



Forest Service
U.S. DEPARTMENT OF AGRICULTURE

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Grindstone Prescribed Fire- 109B Fire Declared Wildfire Review

National Forests of Alabama, Southern Region

Bankhead Ranger District*



Abstract

On March 28, 2024, the Bankhead Ranger District (BKRD) in the National Forests of Alabama (NFAL) implemented the Grindstone Prescribed Fire (RX) with good fire effects. The following day, wildfire was observed on adjacent private land, and BKRD resources responded. Resources reported 90 percent containment by 2052 on March 29. Approximately 300 acres were burned, including about 100 acres on private land. The BKRD Ranger (DR) visited the incident site on March 30 and determined the incident should be declared a prescribed burn that resulted in a wildfire. The wildfire originated in an area where the line had been observed from a distance in an inversion situation but had not been physically checked with boots on-the-ground. The presence of an unmanned aircraft system (UAS) to check physically challenging areas post-burn may have provided earlier detection of the escape.

*The National Forests in Alabama includes approximately 667,000 acres of National Forest System land in the Southern Appalachian Mountains, Cumberland Plateau, and Piedmont and Coastal Plain areas of the state. Four national forests are divided into six ranger districts. The Bankhead National Forest, Conecuh National Forest, and the Tuskegee National Forest are all one district each. The Talladega National Forest is divided into the Oakmulgee, Shoal Creek, and Talladega ranger districts. Thus, in this document, the Bankhead National Forest is referred to as the Bankhead Ranger District (BKRD).

Cover photos: *Left:* This image depicts the Bankhead Ranger District (BKRD) portal sign outside the District Office located in Double Springs, AL. *Right:* This image shows the Grindstone/Mill Creek RX units from Drop Point (DP) 48 prior to ignitions on Thursday, March 28, 2024.

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Executive Summary

On March 28, 2024, the Bankhead Ranger District (BKRД, District) in the National Forests of Alabama (NFAL) burned two adjacent prescribed fire (RX) units under a Region 8 (Southern Region, R8) variance for wind speed and an NFAL variance for relative humidity (RH): the 670-acre Grindstone unit and the 1,089-acre Mill Creek unit. Burn plan objectives included reducing litter layer fuels by 50 percent; topkilling 20 to 40 percent of undesirable midstory and understory mesic species less than three inches in diameter on ridgetops; and maintaining prescribed fire application frequency according to the NFAL Land and Resource Management Plan (LRMP) to achieve a desired mosaic of intensity and fire coverage across project areas. Fire effects were very good, with one small spot over the line that was caught immediately. As the work day ended, resources left with the burn contained.

Early the following morning, March 29, BKRД fire staff returned to the burn area to ensure fire had not moved outside of the containment lines; this check occurred before a morning inversion had lifted. At 1115, the District Ranger (DR) observed smoke on County Road 63 in the general vicinity of the burn area. He determined the smoke was coming from a private prescribed burn and notified the District FMO (DFMO). The District did not conduct prescribed burning on this day because of low RH conditions and other factors.

Later in the day, the DFMO/Duty Officer (DO) checked on the private prescribed fire and observed another column of smoke in the vicinity of Forest System Road (FSR) 109B. At 1545, the DFMO notified the DR of the 109B incident; at 1751 he notified the DR that the fire had entered an adjacent 80-acre private property tract. Local resources responded, with the District Engine Captain (EC) as Incident Commander (IC). The escaped fire later entered another adjacent private property tract. Local resources contained 90 percent of the fire as darkness fell.

On March 30, the BKRД Ranger declared the escape a wildfire. In all, the fire burned 300 acres outside of the planned RX unit, of which 100 acres were on two separate parcels of adjacent private land. The private land on the north parcel contained hardwood while the south parcel included hardwood along with a newer pine plantation. No injuries occurred, and no structures or equipment were lost. Fifty to 80 acres of mixed pine and hardwood stands received moderate to substantial scorch.

