as Timber Management and Line Officers.

Line Officer 2

1. Escapes

- Oh yes (has had escape). No disciplinary action was taken.

- Declare when fire damages or has the potential to damage private property or resource damage (eg Christmas tree farm) – if a claim is likely.
- Requirements to declare – leave as broad as possible – tie back to resource impact.
- Hold people accountable but that doesn't mean kick them out the door.
    - Raise awareness.
    - Develop a learning culture as opposed to discipline.
- Stigma – the threat is always there. Punitive action isn't always shared due to confidentiality but info needs to get out.
    - As long as I followed policy and direction I would expect to be backed by the RO and supported if I had an escape.
    - If I step into the gray I would expect to be held accountable.

2. Learning Organization

- Would like to see shadow assignments for line on Rx burns. The emphasis now is on wildfires but we don't take advantage of doing that on the Rx fire side.
- Sharing the info – tell the story and get it out – will help build trust.

3. Shared Risk

- There's a disconnect at the RO with shared risk.
- At the Forest level it's more shared with the fire shop but doesn't tier over to the Forest Supervisor.
- Fire Shop in the SO deals with RO, strategic planning and info sharing in those strategies.
    - Would be nice to have a Fact Sheet on issues the Forest is facing and have it available for the RO.
    - Challenge getting fire in the right places at the right time.

Line Officer 3

1. Escapes

- No escapes as ranger.
- Declaring an escape could be due to unacceptable resource damage (on and off Forest) and potential for claim.
- I have two helicopters available so funds is not typically an issue with declaring.
- Has had five incidents with smoke on District resulting in five reviews.
    - These processes have helped us "refine our craft" in how we look at smoke.
    - Changed and led us to come up with additional tools over and above regional requirements.
        - Atmospheric checklist.
        - Night patrols (in Forest supplement).

- Stigma – need to look at all factors – if negligence or unacceptable risks, then yes there could be for Burn Boss. Me, personally, no. *"If you do it long enough it will happen. If it doesn't, you're not burning enough."* "

Line Officer 4

1. Escapes

- Impassable Bay is the only one I know that had disciplinary action.
- Is disciplinary action warranted? Of course, if negligence is a factor or failures to follow procedures.
- If everyone is doing what they're supposed to be doing we don't want to discipline employees for doing their job.
- It's a funding challenge to pay cooperators for help with burning.
- Stigma – No for staff. I said to Fire Staff: *"Why are we so averse to declaring wildfires?"* Then realized why, when the phone calls started coming. *"It's definitely a hassle when all of a sudden more people are involved in your decisions."*

2. Learning Organization

- *"We gotta get better at how we share it."*
- Pleased with the openness and dialogue our folks bring to AARs.
- *"Even across Florida we could do better."*

3. Shared Risk

- *"Personality driven."* Some rangers are reluctant to communicate early because of perception of lack of control (increased involvement of others).
- Develop relationships before the crisis situation arises.

Line Officer 5

1. Escapes

- Yes, has had an escape. No disciplinary action.
- Try not to call it an escape if we could.
- If we start punishing people for spot fires we will run out of burners.
- If we don't need to declare it, we won't.
- Stigma – *"Yes. I do. And maybe it's just perceived, but that can be real."*

2. Learning Organization

- Safety journey – talk more openly so we learn.
- *"We are moving in the right direction but we just gotta keep giving the message until people get it and see we mean it."*

3. Shared Risk

- *"I would've answered this differently before. Today, as a District Ranger, I feel like it's all sitting right on our heads, right here on the ground."*
- Everything gets under the microscope if the least little thing happens. We get regional stand-downs.
- It's a risky business, and not just fire. Things happen. We drive, we fight fires. The wind blows trees down.
- *"On the District, the risk is mostly mine, but I'm sure my Burn Bosses would mostly think it was him or her."* We all take our jobs seriously.
- *"I get all the risk but I'm not the one making the decisions anymore. Sometimes I wonder what my job really is."*
- *"I would love to feel like someone else was sharing the risk…but I really don't feel like that anymore."*
- *"Why would anyone in DC give a rat's butt on who I hire for a GS-7 fire position?"*

Line Officer 6

1. Escapes

- No escape as DR.
- Disciplinary Action? Depends. Could be if didn't follow burn plan, or weather. Sometimes crap happens, though. Outside of policy, yes.
- Stigma – No. I'm eligible for retirement. But every time we have an investigation, there's a witch hunt. And that could affect careers. Those teams HAVE to find something wrong.
- What would cause you to declare? Money shouldn't be a factor in declaring – there should be different reasons to declare than money. It's often a "gut call." When the hair on the back of your neck stands up – all the factors figure into it.

2. Learning Organization

- Cherokee does an outstanding job. I have eight Burn Bosses and have spent a lot of time and energy getting people qualified and experienced. We do a lot of Rx burning and balance it out with getting experience – rotate Burn Bosses.
- Our ICT3s spend a lot of time mentoring trainees and delegating so folks get experience.
- This comes down from the Forest Sup who has a passion for fire and does believe that every day is a burn day.
- *"We need line leadership to be supportive."* Line officers have to be willing to spend money for training and then let folks go on assignments.
- There is a lack of fire leadership above the Forest level.

- AARs are for the groups that are involved and don't need to be written down. Folks are leery of sharing because of the "head hunt" philosophy – *"It's a real fear factor."*

3. Shared Risk

- If something goes to hell in a hand basket, it all goes on the District Ranger. The risk should be there.
- Yes, the Forest shares risk.
- I haven't had to find out about the RO. I like to think that RO fire would be supportive.

Line Officer 7

1. Escapes

- Has not had as District Ranger, but has been involved in them as burner. There was no disciplinary action.
- I would not pursue disciplinary action except in a *"very, very, very rare case." I can't imagine that ever happening".* I have 100 percent confidence in my employees. If something like that happened, *"I'd have to point the finger at myself."* That would be a tough path. Better have really good evidence as to why you're going there.
- Other than current policy, I might declare an escape if I thought there might be a claim. Factors change the way you look at it. Would need to look at it closely.

2. Learning Organization

- We are on the District. It's a world where we do FLAs on a regular basis. And we are trying to get our partners to go that route, too.
- Rx fire leads the way. There are more opportunities to learn because we do so much burning.
- The Region is doing an excellent job of sharing learning, but we still have a long way to go.
- Fear is still there where *"the hammer comes down."*
- I still see us revert back to the old ways of punishment, especially with accidents – all accidents whether it's a vehicle or Rx burn.

3. Shared Risk

- We share risk certainly at the District level day to day.
- Forest, pretty much.
- RO, probably not.
- I hope the Line Officer and DFMO have discussions daily and that they plan ahead together.
- Forest level is doing a good job. Could do more, sure.
- The RO (fire) is trying to help us with burning, eg providing modules.

- The RFs have a tendency to revert back to the old ways – we've done it that way for so long it does become a "CYA" thing.
- It's going to take time. It's easy to say we are a learning culture when not much is going on, but when something happens it's easy to revert back to the old ways.
- When we've had incidents, the Regional Forester and Deputy Regional Forester have jumped in to help and have been more concerned about the welfare of the employees.

Line Officer 8

1. **Escapes**
   - Had one in five years as a Ranger. Burned less than 10 acres outside, got close to private land beyond what we'd intended. No disciplinary action. Did lessons learned/AAR and used lessons to change how things are done.
   - Stigma – there's no doubt some people feel this. Personally, it doesn't impact me. I do not worry about it at all, but Burn Bosses are aware. *"As Line, I wish I could take all that risk away from them."*
   - I thought escapes onto private land was automatic conversion requirement.

2. **Learning Organization**
   - *"We are saying we are. I believe we are trying."* Definitely, the message is being sent from the RO and Forest levels.
   - Hard to get past the punitive culture that's been ingrained for so long.
   - Folks are scared from a liability standpoint.
   - We are getting better. Line might say it (that we are getting better) more than people at the ground level would.
   - RO level – could do better to share information and lessons learned.
   - Could be more efficient and do better job at getting experience for Line Officers on Forests with little fire (Line Officer Cert). I have done shadow assignment, but I don't feel I can do adequate job as Line with all the responsibilities needed for wildfires.

3. **Shared Risk**
   - I still think the Burn Boss has that risk but I hope they feel like I'm supporting them.
   - There's a push from the RO, Forest, and me to get acres burned, but not by compromising safety.
   - We do talk about the number of acres. There is pressure, but again not at the expense of safety to get acres.
   - Saying that, there haven't been any repercussions for NOT getting acres burned.

Line Officer 9

1. Escapes

- Yes, has had several in 10 years as DR. No disciplinary action.
- The older escapes had traditional reviews often with folks coming in from outside Region. More recent have used FLA process.
- Two escapes were because got onto private timber land in pine plantations and knew there would be claims.
- Needed to open P-Code for extra resources.
- Likes the flexibility of current policy. Private land is not automatic trigger point – have had burns get onto private that weren't declared.
- Would only use disciplinary action if gross negligence.
- Had Rx burn that burned up private property. LE got involved and came after the employees. Had been trying to promote "Just Culture" and learning, and then LE made folks feel like they were looking to find blame and "pin this on someone." There has to be a different approach with LE. LE needs to get the message about learning and Just Culture. Made folks feel very uncomfortable.

2. Learning Organization

- District and Forest are doing a fine job.
- People at the RO are trying to facilitate that as well.
- One of our burns was responsible for a regional Rx burn stand-down. Regional stand-downs don't work. *"We wasted good burning days."* We had our own District stand-down and addressed issues.
- We need to do a better job of sharing lessons learned/FLAs. We haven't even been good at sharing our FLAs with our sister Districts.
- Has proposed that a portion of fall fire refresher is dedicated to lessons learned and take-home messages – talk about FLAs and other lessons over the past year.
- Drought – we made some calls to look at fuel loading and fuel moisture more closely and we continue to monitor these. Probably more closely now.

3. Shared Risk

- *"The Burn Bosses know that, ultimately, all risk lies with me."*
- We talk about the risk.
- With the two escapes and the burned bridge I showed that my support is unwavering.
- Have red card and line quals and get out on the fireline. Used to be ORA and so had fire under me.
- SO is coming in line with risk. I feel better now than I have. I feel comfortable with the SO and risk.
- The RO, they're fine. Feel like folks in RO fire support us.

Line Officer 10

1. **Escapes**
    - Yes, fire crept across a stream in two locations and got onto private land – one location where the stream went underground for about four feet and another place where the channel was dry but had continuous leaves and grass.
    - We notified the landowner by letter and phone to discuss the matter. We also made ourselves available to go out with them, which they did not request. Their nephew is a forester and determined no damage was done. No disciplinary action was taken.
    - Now we ensure that streams are checked by someone to ensure fire cannot cross.
    - In my opinion, disciplinary action should be taken if policy is not followed.
    - Is a stigma attached to an escape? Yes, I think there can be. [In my escape] the Burn Boss nor I felt any repercussions. But if the landowner had filed a claim, I'm sure both would have had to explain. The Burn Boss would probably feel the greater burden…they are directly supervising the burn.
    - Other criteria for declaring an escape: I am sure it should include escaped fire onto private land. At times we have spots on FS property outside the burn block we are burning, but none have been declared an escape. To my knowledge, none have been outside an approved burn block.

2. **Learning Organization**
    - I think we [Southern Region] are doing fairly well. We listen to our employee concerns and act on them.

3. **Shared Risk**
    - I think we have shared risk if there is a change and needs approval at multiple levels.
    - We do very thorough analysis before conducting a burn and have analyzed potential risks. I think the District takes the bulk of the risk but we have assistance /support from the Forest and Region, particularly with smoke management. Our fire staff officer and Forest FMO are very active participants in our decisions.

5. Summary

The Southern Region's Prescribed Fire Program enjoys a remarkable record of accomplishment coupled with very low incidence of undesired outcomes. Risk management techniques developed locally and regionally, along with a culture of continuous improvement, has contributed to this Region's excellent record.

This report has documented numerous techniques which are being implemented locally, but, at least in some cases, are not known throughout the Region.

Each local unit may gain incremental improvement in risk management of its prescribed fire program through adoption of one or more of the techniques discussed in this report. Several considerations were identified which could be implemented by the Region for enhancing prescribed fire risk management across the Southern Geographic Area, including:

- Provide staff support for organizing lessons learned and making the information readily accessible by all prescribed fire planners and implementers.

- Develop a framework for documenting individual prescribed burns which:

    - Identifies specific environmental parameters under which each burn is implemented.
    - Provides a narrative of fire behavior (with photos).
    - Describes the degree to which objectives are achieved.
    - Describes control problems.
    - Is easy to complete in a short time.
    - Is stored/archived in a standard location (e.g.: O drive).

This documentation can then be used by planners and burners in the future to emulate success and to avoid previously encountered problems.

Learning organization philosophies are widely known, understood and embraced within the Southern Region. However, not all personnel or Districts or Forests have fully adopted learning organization concepts.

There appears to be an opportunity to make additional progress toward full adoption and consistent application of learning organization principles. Providing additional learning organization training and guidance (with an emphasis on practical examples) to District Rangers, Forest Supervisors, and other influential regional staff could make meaningful progress in this area.