Introduction

On Thursday, March 28, 2024, a BKRД prescribed burn day began much like all the rest and seemingly ended as such. It was not until mid-day the following day that anyone discovered that something was amiss. Surprisingly, one small seemingly innocuous but overlooked detail led to the subsequent declaration of an escaped wildfire.

According to Forest Service Manual (FSM) 5140, Forest Supervisors are responsible for conducting reviews of any prescribed fire converted to wildfire that does not result in significant damage or cost. The declared wildfire review team consisting of RX subject-matter experts (SMEs) convened on April 7, 2024, to review the Grindstone/Mill Creek burn plan and execution

along with the burn participants' qualifications and experience. The team conducted interviews with those involved and reviewed supporting documents to develop a narrative that included events and the logic behind actions the participants took before, during, and immediately following the RX burn and subsequent escape. The review team also visited the burn site with BKRD personnel, including the DR, to better understand logistics and reasoning behind actions and decisions so as to help the USDA Forest Service (Forest Service) learn from this incident. This resulting document includes lessons learned and recommendations from which others involved in wildland fire might benefit.

Settings

National

In late 2022, a series of large-scale prescribed fire escapes led to an RX pause, pending the Chief's 90-Day Prescribed Fire Program Review (Chief's Review). Following the Chief's Review and multiple large-fire complexes in several Forest Service regions, United States Secretary of Agriculture Tom Vilsack worked with Forest Service Chief Randy Moore and others to introduce a strategy called "Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America's Forests" (Wildfire Crisis Strategy). The strategy has many aims; however, one key factor is fuels treatments on the forest landscape through the use of prescribed fire. Through this reinvigorated effort, the Forest Service anticipates increased fuels treatments, primarily through prescribed-fire use.

Regional

The Southern Region (Region, Region 8, or R8) encompasses 13 states and Puerto Rico. Region 8 contains 14 national forests and grasslands and two special units stretching from Virginia to Texas, down to Florida and Puerto Rico. The 13.5 million acres the Southern Region manages have a diverse ecosystem including mountains, prairies, and grasslands, as well as coastal plains. Generally, National Forest System (NFS) lands in the Southern Region consist of fire-adapted ecosystems that depend on fire every two to seven years for healthy forests and grasslands.

Beginning in approximately October for some smaller scale RX, the Southern Region anticipated that the RX season would last into May of 2024, with large complex RXs being implemented on many forests. By March 28, 2024, the Southern Region had completed over 1.1 million acres of prescribed fires across all 13 states and 16 forest areas. Thousands of firefighters conducted hundreds of burns to successfully treat over a million acres for the Southern Region.

The Southern Region typically completes more RX acreage than all other eight regions combined. The ecosystem and ecological restoration projects require frequent prescribed fire on the landscape. In consideration of the Wildfire Crisis Strategy, R8 continued to produce a large amount of RX without having to change the already impressive operational tempo. However, increased RX in other regions has led to enhanced coordination and cooperation. R8 depends on out-of-area Geographic Area Coordination Center (GACC) resources to accomplish the large amount of work

on its forest lands. These critical resources are now completing additional RX in their home regions in coordination with the Wildfire Crisis Strategy.

Forest

The National Forests in Alabama (NFAL, Forest) has six Ranger Districts that extend from the coastal plains to the foothills of the Appalachian Mountains, covering 667,000 public acres. The NFAL burns approximately 130,000 acres annually. By the end of March, the Forest had burned over 100,000 acres across the six districts, with 50,000 more acres planned for the season. The NFAL was on track to accomplish more RX than it had ever done to once again significantly contribute to the Southern Region's RX totals. With the addition of a full organizational chart at the Supervisors Office (SO), the NFAL is able to successfully support the districts' needs to help them accomplish the additional acreage.

Project Area Location and Description

Bankhead Ranger District Description

The Bankhead Ranger District (BKRD) in the NFAL is situated in the northwest corner of the state of Alabama, 50 miles northwest of Birmingham and 40 miles southeast of Huntsville, with the District Office located near the city of Double Springs.

The NFAL's northern-most ranger district, the BKRD has a total of 181,200 acres, 66,000 of which are prescribed fire compartments. An environmental impact statement (EIS) completed in 2003 indicated that the BKRD has three primary areas of burnable vegetation, described as hardwood fuels on the north end of the unit; shortleaf pine and loblolly pine through the central section; and longleaf pine towards the south. Due to the variable vegetation located on the District, Fuel Model 9 (FM9) consisting of longleaf and hardwood stands is the predominant fuel type found throughout this forest.

Grindstone and Mill Creek Prescribed Fire Project Description

The Grindstone and Mill Creek Prescribed Fire (RX) areas are located in the shortleaf EIS area, the central shortleaf area. The two project areas are part of the fiscal year (FY) 24 RX area designated and approved on the BKRD as part of a three-year rotation plan to meet the requirements in the LRMP and for the desired ecological health of the forest in this ecosystem, typically achieving 22,000 acres annually from January to April. The Grindstone RX is a 634-acre unit located to the west of FSR 109 at Township 9 and 10 south and Range 7 and 8 west. The Mill Creek RX is a 1,082-acre compartment to the east of Grindstone and FSR 109, within the same township and range as the Grindstone RX compartment.

The combined area of 1,759 acres is surrounded by National Forest System (NFS) lands and private property on all sides. Five individual areas of private land border small sections of the project areas as well as large sections of NFS land, which are frequently referred to as "checkerboard" areas located throughout the District. To the west of the Grindstone RX is the Wilborn RX (1,070 acres) that was burned in March 2023, and to the east is the Mill Creek East RX (266 acres) that was burned in February 2024. A map of these units is located in [Appendix B](#).

Grindstone and Mill Creek Prescribed Fire Objectives (Burn Plan Element 5)

The Grindstone and Mill Creek RX units are described in detail within the Black Warrior Burn Plan. These adjacent units consist of the same fuels. Element 5 of the burn plan lists several objectives that cover both compartments. The prescribed fire objectives are identified as the following:

- Reduce litter layer fuels by 50 percent.
- Topkill 20-40percentof the undesirable mid-story and understory mesic species less than three inches in diameter on the ridge tops.
- Maintain as much as possible fire application on a consistent two- to three-year cycle while maintaining a mosaic pattern across the project area.
- Maintain prescribed fire application on a <three-year cycle for short units and a <10-year cycle on long rotation units.
- A mosaic of intensity and fire coverage across the project area is desired.

Vegetation Description

Both the BKRDRanger and the DFMO stated the goals of the prescribed fire implementation in these compartments are to maintain a two- to three-year rotation for the health and diversity of the forest's native species. Further resource objectives the burn plan supports include a desire for shortleaf woodland area with bluestem grasses on upper slopes; hardwood/cove forest in drainages and canyons; and oak/pine woodlands and bluestem grasses on mid slopes, all of which are the vegetation components found within the Grindstone and Mill Creek RX compartments.

Prescribed Fire Prescription (Burn Plan Element 7)

To achieve the desired prescribed fire effects described above, the BKRDR used several inputs that historically provided the desired fire effects on these units. Element 7 in the Black Warrior Burn Plan details the indices and parameters used for inputs in the burn plan development, such as fuel moisture parameters, temperature, wind speed and direction, Keetch-Byram Drought Index (KBDI), and others. The RXB2 conducted BehavePlus runs on the morning of the burn with forecast weather conditions, and the historical inputs used for the prescription provided the desired effects as described in the burn plan (see [Element 5.](#))

Predicted Weather and Variances

The predicted weather for the day from the spot weather forecast only had two elements that were outside the burn plan prescription elements for March 28: wind and RH. The wind was forecast above 20 mph, requiring a Region 8 variance, and the RH was predicted for 27 percent, requiring a Forest-level variance (see attached spot weather forecast and completed prescription table in [Appendix A](#)). The Weather Information Management System (WIMS) data available for the day showed that the other parameters were within the prescription for this plan and generally in “good” conditions for desired plan outcomes.