6. Review Team

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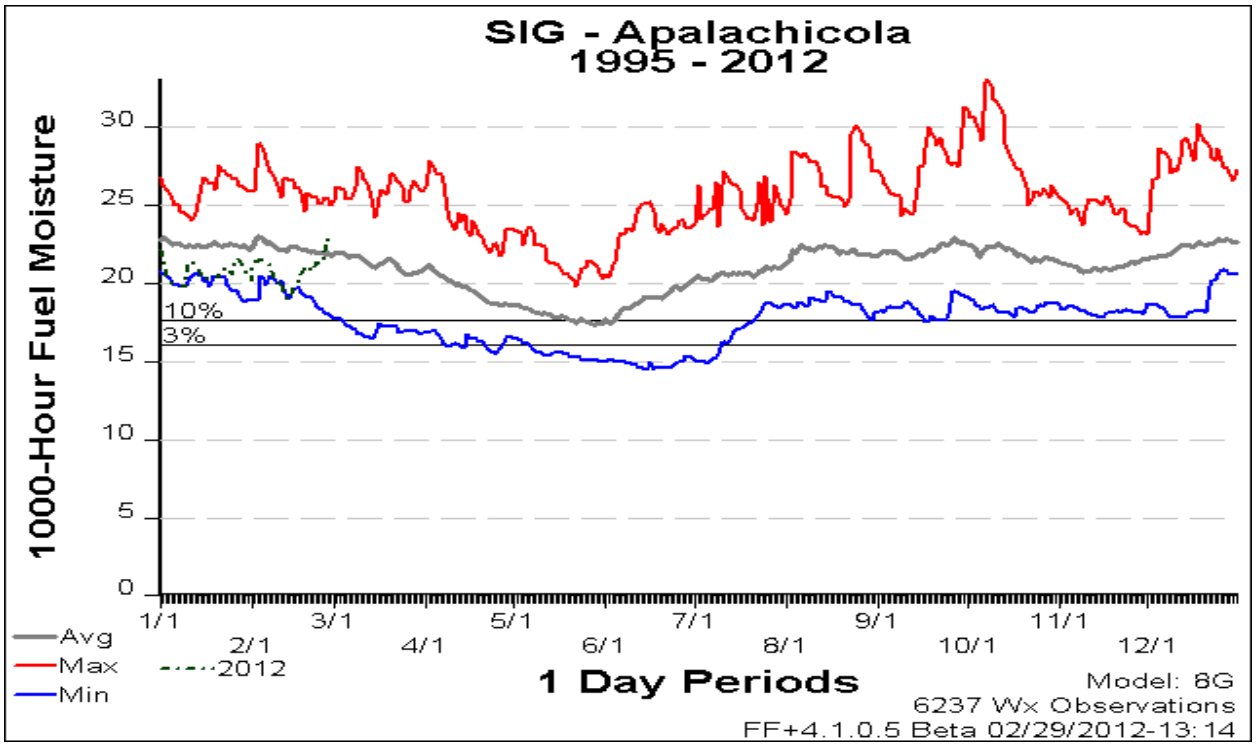
7. Appendices

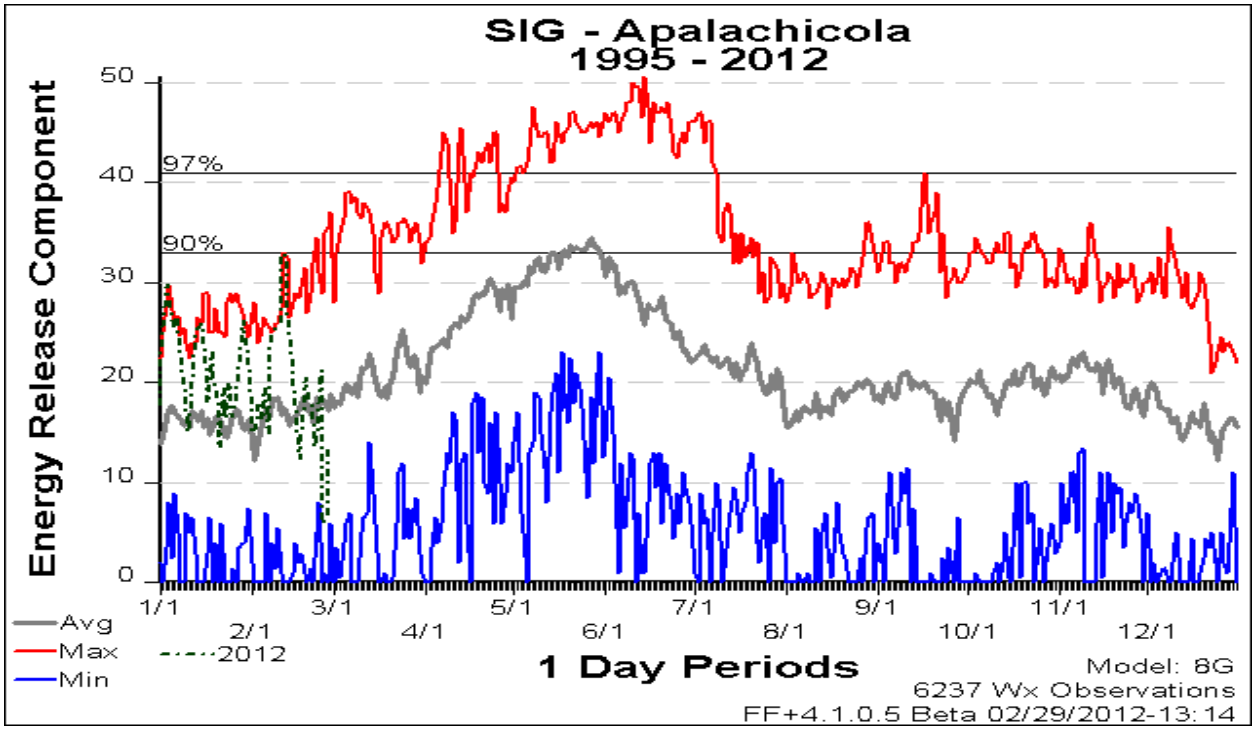
Appendix A – Action Plan

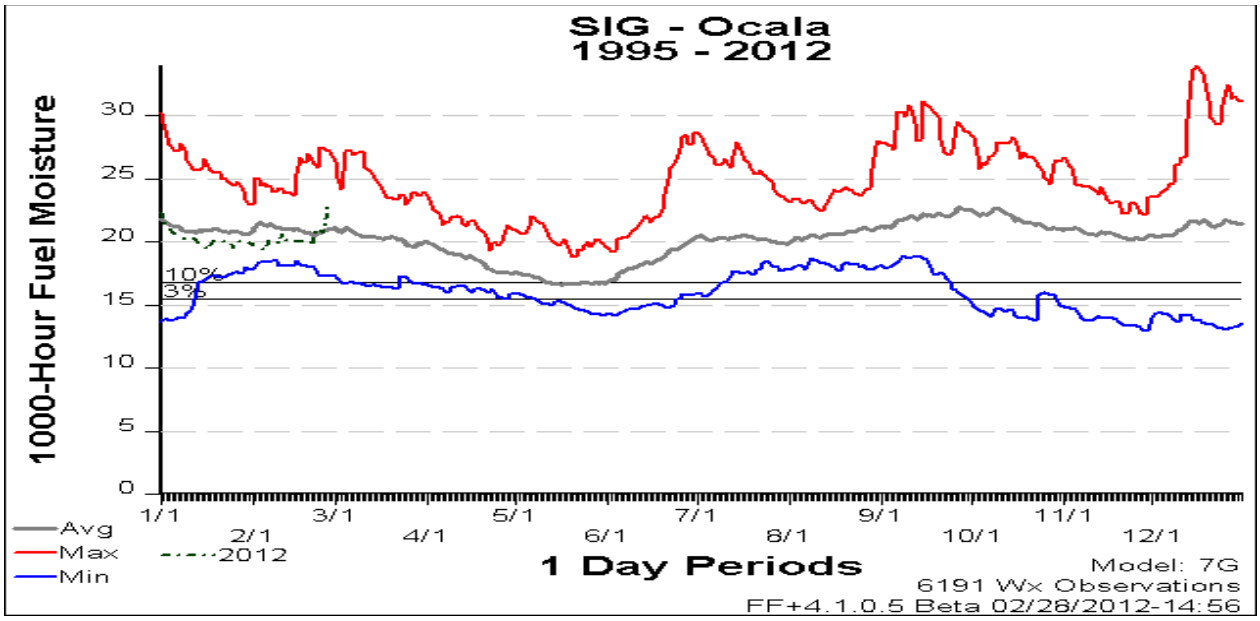
Action	Responsible Party	Cost	Date to Complete
Develop/hire point of contact for lessons learned (could be WAE employee with R8 Rx fire experience from different Region)	R8 FAM		
Develop accessible and sortable site for lessons learned	Above position		
Develop Rx Fire "shadow assignment" program for inexperienced line officers	R8 Fire Training/LO		
During burn season, conduct weekly Regional FAM conference calls to keep abreast of Rx fire situation	R8 FAM		
Document all Rx burns in a standard format including actual Wx obs, fire behavior narrative, control difficulties, and rating of objective achievement. Archive in a sortable database.	Position ID'd above? OR do we see what LLC does with website?		
Develop and implement training/information program to enhance Line Officer and fire manager awareness of policy and flexibility for prescribed fire escape declarations.			
Develop and implement a training/information program to enhance Line Officer and fire manager awareness of learning organization principles (especially where disciplinary action is not recommended).	RLT has already established?		
Develop and implement a training/information program to enhance Line Officer and fire manager awareness of shared risk concepts and the Southern Region stance on sharing risk associated with prescribed fire.	R8 FAM – work with contractor		
Share learning organization principles with LE&I.	R8 FAM/RFs		

Appendix B – Fire Danger Analysis

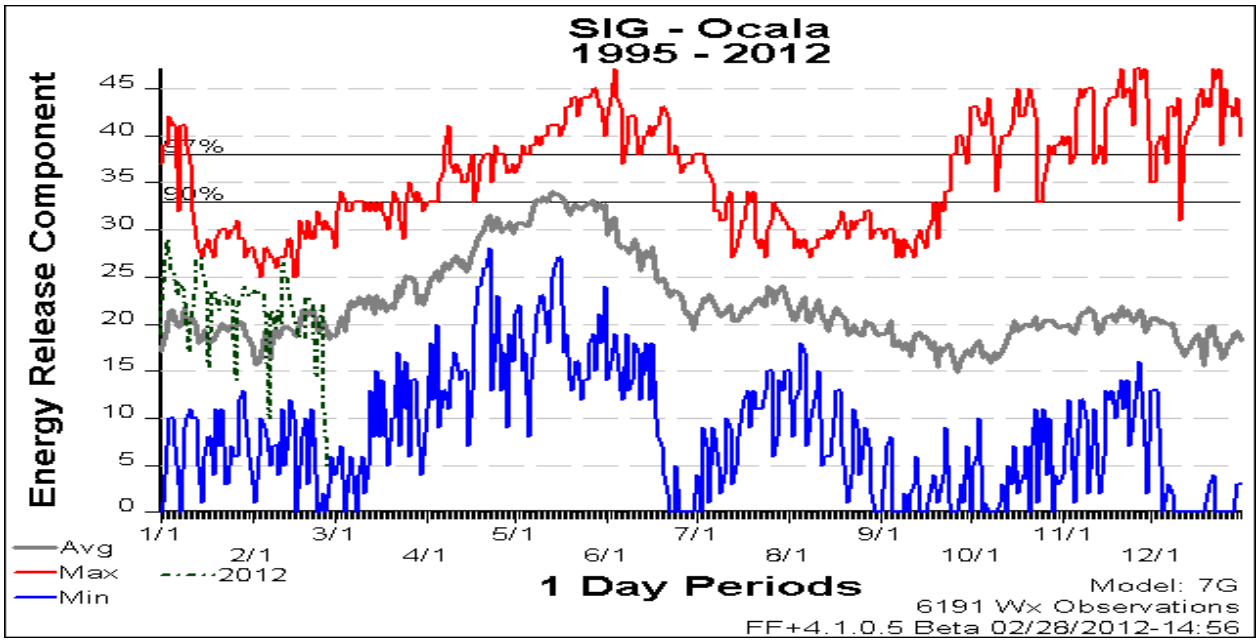


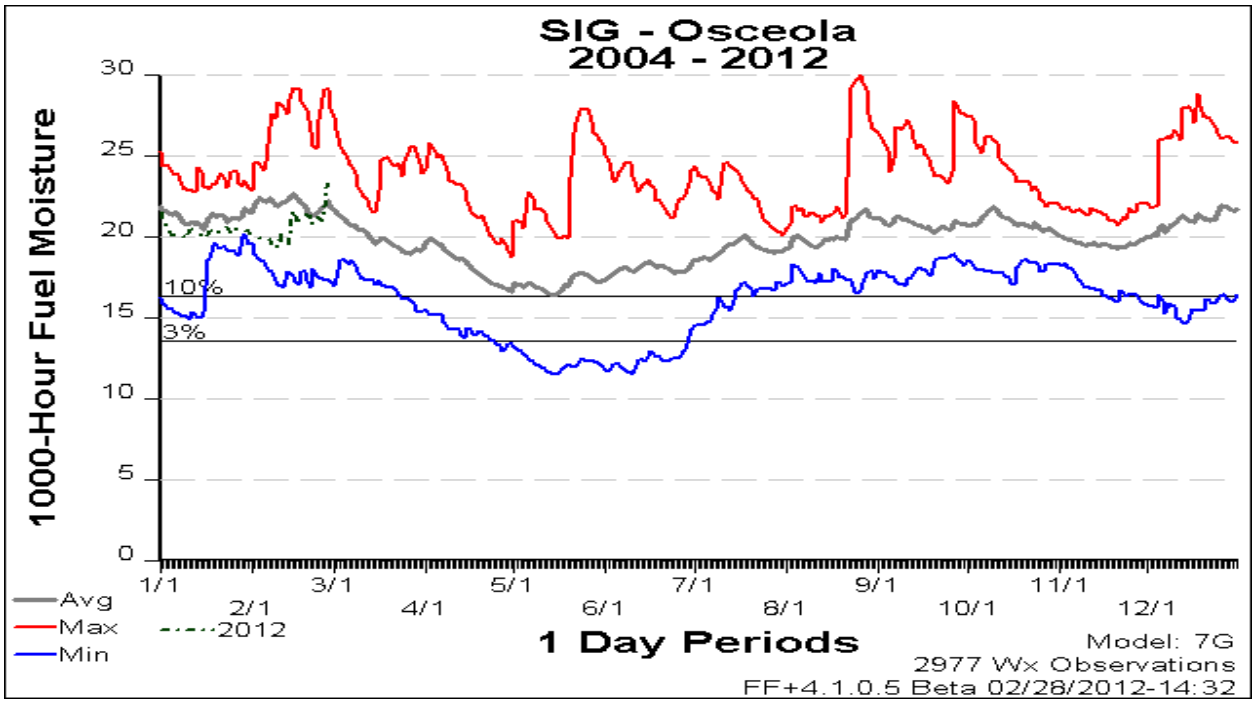
The **Apalachicola National Forest** recently had the Grand Bay wildfire. This fire burned on Feb. 12, 2012. The Energy Release Component graph above shows a spike to the 90th percentile on the day of the fire. Conditions have since moderated as a frontal passage brought long durations of high humidity and some measurable precipitation.