Prescribed Fire Outcomes

The outcome of having burned these compartments within the <three-year rotation described within the burn plan is a healthy mix of conifer and hardwoods, as well as bluestem grasses found continuously throughout the unit. Post-fire effects show the reduction of litter fuels by about 50 percent, topkill of mid and understory of between 20 to 40 percent, and low- to mid-fire intensity throughout both units. The review team SMEs' on-site observations revealed that the prescribed fire within the unit met the unit objectives written into the burn plan.

Wildfire Declaration

The 109B Fire Declaration was made after careful deliberation and conversations among the DR, the Forest Supervisor (FS), and Region 8 Fire and Aviation Management (FAM) staff. While the fire was not discovered until the day after the RX (beyond one full burn period), and additional resources responded that were not initially listed on the burn plan, they were not the only considerations for a wildfire (WF) declaration. The AA scouted the area and determined that the fire was likely from the Grindstone RX, and by declaring a WF, he would be able to better understand the conditions that led to the escape. The opportunity for a RX-to-WF review would also allow the AA, the Forest, and the Region to share some of the lessons that firefighters and Forest staff learned during this event. While other learning tools may have been available, one of the large motivating factors was that a declared review would provide an outside team to the District that could help tell the story and better improve prescribed fire operations on the District, the Forest, and the Region.



Figure 1. The Grindstone/Mill Creek RX generally achieved resource objectives as outlined in the NFAL LRMP and BKRD shortleaf EIS area (reducing the litter layer, topkilling mesic hardwood understory species, and minimizing mortality to the overstory).

The Narrative

Note: The individuals in this narrative are identified with pseudonyms (see figure 2). Their pseudonyms are first introduced with their Forest Service title and/or position.

Background

Seasonal Prescribed Fire Planning

In late 2022, following the Chief's Review and as part of normal prescribed fire management activities, the BKRD FMO (Keith) conducted an off-Forest review of the Black Pond Programmatic Burn Plan. The Black Warrior Programmatic Burn Plan was written after the Chief's Review and incorporated comments from the off-Forest technical review, completed most recently on November 6, 2023. The BKRD DR (Alan), as the Agency Administrator (AA) for the burn plan review, had signed the burn plan on February 1, 2023; however, he did not sign to indicate approval of the final review, not realizing his signature was needed for the final approval.

Weather during the 2023-2024 fall season had been fairly typical for the BKRD; if anything, moisture was a bit above average. District fire staff began looking forward to completing its annual average of prescribed fire acres to support Region 8's efforts to continue to lead the Forest Service regions in the number of prescribed fire annual acres. Preparations for the prescribed fire season began on May 9, 2023, with the FY 24 interdisciplinary team meeting (IDT), and the first prescribed fire of the season took place on January 31, 2024.

Official Forest Service Title	Prescribed Fire Title	Declared Wildfire Title	Pseudonym
NFAL Acting Forest Supervisor	Overhead	Overhead	John
NFAL Fire Staff Officer	Overhead	Overhead	Dennis
NFAL FMO	Overhead	Overhead	Monica
NFAL AFMO	Overhead	Overhead	Robert
NFAL Temporary Firefighter (AD)	FDO	FDO	Ron
NFAL Fire Planner	RXB2		Steve
BKRD District Ranger	RXA2/AA	WFA3/AA	Alan
BKRD FMO	FFT1/Firing	DO/DZIA	Keith
BKRD AFMO	FFT1/Firing		Clint
BKRD Fire Engine Operator (Captain)	RXB2(t)	ICT4	Norman
BKRD Equipment Operator	FFT1/Firing	DZIA	Caleb
BKRD Forester - Silviculture		FFT1	Neal
BKRD Forestry Technician	RXCM/Firing	RXCM	David
BKRD Wildlife Biologist	FFT2/Firing		George
BKRD Seasonal Firefighter	FFT2/Firing	FFT2	Josh
BKRD Seasonal Firefighter	FFT2/Firing	FFT2/FFT1(t)	Alex
TNC Firefighter	FFT1/Firing		Chad

Figure 2. Grindstone RX and 109B Declared Wildfire Participant Titles and Pseudonyms.