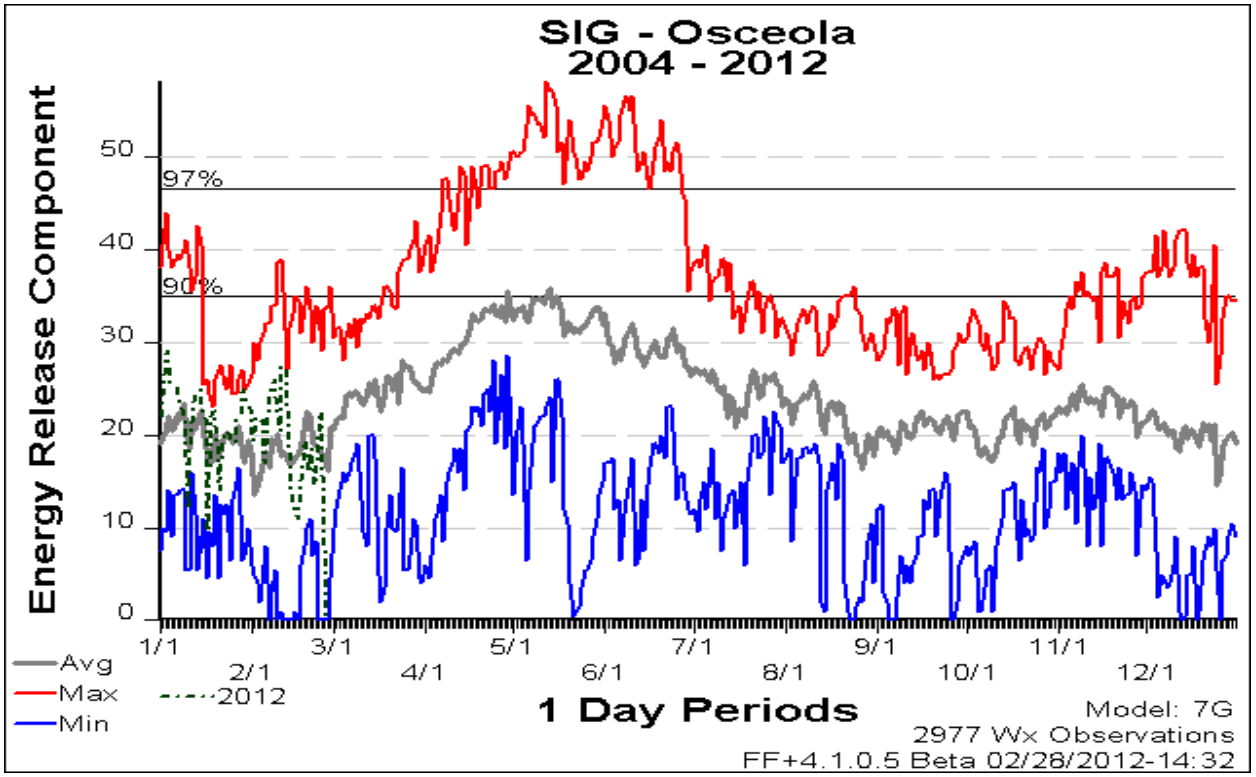


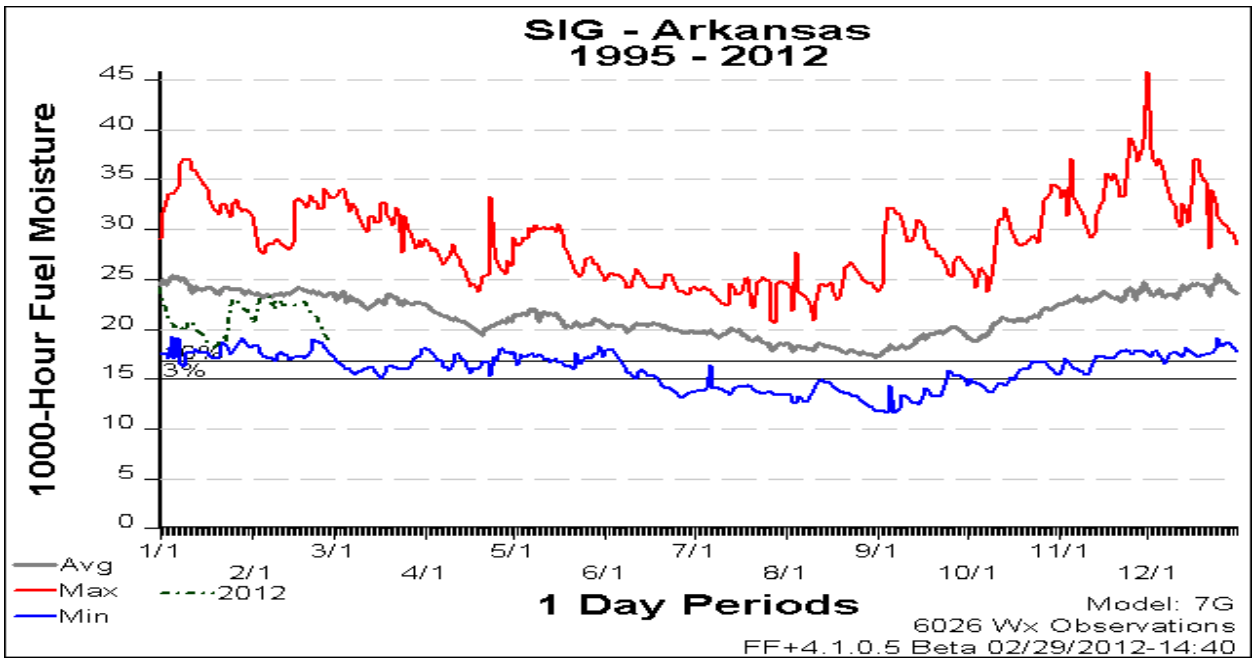
Fire Danger on the **Ocala National Forest** is average for this time of year, however a look at the ground water at USGS sites adjacent to the Forest reveals lower than normal water levels. This is a result of the long-term drought which is forecast to persist. Although fire danger is average now, this situation will likely change as cold front passages in March will bring lower humidity values.



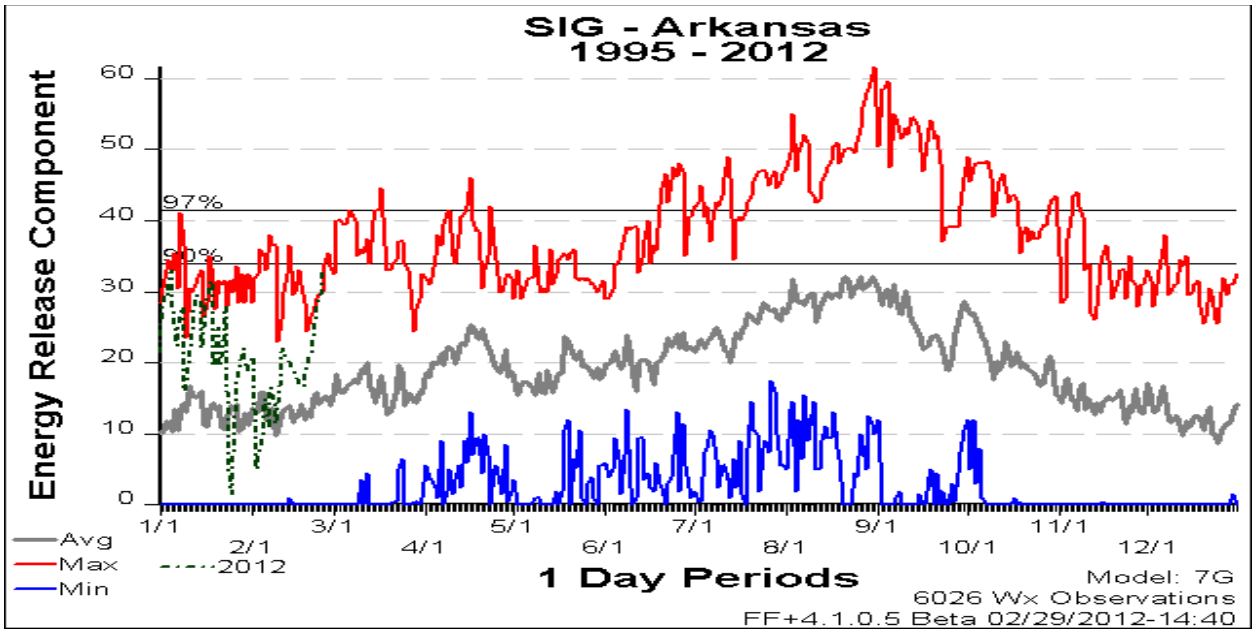


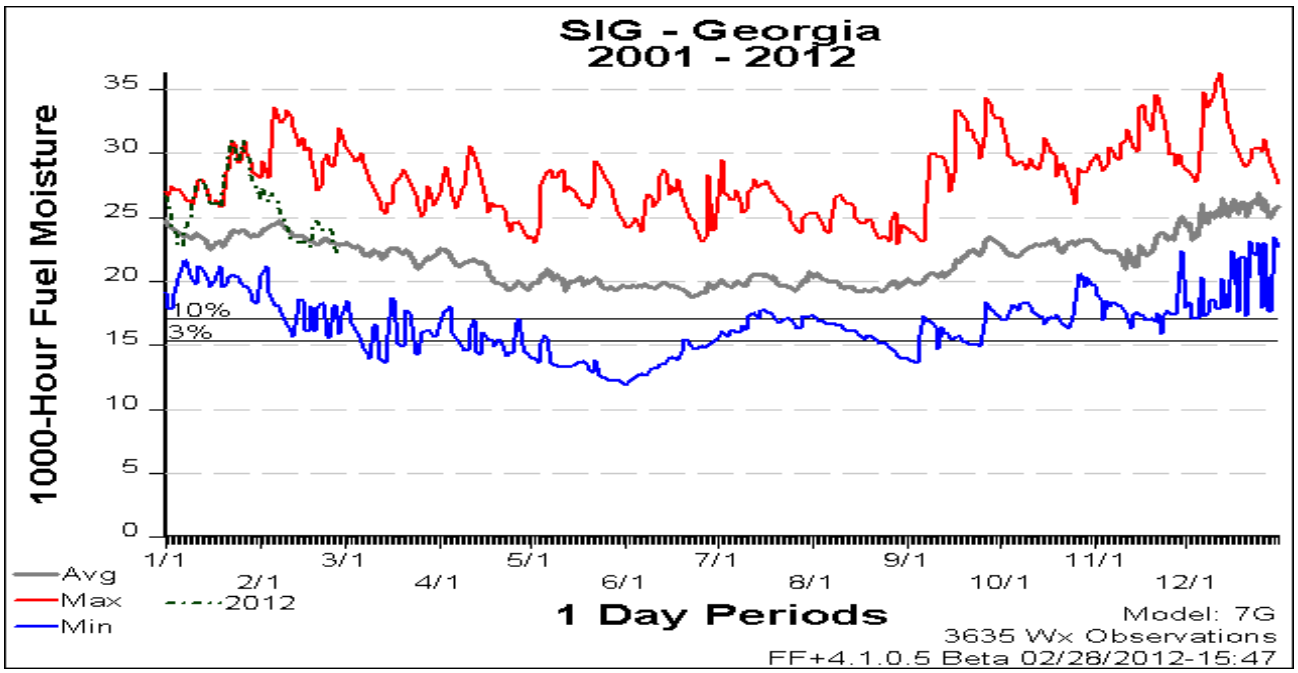
The **Osceola National Forest** also shows average fire danger for this time of year. However, like the Ocala ground water, levels are significanly below normal. This Forest is at significant risk for organic soil fire. Expect fire danger to increase dramitically through March and April 2012.



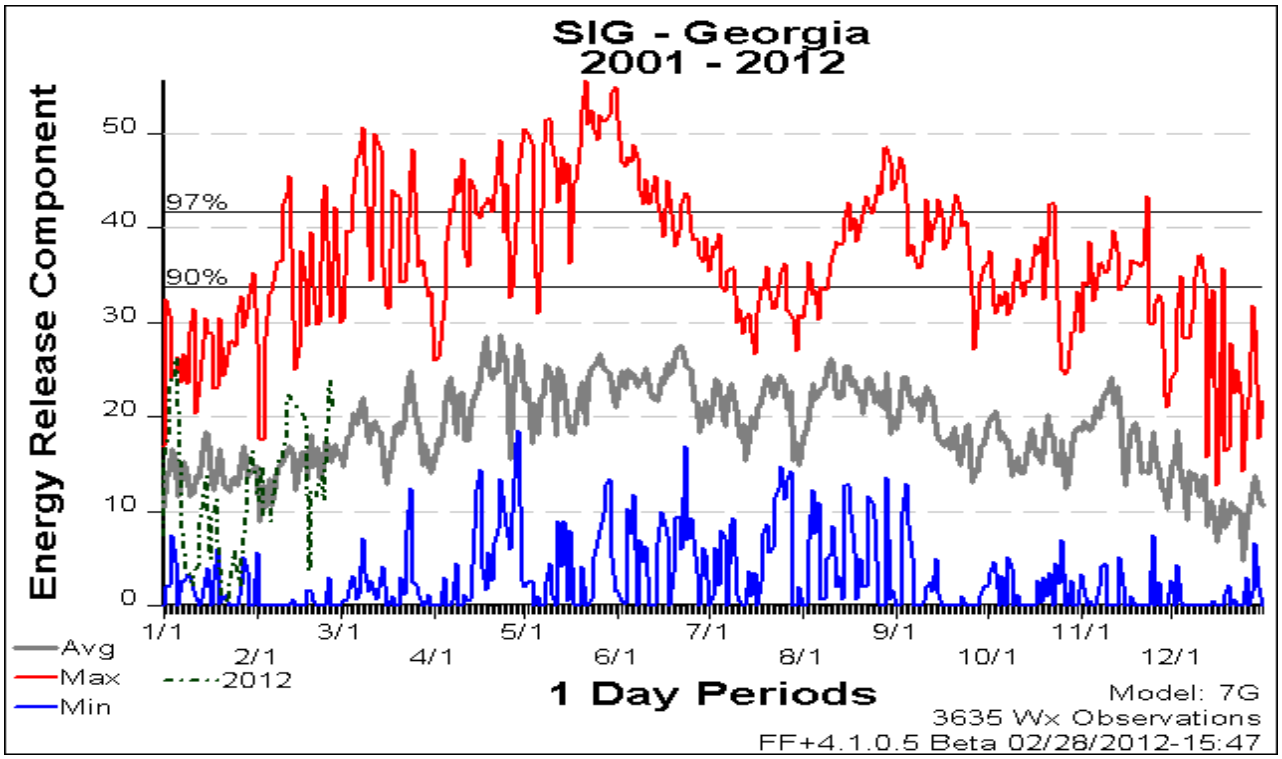


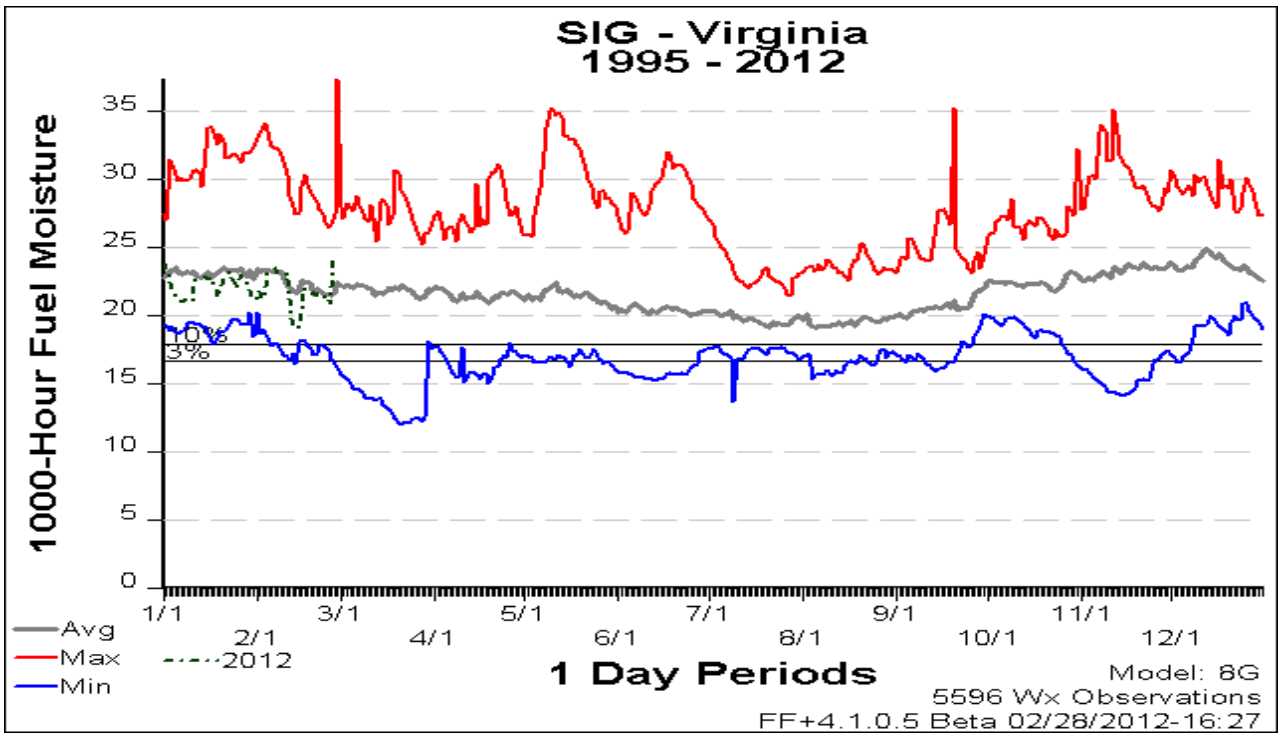
Fire danger is currently escalating across Arkansas, however long-range forecasts do not show that this trend will continue. 8-14 day outlooks show above average chances of precipitation which will likely decrease fire danger back to near or slightly above average.