Keith preferred to use local fire staff and auxiliary firefighters to conduct prescribed fire, believing that local knowledge within individual units leads to more efficient operations that lessen the need for off-Forest resources. In early 2024, low seasonal severity in the Southern Region further contributed to this opinion. By late March, District staff had already successfully implemented 21 burns for 12,367 acres.

Events Preceding the Week of the 109B Fire

In the interest of moving forward with prescribed fire objectives while key fire staff took some well-deserved time off, the BKRd sought a visiting Burn Boss (RXB2) for the week of March 25. The first individual pursued who was familiar with the unit was declined because of National Forest Salary and Expense (NFSE) budgetary concerns, so the District then invited the NFAL Fire Planner (Steve) to conduct burning operations.

During the week of March 18, District fire staff accomplished 2,685 acres of prescribed burning on March 19, 20, and 21. The BKRd Assistant Fire Management Officer (AFMO) (Clint) briefed the incoming RXB2 (Steve) virtually on Friday, March 22, as they looked to continue burning their planned compartments. On March 25, the Conecuh District Ranger began serving as NFAL Acting Forest Supervisor (John) while the Forest FMO (Monica), who had arrived only last fall, also brought in an Acting DO (Ron) for the Forest, an Administratively Determined (AD) retiree who was familiar with the area.

“Relationships need time to mature.” –John (NFAL Acting Forest Supervisor)

Coordinating the Plan

March 26 Events

Steve arrived on Tuesday, March 26, from the NFAL SO located in Montgomery, Alabama, after repairing a Remote Automatic Weather Station (RAWS) station on the Talladega Ranger District, which was on the way to the BKRd. Initial plans to burn the next day on the BKRd had changed because of a need for fire personnel to help wildlife staff with wild hog trapping and other activities. Upon arrival, Steve immediately focused on burning the 634-acre Grindstone RX unit¹ on March 28. He began coordinating with the National Weather Service (NWS) for obtaining the March 28 spot weather forecast for the Grindstone RX unit, located centrally on the BKRd.

March 27 Events

On March 27, Steve requested an updated March 28 spot weather forecast for the Grindstone RX area. This unit was selected in part because the predicted wind direction would be out of the north and would keep smoke out of areas to the north near the RX that were identified as smoke-sensitive. Upon deeming variances would likely be necessary due to high predicted wind speeds, Steve tentatively scheduled a 0700 March 28 meeting with Ron for Region 8 (wind speed) and Forest (RH) variance approvals. Predicted winds greater than 20 mph out of the north (gusts of 23

¹ The Grindstone/Mill Creek Prescribed Fire Units Map in Appendix B can be useful when reading the remainder of the narrative.

mph) would require a Region 8 variance per the R8 5140 (wind speeds ≥ 20 mph), and predicted RH at 27 percent (RH ≤ 29 percent) would require a Forest variance per the Black Warrior Burn Plan.

The 1,082-acre Mill Creek RX unit had previously been considered along with the Grindstone RX unit. Thus, the RXB2 and the District EC (Norman) discussed burning the adjacent Mill Creek RX unit along with the Grindstone unit. At various times in the past, these adjacent units had been burned together, and the weather was favorable to burn them together on March 28. A recent wind event had caused several green trees to uproot and fall across previously prepped control lines on the Mill Creek unit. The trees would need to be cleared before the unit could be burned, and Norman supported completing the preparations at this time because the unit was included in the BKRD's FY 24 RX plan.

Steve then decided to move forward with plans to burn Mill Creek along with Grindstone the following day and subsequently requested an updated March 28 spot weather forecast for both RX units. The units had received rain on Monday and Tuesday (3/25 and 3/26), with 2.2 inches of precipitation received at nearby Bankhead RAWS over those two days. With the predicted indices and the recent rainfall, the units were within prescription to burn if the Region and Forest approved the variances.

During the day, Steve and Alan also talked about the smoke-sensitive area north of the Grindstone RX unit, and both the NWS forecast and smoke Hybrid Single Particle Lagrangian Integrated. # Trajectory (HYSPLIT) model runs confirmed the area could be avoided if burning the next day. Before leaving for the day, Steve confirmed the 0700 scheduled variance meeting with Ron for the following morning.