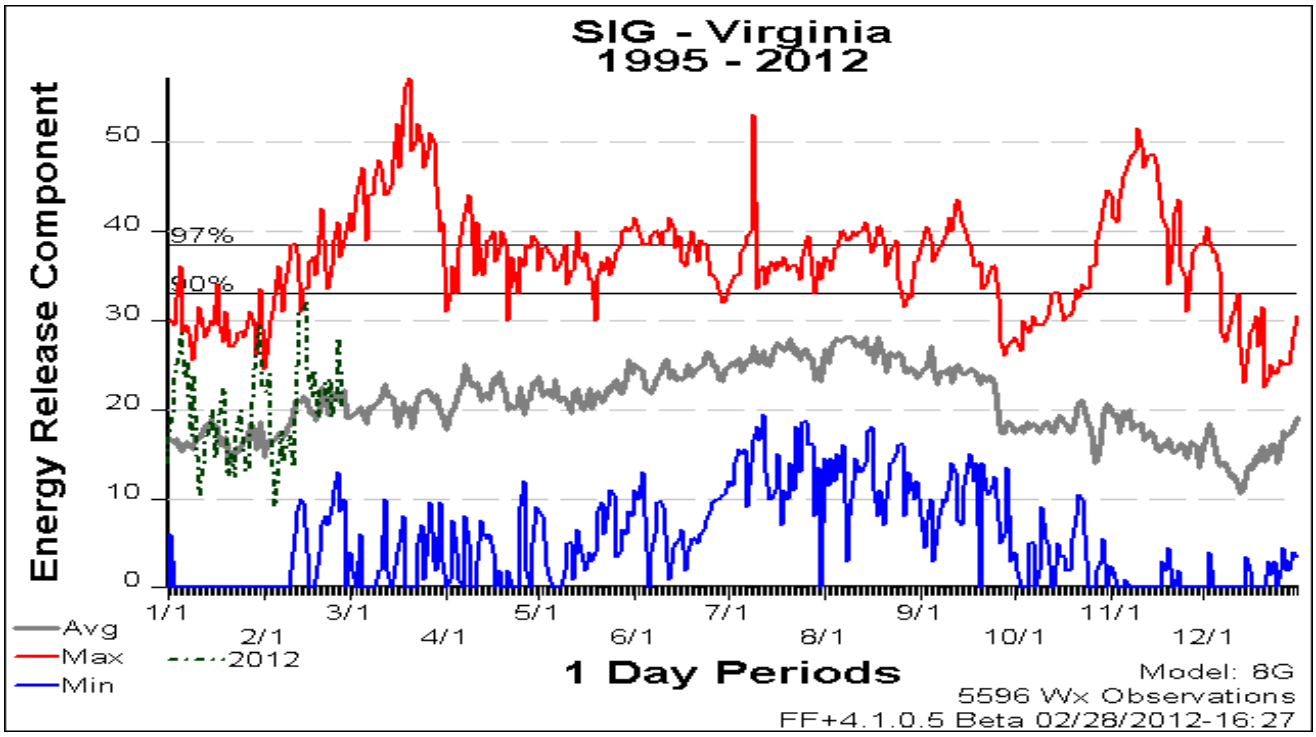


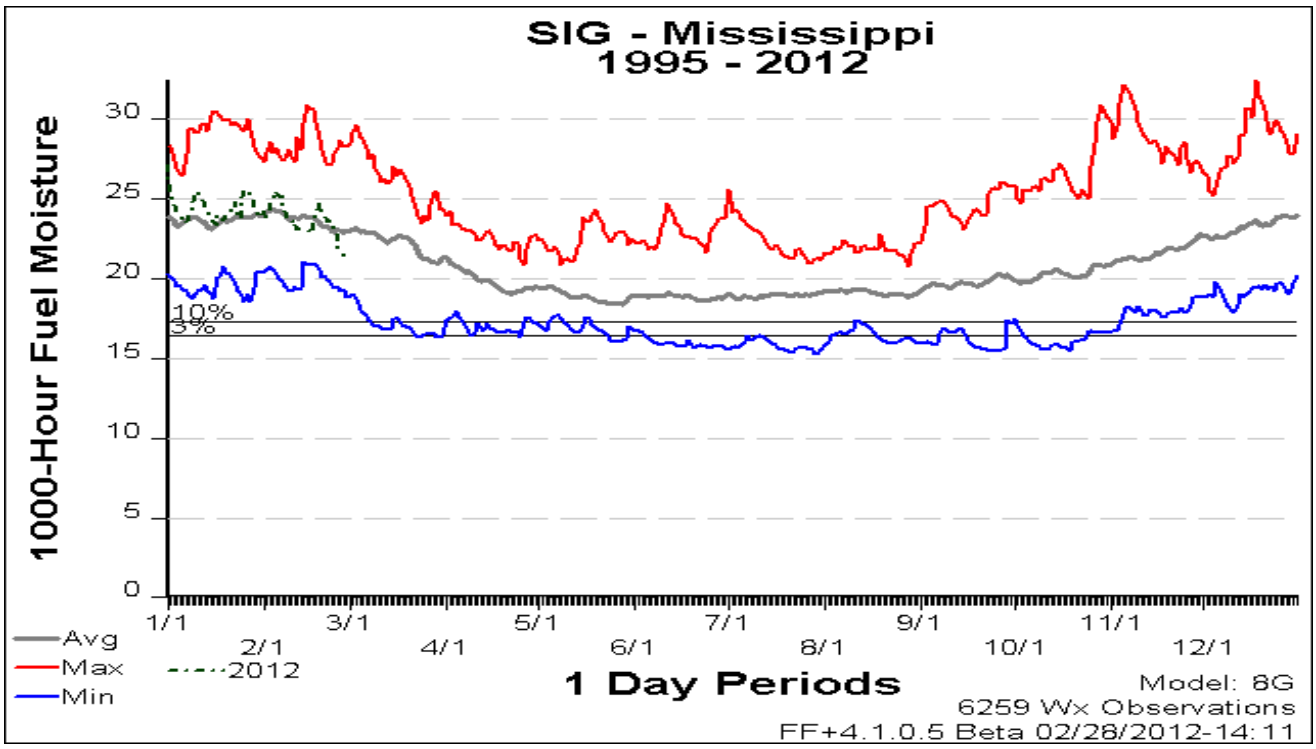
The **Chattahoochee-Oconee National Forest** is currently drying out and could show some elevated fire danger prior to greenup of hardwood forests. Areas in the piedmont with more mixed pine hardwood forests will likely experience fire danger similar to last year as long-term drought is still in place. Fires on this Forest traditionally occur in late March into April.



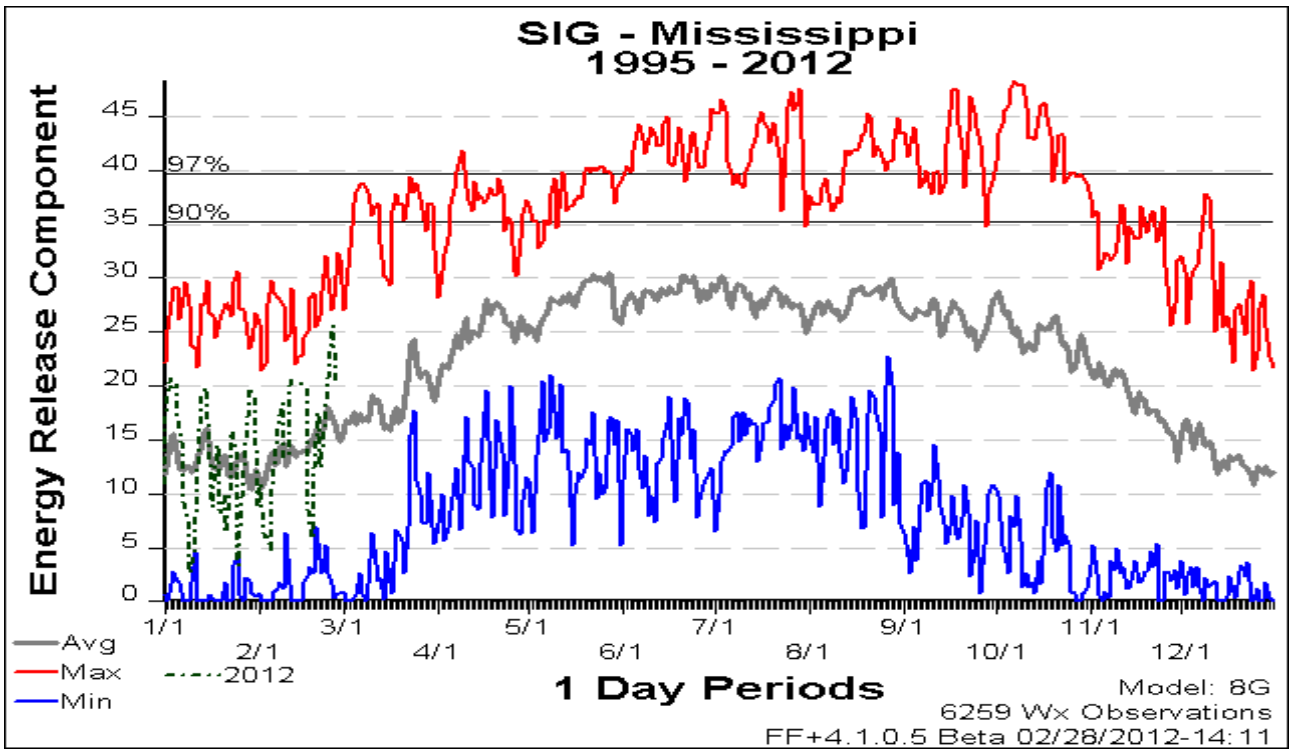


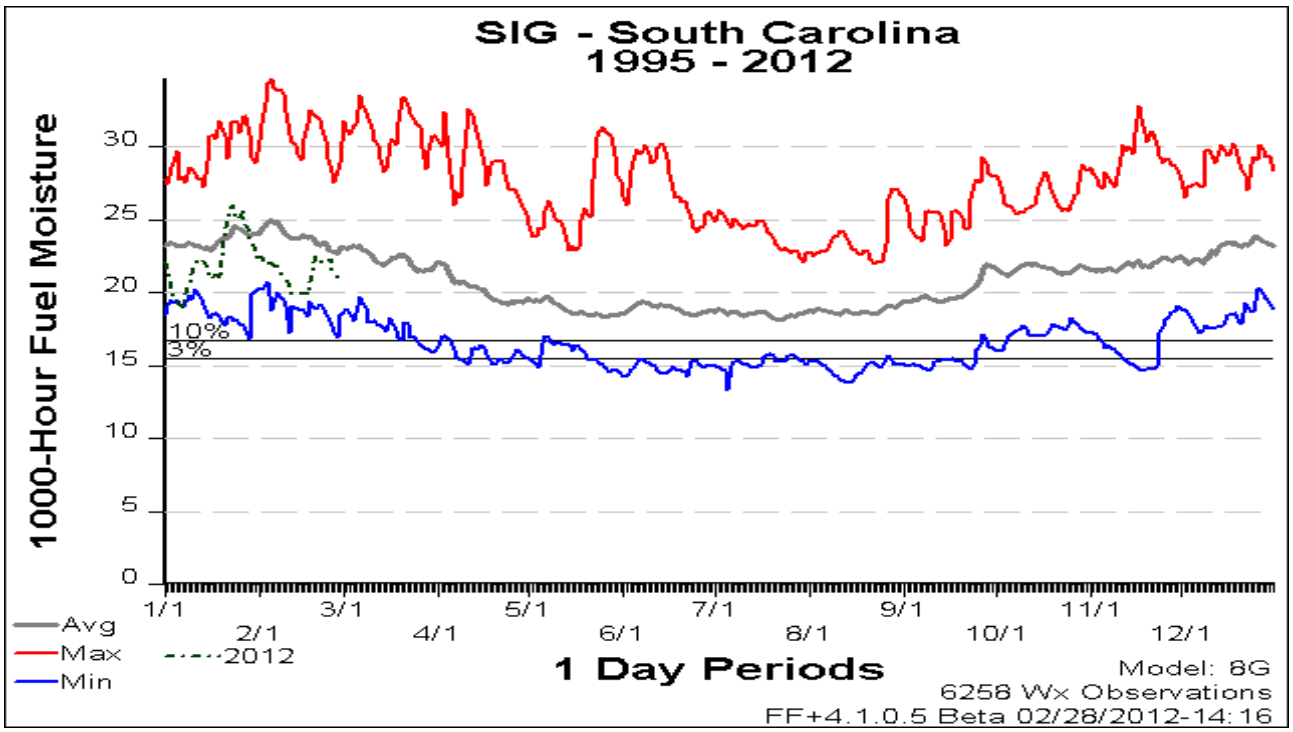
Fire danger is average on the **George Wasigton and Jefferson National Forest** for this time of year. The exception is the Lee Ranger District which shows slightly elevated fire danger and moderate drought. Fire danger will likely continue to spike up for a few days following frontal paassages with little or no precipitation, however, fire and prescribed fire activity will likely remain average for the upcoming spring fire season.