The Prescribed Burning Operations and Wildfire Response

Burn Day - March 28, 2024

Pre-Burn Activities

At 0400 on March 28, Steve requested his first spot weather of the day and headed into the office. At 0630, Steve and Alan met to prepare for the 0700 variance meeting and subsequently joined that meeting to request a Region 8 variance for high winds and a Forest variance for RH. The variance-request conversations and approval were delayed somewhat by the Regional Office weekly coordination call. At 0730, Alan authorized the ignition and signed the 2A, contingent on the variances being approved before ignitions began.

Between 0730 and 0845, Steve began finalizing fire behavior modeling (BehavePlus), smoke modeling, permitting, organization charts, and notifications and then left the District Office for the burn units.

Meanwhile, burn resources arrived on scene to the Mill Creek and Grindstone RX units to finish unit preparation. Resources for the day included 10 crew members; two engines (one Type 6 and one Type 7); and three utility task vehicles (UTVs), two of which were equipped to conduct ignitions with UTV torches and one that would be used for patrol and as transportation for burning

by hand. Two persons staffed on each UTV allowed efficient use of backing fire along control lines while ensuring fire was adequately reaching interior fuels.

Burn Activities

Steve arrived on the burn unit at Drop Point (DP) 48 and began the briefing at around 0900. The briefing included the required elements, emphasizing unit hazards and the ignition plans using the available resources. Back from annual leave the first three days of the work week, the BRKD FMO (Keith) and Clint had arrived at work later than their usual start times and were not present when the briefing began. However, during the briefing, Clint noted that the RXB2 had missed addressing the UTV Go/No Go checklist, and the situation was resolved on site.

At 0936, Steve was notified that the requested variances were authorized. Ten minutes later, the test fire was lit just north of DP 48, and the 2B Go/No-Go checklist was completed. At 0955, the test fire was deemed successful, and Steve notified the Alabama Interagency Coordination Center (AL-ICC, Dispatch) located at the Forest Supervisors Office in Montgomery. Firing operations began on the burn unit's south end (DP 48) at 1000.

Clint and the Fire Equipment Operator (Caleb) began burning from DP 48 towards the west down towards the creek. It took time to implement and get fire to back down towards the creek to build depth for that first pressure line. Other units moved south and north (in the direction of DP 52 and DP 47), blacklining to secure downwind lines and lighting accessible ridges near the roads. Firing operations were brought to Grindstone Creek on the burn's west side at 1025.

By 1100, UTVs moved into DP 45 and 46, Grindstone north, to continue ignition operations. Ignitions were tied into the creek near DP 54 at that same time. Steve also documented weather at 1100, and firefighters reported good fire effects within the compartments; however, they noticed east winds and increased fire behavior. By 1150, the south end of the Grindstone baseline north of DP 45 and 46 was complete.²

Steve documented weather again at 1258, using the RAWs located at the Black Warrior Work Center. Resources continued to move north in an east-to-west fashion to ignite all areas of the units. By 1316, Steve noted that 40 to 50 percent of ignitions were complete with no concerns.

At 1405 the crew caught a small spot fire north of DP 30 and were able to contain it quickly with two firefighters. At 1430, the final ignitions took place at DP 35 for Grindstone and DP 24 for Mill Creek. Steve documented weather at 1459. He noted that the high wind speed was sheering off the smoke, but it was not affecting the fire effects or posing a challenge to holding the lines. Crews completed exterior ignitions across both burn units by 1529.

Dual Smoke Reports

Around 1500, two smoke reports came in almost simultaneously. The first was a Federal Aviation Administration (FAA) call to Dispatch about smoke north of the unit; the other was a call to the District Office reporting smoke south of the unit. Keith and Clint took a truck to the Black Warrior Work Center and used the lookout tower to check the FAA-reported smoke to the north. They

² The point of origin for the escaped wildfire would later be identified as just north of DP 46.

determined the smoke was coming from within the burn units and could not see any additional threats at the time.