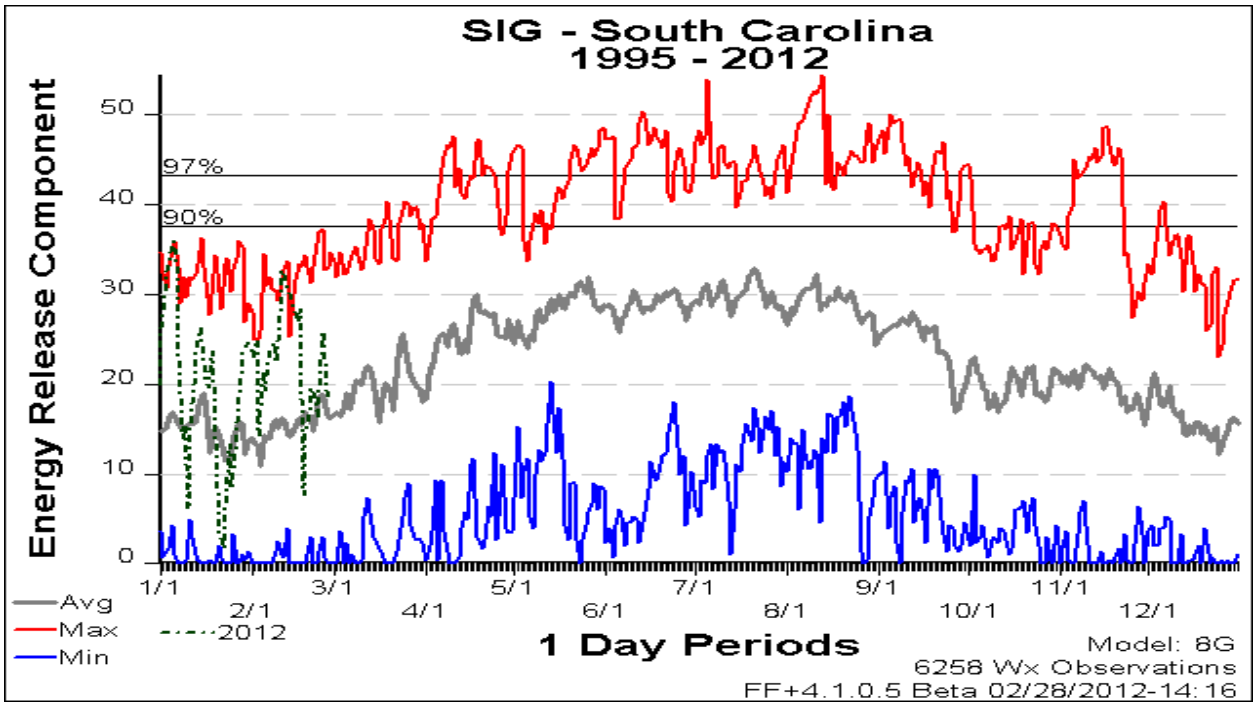


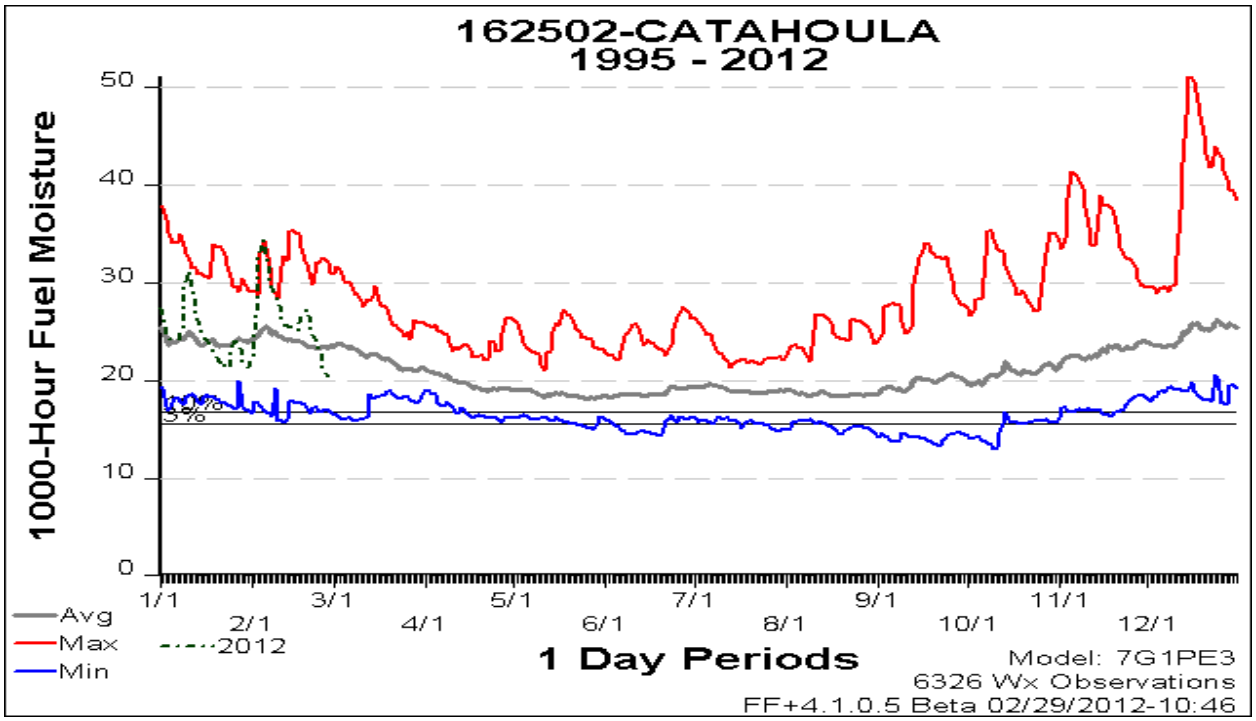
Recent rainfalls have helped to keep fire danger at an average to below average level on the southern districts in Mississippi while the Holly Springs Ranger District in the northern part of the state has seen a dramatic increase in fire danger in the last few weeks. This area of Mississippi is also highlighted in current drought products. Long-term forecasts do not indicate that this trend will continue through the spring. Therefore, as greenup progresses, expect fire danger to also decrease.



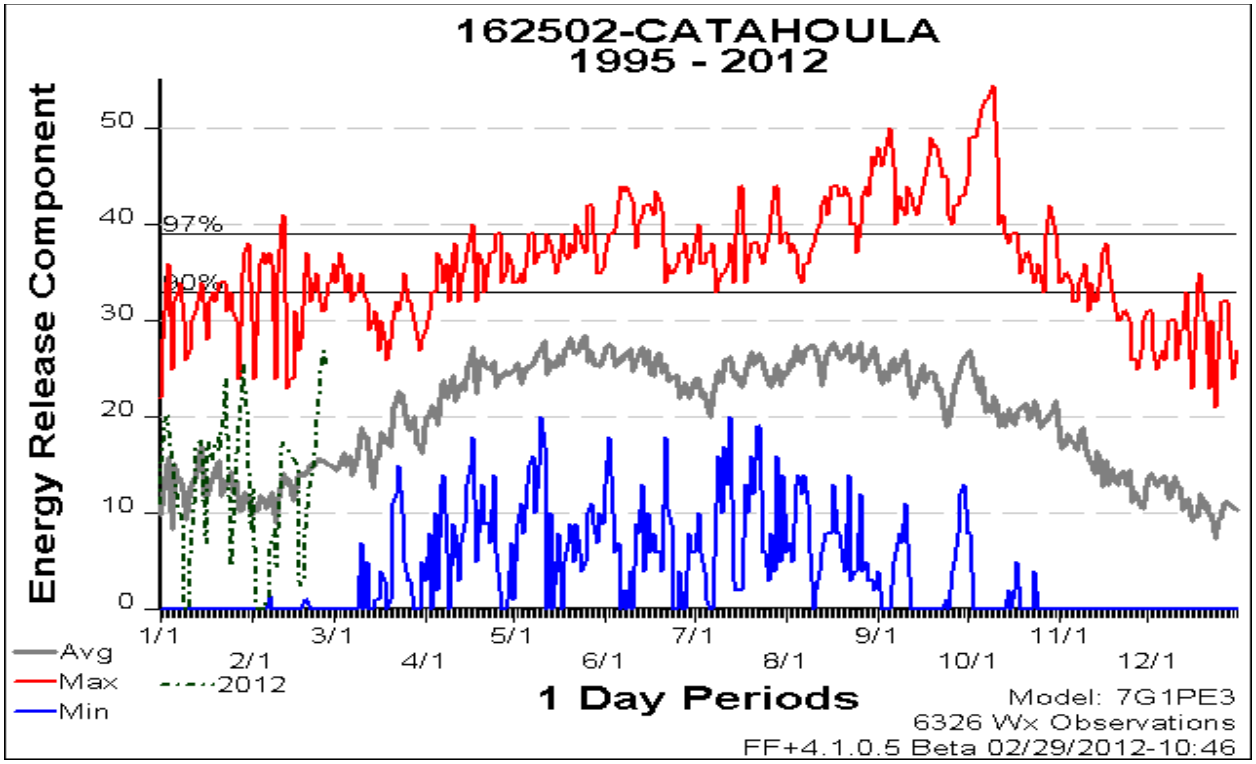


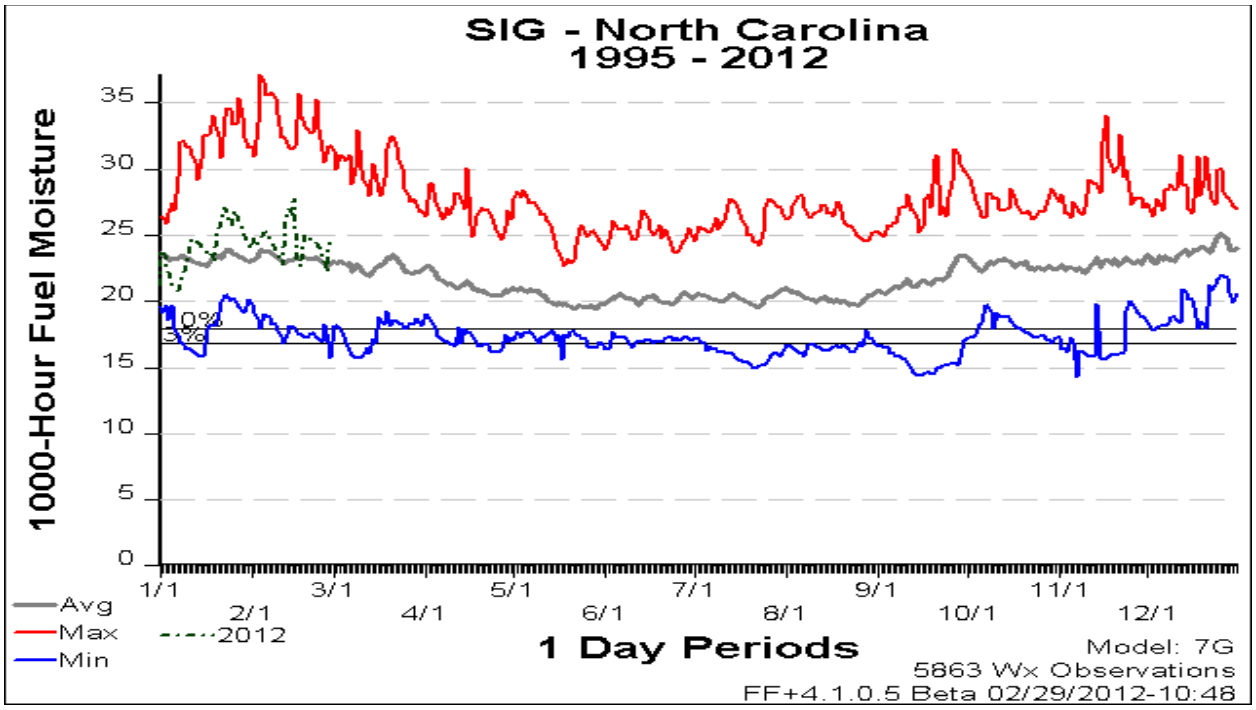
Current drought products show that most of the **Francis Marion and Sumter national forest** are under drought conditions. Fire danger has been above average over the last month, with the exception of a rain event in late February. Current forecasts show that above average fire danger will continue in these Forests through the spring fire season. With low ground water levels, do not expect natural barriers such as streams to hold fire as they normally would. Organic soils on the Francis Marion National Forest will also be at increased risk for long-duration burning.



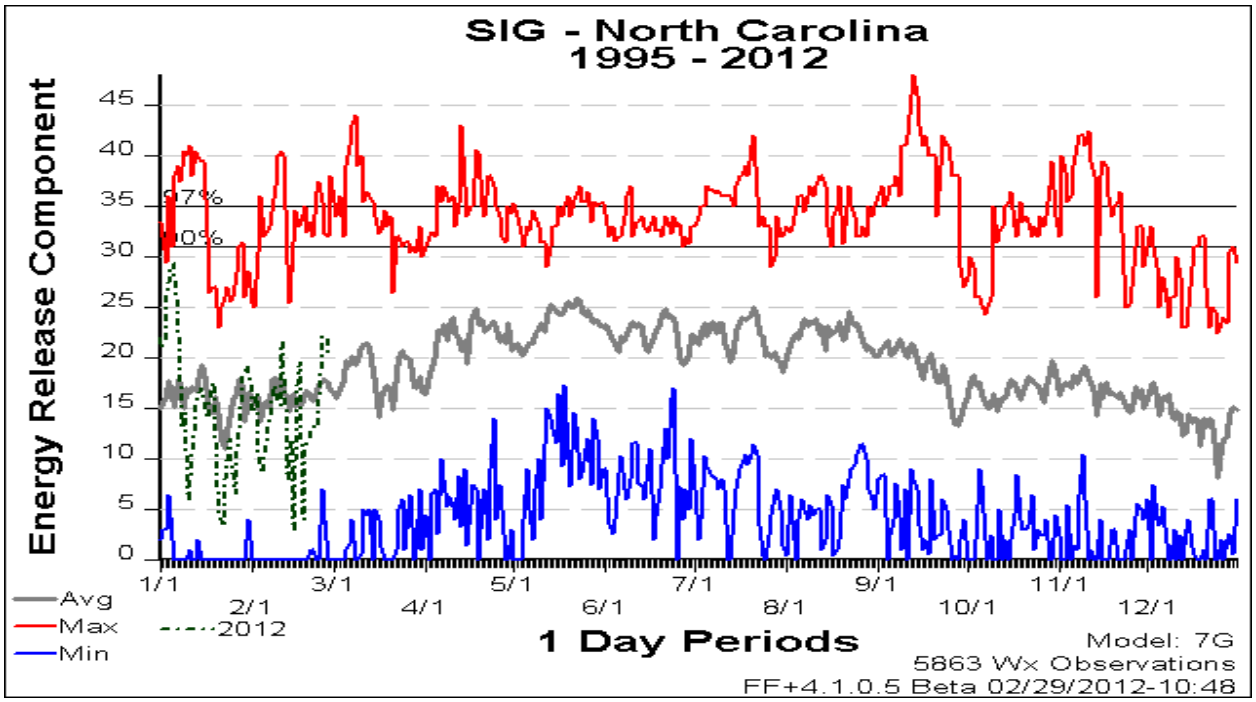


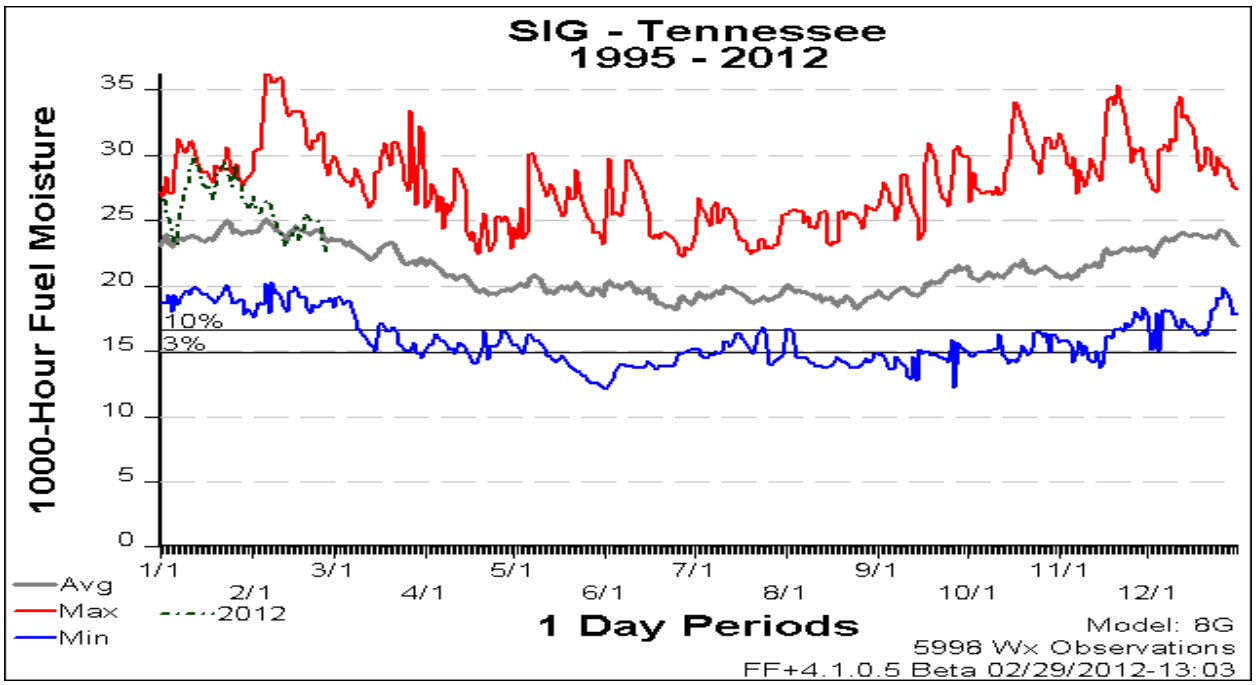
The **Kisatchie National Forest** is just starting to come out of drought conditions. Ground water levels around Alexandria have returned to near normal. However, the nothern end of the Forest is still slightly behind on rainfall. Expect continued above average conditions in Louisiana for the upcoming spring fire season.



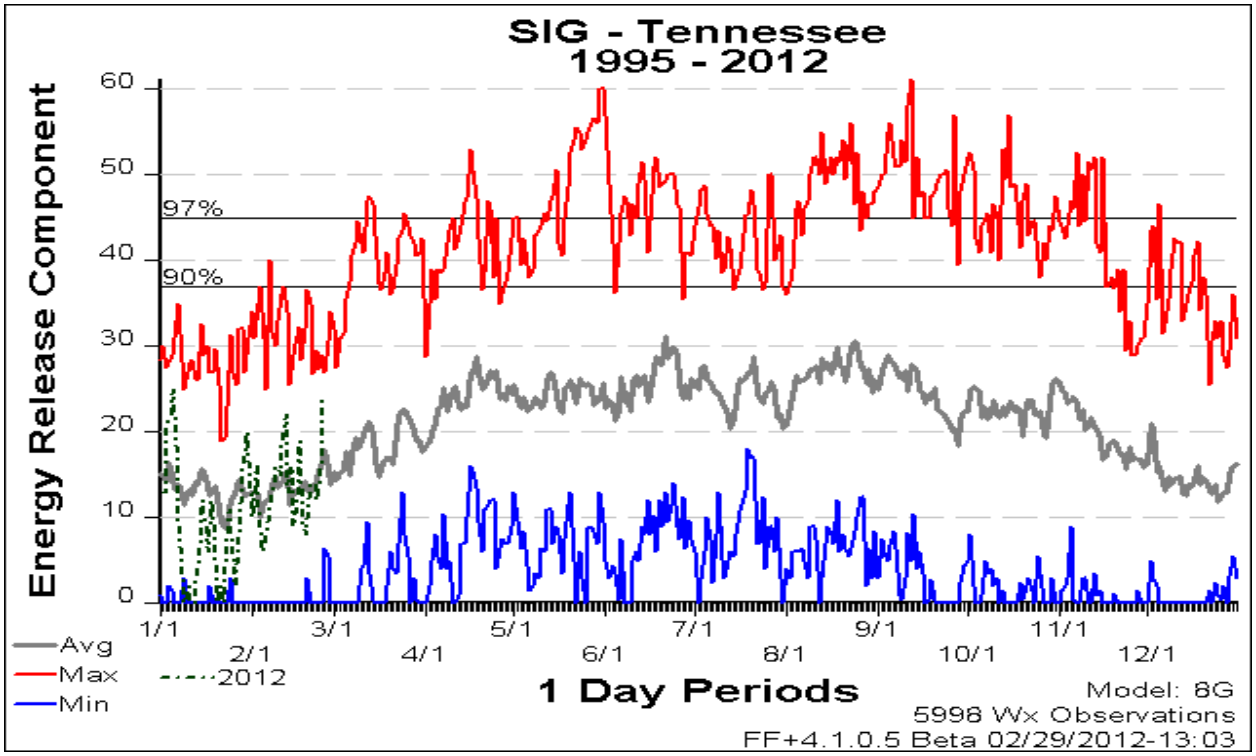


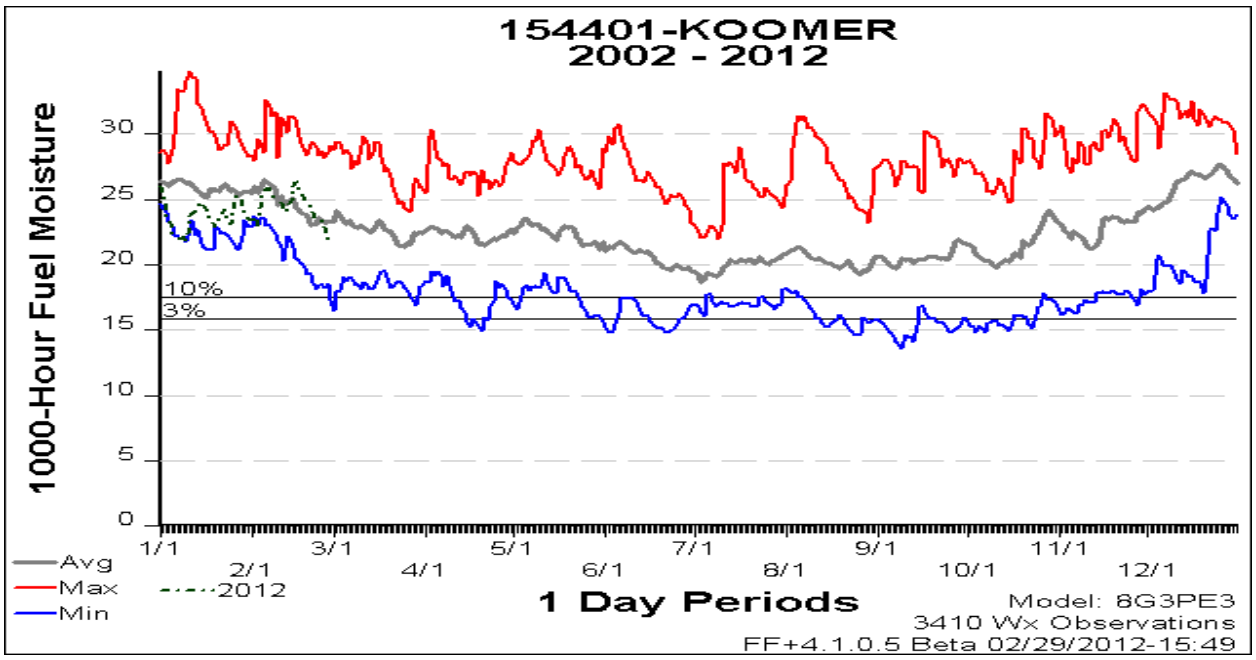
While the mountains of North Carolina will likely remain at or above average during the upcoming spring fire season, fire danger will likely escalate along the coast on the **Croatan National Forest**. Ground water levels remain low along the coast of North Carolina which will increase the probability of long-term organic soil fire on the Croatan National Forest.



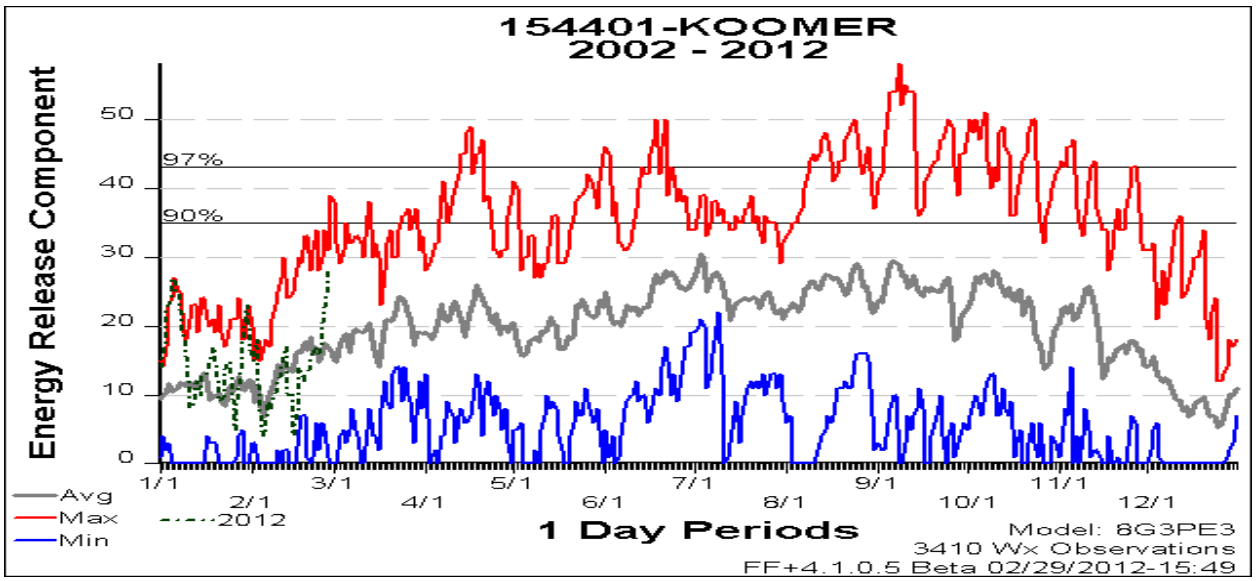


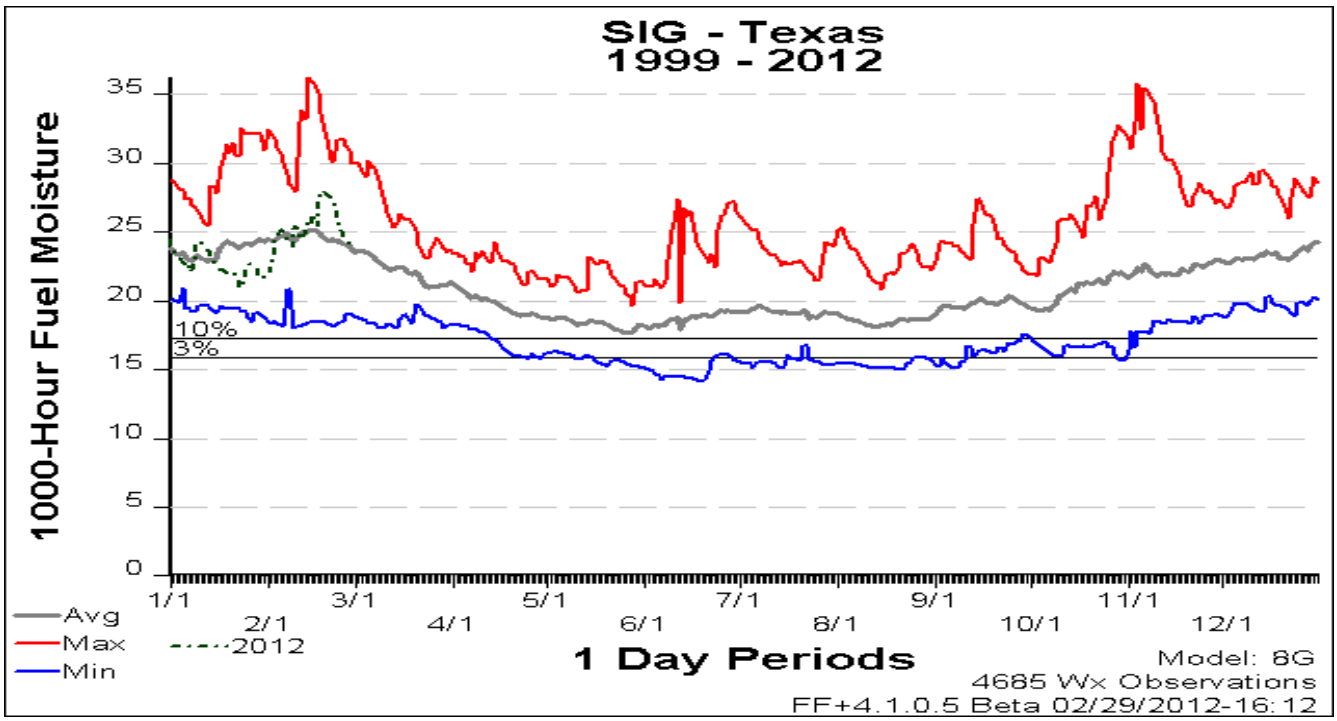
The **Cherokee National Forest** is currently drying out and could show some elevated fire danger prior to greenup of hardwood forests. Long range forecast models show an above average probability of precipitation over the next 8-14 days. Fires on this Forest traditionally occur in March and into early April.