Alan called Keith and offered to check the smoke to the south, as he was at the office and closer to the second smoke report. After investigating, he reported there were strong shearing winds coming off the fire and determined the smoke to be Grindstone drift smoke of no concern.

On the NFAL, only three AAs cover five districts, resulting in the need to cover multiple districts daily.

As the day ended, the crew once again checked all creek tie ins and roads to be sure all was well and that their lines were holding. They took extra care in checking a grassy flat along the Mill Creek unit on the east side of the combined RX where a burn had spotted across the creek in prior years.

Closeout Events

Around 1700, Steve led an after-action review (AAR) at DP 44. During the AAR, the crew reported on a safe and productive day, noting only that there was likely no need for the Type 7 engine to follow a wet UTV, and using that equipment elsewhere may have added to efficiency. Resources were then released to return to the work station.

At 1730, as folks began to head back to the work station, a smoke column was spotted near DP 50. One of the UTVs was unloaded, and the area was checked. The smoke was determined to be from fuels internal to the unit. The crew then headed to the Black Warrior Work Station, and everyone was off the burn by 1800.

The Wildfire - March 29, 2024

Morning Burn Unit Check

On March 29, a spot weather forecast predicting low RH levels and southwest winds that would have sent smoke in a direction that prevented plans to burn a separate unit that day. At 0733, resources, including Norman, BKRD seasonal firefighter³ (Chad), and Caleb (with a dozer) arrived on the Grindstone/Mill Creek burn units to check the control lines. They hiked all of Mill Creek; they checked the roads and drove all the pieces that had been fired with UTVs. On the west side specifically, Norman worked his way into DP 46 on foot and stood on an overlook where he could see up north toward the drainage. Although it was hazy and smoky, he saw nothing of concern. BKRD seasonal firefighter (Alex) and Caleb drove down the line beginning at the FSR 109N near DP 25 to DP 17 and worked to cool down a burning stump. Caleb then hiked west to the creek and looked south down the drainage and saw nothing that seemed to be outside of the control lines. By 0942, all resources had completed checking lines, and resources returned to the work station, expecting to burn later that day.

³ The Nature Conservancy finances this seasonal position.

Other Morning Activities

Around 1030, Steve completed his paperwork, closed out with the DFMO, and returned to the Supervisors Office. Many District employees departed for home at 1030 because it was Good Friday before the Easter weekend, and the weather indices were not favorable to burn that day as the RH was predicted at 17 percent. Keith, Norman, and Chad stayed on duty as the other fire resources were released for the day.

Alan was attending a public meeting at New Home Church (about 2.5 miles northeast of the Mill Creek unit) around 1115 when he observed a smoke column in the general vicinity of the Mill Creek and Grindstone RX. He notified Keith and then drove to the smoke south of his location to assess the situation. Keith dispatched Norman and Chad from the work center to the area to tie in with Alan while he stood by at the District Office in case a dozer was needed to respond. By 1134, they determined that the smoke was to the east of the burn area from a private unpermitted prescribed fire not associated with the Grindstone/Mill Creek RX.

Norman and Chad went out to Straw Riddle RX unit to complete preparations for burning that unit later. The UTV radio microphone was not working, so Keith swapped it out for the one in his truck to help maintain communications as best they could throughout the day on the UTV.

Wildfire Discovery and Subsequent Actions

At 1349 Caleb texted Keith, who was the unit DO, to report two smoke columns seen from his home coming from the vicinity of the Grindstone/Mill Creek units. Keith responded to the text that there was an unpermitted burn on private land near the BKRD RX units. Meanwhile, Norman texted a similar smoke report from where he was prepping the Straw Riddle unit to the west, but poor cell service from that area prevented the message from being sent. Keith left the Straw Riddle area around 1500 and headed back to check the burn from yesterday and to check the private unpermitted burn adjacent to FSR 121B. Keith arrived at the burn units and came down the main FSR 109 and to the FSR 109B4 before moving cross country. As he was scouting on foot, he saw a fire working its way into private land west of Grindstone Creek. He radioed Norman and Chad still working on Straw Riddle to respond. Because radio communication was sporadic, he then texted the District Office and told