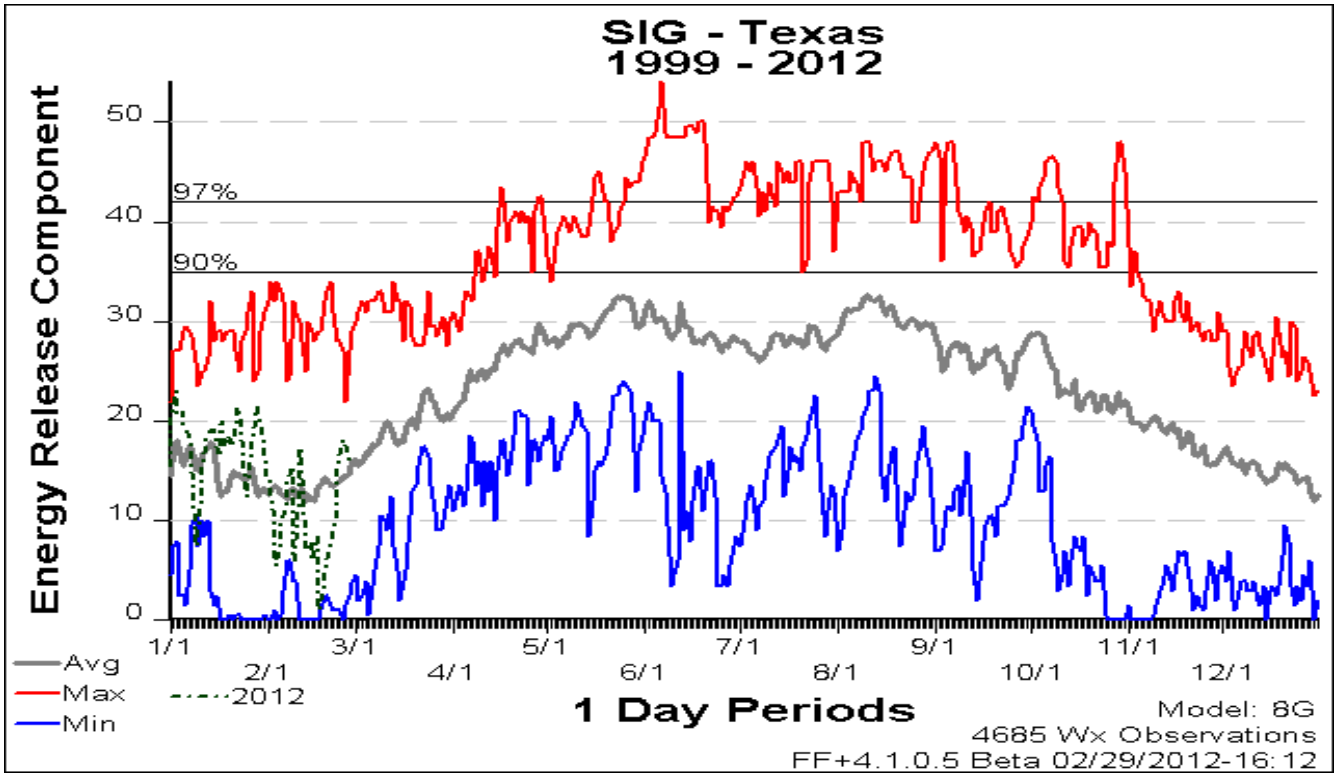


The **Daniel Boone National Forest** is currently showing high fire danger. Forecast models for the next 8-14 days show an increased chance of precipitation which will help to moderate fire danger until greenup occurs. Short-term increases in fire danger and fire activity may occur over the next few weeks between rainfall events.





The **National Forests in Texas** are finally seeing reduced fire danger after a very active fire year in 2011. Fire danger reamins at a near average level and will likely continue to be average over the next 8-14 days. This should continue to allow ample opportunities for prescribed fire.



Appendix C – Fire Danger Assessment Tools: Ground Water

Current fire danger indicators such as 1000-Hour fuel moisture, Keetch-Byram Drought Index, or Energy Release Component, do not always capture the true depth or the potential impacts of long-term drought on forest fuels. Because of this, fire managers in south Florida often turn to the U.S. Geological Survey (USGS) to help depict how dry it is.

Ground and surface water levels are critical when managing fire on lands with organic soils. The following table was constructed after a quick analysis of USGS stream gauges in or around Forests with critical soil types.

These USGS stream gauges can be set up to send interested parties a text message or an email when

Croatan NF	**# USGS 02092554 TRENT R AT POLLOCKSVILLE, NC**					
	10th Percentile	3rd Percentile				
	0.52	0.16				
Ocala NF	**# USGS 02243000 ORANGE CREEK AT ORANGE SPRINGS, FL**					
	10th Percentile	3rd Percentile				
	0.64	0.51				
Osceola NF	**# USGS 02315500 SUWANNEE RIVER AT WHITE SPRINGS, FLA.**					
	10th Percentile	3rd Percentile				
	50.02	49.73				
Apalachicola NF	**# USGS 2327100 Sopchoppy**					
	10th Percentile	3rd Percentile	1st Percentile			
	8.12	7.88	7.8			
Conecuh NF	**# USGS 02369800 BLACKWATER RIVER NEAR BRADLEY AL**					
	10th Percentile	3rd Percentile				
	1.02	0.81				

water levels get to an established critical level. These critical levels are set at the 10th and 3rd percentile. In other words, only 10 percent of the days in 40 years of data have had stream levels lower than the 10th percentile and only 3 percent of the days have had water levels lower than the 3rd percentile. In examining these numbers versus escaped prescribed fires in Florida, the majority of escapes occur when water levels are below the 15th percentile. Water levels this low allow fire to move into organic soils, which can smolder for weeks post ignition.

The table (above) provides a "*starting point*" for determining critical values. As with all analyses, these numbers should be "ground truthed" by local fire managers to ensure that they make sense for your program.

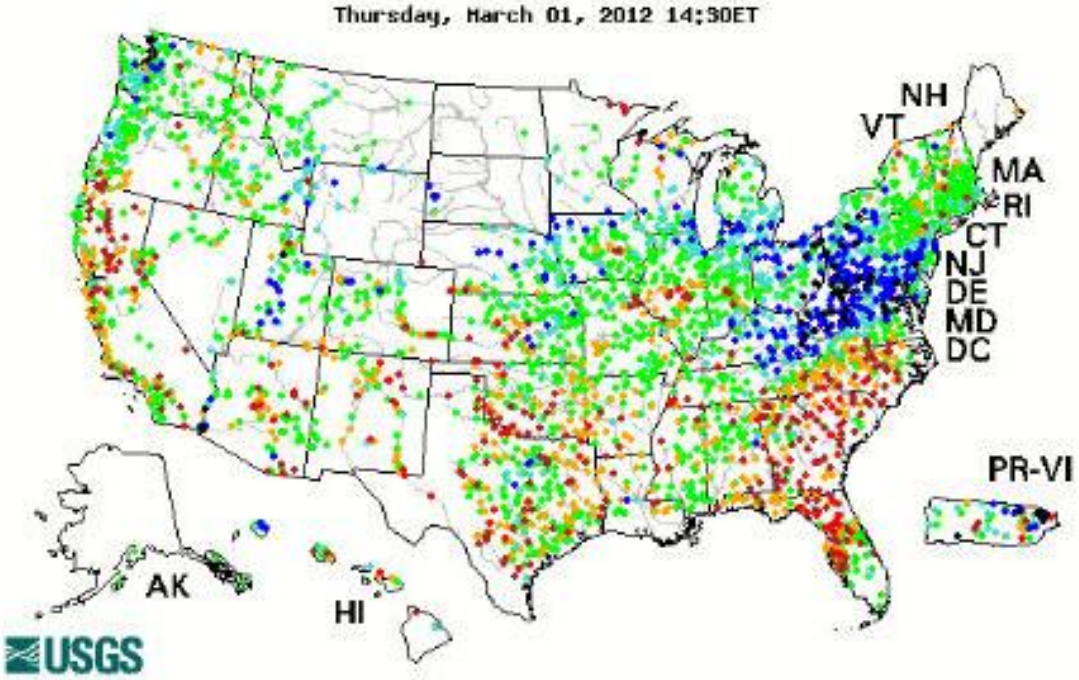
The USGS Water Watch website: http://waterwatch.usgs.gov/new/?id=ww_current
If people need assistance setting up these alerts or doing more in-depth analysis, please contact:

jon_wallace@fws.gov
http://waterwatch.usgs.gov/new/?id=ww_current

Map | Map (HCDN) | Flow Table | Summary Plot | Percent Summary | Summary Table | Google Map | Google Earth

Map of real-time streamflow compared to historical streamflow for the day of the year (United States)

State or Water-Resources Regions



Choose a data retrieval option and select a location on the map

List of all stations in state, State map, or Nearest stations

Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

Appendix D – Patrol Checklist

- ☐ Obtain briefing from Burn Boss.
- ☐ Know location of burn units and previous status.
- ☐ Have maps of project and burn sites.
- ☐ Keep informed on weather forecast (access RAWS website).
- ☐ Identify the Duty Officer status prior to patrolling.
- ☐ **Walk** all burn units.
- ☐ Record and document all activities on ICS-214 Unit Log.
- ☐ Upon returning to quarters, ensure all documentation is filed away properly.
- ☐ Any significant activities report **promptly** to the Duty Officer or Fuels Specialist.
- ☐ Be prepared with all PPE and Equipment to **safely** accomplish objectives.
- ☐ Ensure weather is taken and recorded with a belt weather kit.

Exceeding the shift is allowable, if absolutely necessary.

Rev. 2/28/2008

Appendix E – Highway Visibility Guide

Where the U.S. Forest Service has jurisdiction, this guide can be used to implement the recommended actions. This guide assists Line Officers and fire managers in making informed decisions.

In places where the U.S. Forest Service does not have jurisdiction, this guide can be used as a trigger for when to notify the appropriate authorities that smoke could have an impact on a road in their jurisdiction.

For example, include direction in the burn plan that when visibility reaches a certain threshold, local/state authorities will be notified that smoke could affect visibility. This guide can also be used in pre-burn meetings with law enforcement and transportation departments. Many agencies have no formal mechanism in place to help them make decisions when it comes to smoke impacting a road.

The steps required to meet Migrating Reduced Visibility Situations for highway visibility are to monitor and record smoke density or sight distance along the travel route and then apply a "reduced visibility braking factor" similar to that required for braking in a foggy environment. This minimum acceptable visibility adjustment factor (AF) is 1.75 (California Highway Patrol, 1984). It is multiplied by the normal braking distance required for a vehicle to stop if traveling at a posted speed limit, given dry and clear (ideal) conditions.

Minimum Acceptable Visibility (MAV) is calculated using the California Highway Patrol formula:

$$\mathbf{MAV = (EB + FB) (AF)}$$

Where:

MAV = Minimum acceptable visibility at posted speed
EB = Eye-to-brain reaction distance under clear conditions
FB = Foot-to-brake reaction distance under clear conditions
EB + FB = Total distance traveled while braking under ideal conditions
AF = 1.75 (constant)

Posted Speed Limit (mph)	(EB + FB) (ft)	(AF)	MAV (ft)
10	10.5 + 5.6	× 1.75	= 28
15	16.0 + 12.5	× 1.75	= 50
20	21.5 + 22.2	× 1.75	= 76
25	27.0 + 34.7	× 1.75	=108
30	32.5 + 50.0	× 1.75	=144
35	38.0 + 68.0	× 1.75	=185
40	43.5 + 88.9	× 1.75	=232
45	49.0 + 112.5	× 1.75	=283
50	54.5 + 138.9	× 1.75	=338
55	60.0 + 168.0	× 1.75	=399
60	65.5 + 200.0	× 1.75	=465
65	71.0 + 234.7	× 1.75	=535

Note: The MAV must be doubled if smoke is present along the road at night. Because there is an increased chance of head-on collisions, the MAV must also be doubled when the road is a simple divided highway. The visibility adjustment factor does not take into account a head-on encounter of two vehicles traveling in opposite directions.

Mitigating Reduced Visibility Situations

Take the following steps to mitigate for reduced visibility when a paved road is affected by smoke. These actions are presented in order of decreasing visibility. The implementation of Step 3, for example, means that steps 1 and 2 have been taken.

1. Post "Smoke on Road" signs when visibility is twice the MAV value of less: for example, the sight distance is reduced to 220 feet and the posted rate of speed is 25 mph (MAV = 108 feet).

2. Reduce posted speed limit when visibility is at MAV value, or less: for example, sight distance is 110 feet and the posted speed limit is 45 mph (MAV= 283 feet); therefore, the posted speed limit must be reduced to 25 mph or less.

3. Unless a lead car is on scene, stop traffic by closing the road to travel when the ratio of actual visibility to MAV is ½ or less: for example, the sight distance is 50 feet and the posted speed limit is 25 mph (MAV = 108 feet).

4. When the ratio of actual visibility to MAV is less than 1/5, close the road to all but administrative use.

Appendix F – Synthesis of Recent Prescribed Fire Reviews

LA-Compartment 40-2006

On March 9, 13 days after the District implemented the Prescribed Fire Plan for this compartment, a wildfire occurred directly adjacent to containment lines of the completed burn. Compartment 40 was not in monitor status due to the fact that on Feb. 25 and 26 the District had received 1.6 inches (Natchitoches wx station) of rain. District recreation personnel traversed the road in close proximity to burn regularly, at a frequency of more than twice per week following burn implementation.

The loss of ATVs for use in fire management activities hinders the ability of prescribed burning personnel to monitor a variety of factors during and following burn implementation. In this instance, the burning boss may have received supplementary insight of the mosaic nature of interior fuels during the burn, and the availability of this tool may have mitigated monitoring efforts on subsequent days following the burn.

In most cases the amount of rain received on this unit would have extinguished the burn. The Review Team found one characteristic of this burn unit that probably contributed to the lingering hot spot and eventually the escape was the fact that the majority of the unit had never been burned and had heavy fuels. The heavy fuels combined with lowered prescribed fire intensity and incomplete coverage most likely prevented the rain from penetrating enough to extinguish this hot spot. In addition, islands of unburned fuel bordering the black were in place to reignite as the conditions ripened over the period following the burn.

The lesson would be that planned prescribed fire in units with heavy fuels, and light, mosaic coverage may need additional monitoring after a rain event.

The District discussed the escape freely and helped provide the Review Team with what we believe to be an honest synopsis of occurrences during the burn and subsequent suppression action on the escape.

Considerations: Develop standards for declaring a burn “out”; infrared heat detection; ATV use; and UTV helmets.

FL-Juniper-2006

On August 11, 21 days after the District implemented the Prescribed Fire Plan for this burn unit and wilderness area, weather conditions and an unusual lack of rain for the time of year dictated that this prescribed fire be declared an escape. Starting on July

21, a day after implementation of this project, and continuing until August 11, the District did an excellent job of monitoring and informing Forest Fire Staff of daily status.

The District personnel used their experience to continue monitoring and implementing strategies with the knowledge that normal weather would return. When it appeared normal weather would not return, the District made the decision to declare the prescribed fire escaped. The Review Team found no glaring inefficiencies in the management of the prescribed fire to the point it was declared escaped. The National Forest in Florida has had escapes similar to this incident in the past. They all can be attributed to a disruption in the normal weather pattern as the cause of the escape. While here have been processes taken that could have been improved on, the number one contributing risk factor is the weather changing from normal to abnormal. There is no recommendation to remedy this risk as every project that is implemented on the National Forests in Florida has the potential to holdover until rainfall extinguishes them.

The District is to be commended for providing an excellent documentation package and overview of the incident. Also, District personnel discussed the escape freely and provided the Review Team with what we believe to be an honest synopsis of occurrences during the burn.

SC- C-88 Escaped Prescribed Fire-2008

Topography, primarily drainage orientation and slope, were contributory factors. Dryer than normal fine fuels on the private land provided a receptive source of ignition and contributed to the spread of the spot fires. The drier fuel conditions on the private land were caused by a western aspect and the open canopy which allowed more direct sunlight to reach the grass and herbaceous fine fuels.

What Can We Do Next Time?

This burn unit has a history of control problems. Spotting outside the line and smoke problems have occurred when this unit was burned in previous years. Furthermore, spotting across the line took place on this same private land in the past—northeast of this spot. This escape was caused when two lines of fire converged, producing increased fire intensity, torching trees and column development which resulted in the spot fires across the control line.

Recommendations

- Consider breaking the burn unit into smaller units so problem areas are burned in the morning when temperatures are lower and the RH is higher. This would

moderate fire behavior and decrease the probability of ignition (PI) during the ignition phase and primary burning period.

- Consider adjusting firing patterns in the ridge area west of Division C by utilizing more downhill backing fires which would moderate fire behavior.
- Consider staging a dozer w/plow in Division C at the corner with the private land.
- Consider placing a lookout on the high point on private land.

Final Comments

Private landowners were promptly notified about the spots on their property. Tree mortality caused by the fire on the private land in division C (12-acre spot) consisted of several isolated pine trees in the cutover area where natural regeneration occurred.

A Spot Forecast was requested the morning of ignition and the forecasted weather conditions were within Burn Plan parameters. A variance for a lower RH was requested and approved in advance. Weather parameters were monitored and recorded throughout the day.

The AAR participants were forthright and candid during the discussion.

Consider documenting burn implementation in narrative format. Prescribed fire planner and Burn Boss could then review previous burn narratives for any problem areas or conditions.

FL-Big Gum; Oakhead; Russian Bend-2008

The Big Gum Wilderness burn was conducted on the Osceola National Forest on Feb. 25, 2008 by aerial ignition. All weather and fuel parameters were within prescription and there were no problems encountered executing the burn, according to the Prescribed Burn Plan. A total of 3,040 acres were burned.

The Russian Bend prescribed burn was conducted on April 10, 2008. All weather and fuel parameters were within prescription, and there were no problems encountered while executing this burn, although there was some short-range spotting within the contingency area. A total of 1,130 acres were burned.

The Oakhead Prescribed burn was conducted on April 11, 2008. Once again, all parameters were within prescribed limits and there were no problems encountered while burning this 1,265-acre unit.

Following implementation of these prescribed burns, weather and fuels dried out exceptionally fast and areas of re-burn were first seen on Russian Bend and then the

other two projects. The Keetch-Byram Drought Index (KBDI) exceeded 500 out of a possible 800 points. Fine, 100-hour, and 1,000-hour fuels neared benchmark low levels. District personnel monitored and actively patrolled these projects since April 21, 2008. None of the prescribed fires escaped their primary or contingency burning area, but with deteriorating increasing fire danger on the Osceola National Forest—and no predicted relief in the short-term—these fires had to be continuously monitored to prevent the fires from escaping.

Effective May 15, 2008, these fires were managed as a single wildfire to protect the public and maintain firefighter safety, reduce smoke impact on public highways, and protect the natural resources adjacent to these projects.

Does long-term weather/predictive services info give indication of what is to come? If so, it appears that a discussion should occur with Districts/Forests/Regions on elevated risk vs benefits and the likelihood of additional funds or resources that might be needed to mitigate risk. If all organization levels know in advance what the risks/benefits are, they will be better prepared to understand, accept, and support the decision to go forward with the burn.

AR-Fletcher Block #2/RD. #39-2010

Date of escape: 4/14/2010

Date of first ignition: 4/08/2010

Fletcher Blocks 1, 2, 3 and 7 were submitted to AOICC for ignition on 4/14/2010. Only Blocks 1 and 2 were actually ignited that day. Acreage by block in the Fletcher Burn is as follows:

Block 1 – 234 ac.

Block 2 – 2481 ac.

Block 3 – 132 ac.

Block 7 – 81 ac.

Acres outside of Planned Rx Burn unit: 333 total escape ac. The breakdown of this acreage into ownership categories is estimated:

USFS – 60 acres

Deltic Timber Co. – 180 acres

Other pvt. – 93 acres

Acres outside Planned Rx Burn Unit on non-FS lands/private: 273 ac.

The burn was monitored daily since its ignition on 4/8/2010. All ignition had been completed on the unit on 4/8/2010.

Suppression costs are now estimated as follows:

1. Arkansas Forestry Commission aircraft (2 SEATs + ATGS platform), personnel and other equipment - $10,000
2. USFS personnel and equipment - $3,000

Total - $13,000

Damages to Deltic Timber Co. lands that were stocked, predominately, with 2 yr. old loblolly pine.

The burn had been monitored (critical lines checked both from the ground and occasionally from the air each day since its original ignition on 4/8/2010). No smoke had been observed in the vicinity of the escape for several days. The preliminary investigation on the day of suppression had labeled the cause of the escape as arson. Upon closer scrutiny of the escape vicinity by the district's retiring FMO, a single hot hollow tree was discovered near the area of the escape. The FINV (the local FS LEO) then determined that it was actually an escape from a week-old burn.

Consider increasing patrols based on fire danger conditions present when this burn escaped.

LA-Cooter's Bog-2010

On Tuesday, April 26, 2010 on the Calcasieu Ranger District of the Kisatchie National Forest, Louisiana, the 709-acre Cooter's Bog Prescribed Burn (Compartment 132) was implemented. After completion of the firing phase of prescribed burn operations, a pine snag caught fire and threw embers outside of control lines, causing a spot fire in a pine plantation on adjacent private lands. The fire intensity and size of the escape grew rapidly and exceeded the capabilities of onsite resources for that burn unit. The FMO declared the escape a wildfire at 1445, per direction in the prescribed burn plan. The wildfire eventually burned 132 acres of pine plantation before being brought under control by onsite and contingency resources.

14:20 Spot over in private plantation detected. UTV water pump on patrol unit lost prime. Dozer requested at spot over. High resistance to control with flame lengths of 12

to 15 feet. IC changed strategy from direct attack to indirect attack by firing roads to contain fire. The south side of fire jumped the next road running east and west. The engines tried to contain it but the fire progressed into another plantation that was 15 to 20 feet tall and very thick. IC requested helicopter and bucket. Helicopter arrives. IC directed firing of the next road, but this road did not hold. These spots were controlled by the dozer unit and support resources.

14:30. Winds NNW at 8-10 and Gusts to 17 mph, RH 25%, Temperature 83.

14:45 FMO declared the escape a wildfire.

1. An analysis of seasonal severity, weather events, and onsite conditions leading up to the wildfire declaration.

a. Fuel conditions were characteristic for the season with severity being low due to live fuels being at peak green-up conditions.

b. Though there was a rainfall deficit at the time, drought indices (KBDI) for this time of year were acceptable and well within acceptable limits.

c. It had been 2 days since rain. That rainfall amount was .07 inches.

d. No control issues occurred on multiple prescribed burns on the District's last burning day—3 days before this unit was burned. On that day, a total of 4 units were burned for 2,700 acres.

e. The burning snag had been protected by raking yet caught fire sometime later while it was unwatched. Patrols passed this snag multiple times during the day, but were not present when it spotted across the line.

f. The private land fuel conditions at the point of escape were open and exposed with small pines (approx 2-3 years of age) present. Flashy grass fuels were the primary carrier of the fire. This exposed and grassy condition was significantly different than the timbered conditions on site.

g. Actual parameter observation information for the burn unit was not documented. Specifically, information concerning PI and BI should be added to the prescription documentation page of the district burn plans.

h. The Forest has an established parameter for days since rain (14 days). However, this Forest standard for days since rain does not specify a minimum amount of rain in that parameter.

2. An analysis of the prescribed fire prescription and associated environmental parameters.

a. The general weather forecast from the National Weather Service Fire Weather Center at Lake Charles, Louisiana predicted a minimum Relative Humidity of 25% for Vernon Parish on the day of the burn. A subsequent spot weather forecast requested for the burn site predicted a 30% minimum relative humidity. After firing of the unit was finished, a RH of 25% was recorded from the closest RAWS station.

b. A sudden, unpredicted decrease in RH and increase in winds occurred at 1400 hours.
c. No spotting or slop-over activity occurred that day on the burn unit before the escape.

3. A summary of causal agents contributing to the wildfire declaration.

a. Off-Unit resources were unfamiliar with the burn and adjacent private land, particularly the significance of the locked gate which prevented access by engines to the east flank of the unit.

b. Inadequate local briefing was given to the off-unit Burn Boss.

c. A gate into the private land was assumed to be open for engine access. Locals should have addressed the issue and advised the Burn Boss.

d. A sudden and unpredicted change in weather (wind, RH) created control problems.

e. A malfunction in equipment (UTV pump prime) may have been a contributing factor.

f. Delay in detecting the spot fire due to a shortage of holders along the fire line. This shortage was due to unexpected access issues, and associated shortage of mechanized resources.

g. Ignition of a snag even though it had been protected by clearing of fuels around its base. This ignition was not detected and mitigated by the holding crew in a timely manner.

Recommendations

1. Consider the use of more local (District) resources should be used on burns that are high risk (ie, private land, plantations) if the burn is staffed predominately by off-unit resources.

2. Non-local Burn Bosses should get a thorough briefing and be allowed time to become familiar with the planned burn area before the test fire. During burn plan preparation, Districts should write the plans with enough information for an off-unit Burn Boss to clearly understand its requirements.

3. The Kisatchie National Forest FMOs and Burn Bosses will develop a standard method of specifying minimum resource needs in a manner that is understood by all and consistent across all Districts. Standard organizational charts would aid greatly in

this effort. Specifically, listing the number of personnel needed for each piece of equipment would aid in determining minimum staffing needs.

4. The Forest FMOs, Burn Bosses and GIS specialists will meet to establish standard forest-wide burn plan map formats and legends. This group will consider the use of aerial photography as a layer in these maps.

5. When planning burns, address the most reactive fuel conditions inside and outside of the burn unit, especially pine plantations or high concentrations of fine fuels. Specify staffing and resource needs and types for these conditions.

6. On days when multiple burns are scheduled, prioritize resources by the risk associated with each burn block.

7. If the Burn Boss gets a "gut feeling" that they need more resources, order them, even if not required by the burn plan's minimum staffing requirements. This is especially true when conditions change, such as equipment malfunctions, weather changes, or sudden increases in fire behavior.

8. If practical during implementation, consider dividing units into smaller blocks when burning on the high end of prescription parameters.

9. Due to the risks associated with spotting when burning adjacent to private lands or other high risk areas, felling of snags adjacent to private lands should be seriously considered after assessing risks associated with each snag. In some cases, raking all fuel around the base of each snag may not be adequate.

10. Burn Plan Element 11 was confusing as written. In addressing the implementation of multiple units concurrently, it allows sharing of resources with other burn units, but also appears to restrict such sharing. This should be clarified in future district burn plans.

11. The Forest should consider establishment of a minimum rainfall amount to further clarify its current parameter of days since rain.

FL-313-23011

The 313 prescribed burn (2015 acres) occurred on 08/11/11. While he Apalachicola National Forest had been experiencing an unusually dry year, a more normal summer rain pattern had begun to set in. On 8/11, three days after 0.38 inches of rain, the Forest prescribe burned Unit 313. The burn on 08/11 also consumed the fuels on the uplands and began to burn in some of the smaller swamps. On 08/12, crews monitoring the burn extinguished 3 spotovers in Bradwell Bay Wilderness on the southern edge of the burn which were quickly controlled due to the low 1-year old rough. Following 08/11, the rain that had been predicted did not materialize. Fuels continued to dry out, more swamps began to burn and reburning began to occur in areas of needle cast. On 08/28, five spots were found in the Bradwell Bay Wilderness, but all spots were quickly extinguished.

With very little rain, indices began to rise. By 08/25, ERC values, KBDI and BI had all climbed into the 90 percentile.

7. A summary of causal agents contributing to the wildfire declaration.
On 08/29/2011, AFMO, ZFMO and District Ranger met and decided to declare the 313 prescribed burn escaped. Several factors led to this decision: (1)The Florida Forest Service had conducted a prescribed burn on State land adjacent to the Apalachicola National Forest and the State prescribed burn had continued to burn, much like the 313 burn, in the swamps and needle cast. Some Forest resources were committed to this prescribed fire to control spot overs that were occurring on National Forest land. (2) Updated weather predictions showed a continued dry period and fire indices showed an upward trend. (3) Due to the increase in the amount of reburning, the number of swamps burning, and the 17-mile perimeter that needed to be patrolled, containment of the prescribe burn could no longer be assured without bringing in additional resources. (4) Smoke from the 313 fire and numerous other fires outside of the National Forest was blowing into smoke sensitive areas.

Lessons Learned
Even with recent rains, the cumulative effects of several drought periods has affected fire behavior, especially within the swamps. With Predictive Services projecting continued dry periods for the next 10 to 15 years, additional data on swamp characteristics would enable Burn Bosses to make better informed decisions. We need to explore remote sensing options for characterizing our numerous swamps as it relates to fire.

We need to utilize our public outreach to frame a message about smoke lingering for several days after a prescribe burn, especially in these times of low water levels. The message should employ the “One Message, Many Voices” approach to show the smoke as necessary to achieve the desired outcome.