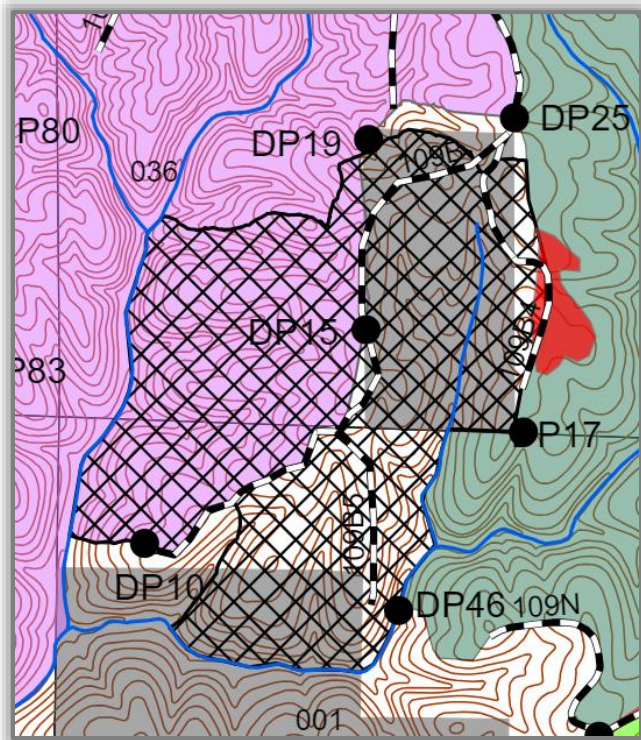


Figure 3. This map of the 109B declared wildfire escape footprint may be a useful reference when reading the wildfire discovery portion of the narrative.

the BKRD Silviculture Forester and auxiliary firefighter (Neal) to “rally all available District fire resources.” A text was also sent out to Caleb, Clint, and another BKRD seasonal firefighter (Josh), who were released earlier in the day (since it was their normal Friday off) to see if they were available.

At 1542, Norman and Chad began the initial response to the 109B Fire. Neal and the BKRD Forestry Technician auxiliary firefighter (David) came in a vehicle from the District Office headed to the Grindstone RX area. The two firefighters working on Straw Riddle arrived at the 109B Fire, and Norman was assigned as the IC as he arrived at DP 25. Keith then went to get the second dozer (DZ2/DZIA) from the District Office as the first dozer (DZ1/DZIA) was enroute. Soon thereafter, Caleb came with DZ1 and began improving line between DP 25 and DP 19. The IC’s size-up noted the fire was five to 10 acres on both private and NFS land.

Upon discovering the fire, Keith texted Neal at the District Office and told him to “rally all available District fire resources.”

At the SO, Dispatch and Ron started hearing traffic concerning a dozer moving into the forest. Since it was late in the day, they began to wonder whether there was an incident underway. Around 1630, the IC sent a message to Dispatch that included the five- to 10-acre size-up and that they were calling this incident the 109B Fire.

Immediately after being given the size-up, Dispatch asked Norman if he had a need for a nearby helicopter (7BH [Type 3]) that was flying a recon flight on the Talladega Ranger District from a previous day’s wildfire. Norman said no, in part because of the added risk and after confirmation with Keith that it was not needed. Approximately an hour later, the helicopter was again offered as it was completing the Talladega recon flight and was declined again as the 109B Fire crew was making progress with the two DZIAs and other on-scene resources. Norman was also offered the Smokey Bear Interagency Hotshot Crew (IHC), staged on the Talladega Ranger District, and he also declined these resources because he believed his current resources were sufficient.

On the north end of the private property, Caleb (operating DZ1) continued to put in line across the ridgeline to contain the fire back over to the creek and keep it from heading further north near DP 19. Other resources began to engage near the IC’s location, just south of DP 25.

The initial focus was to stop the fire spread from progressing further north and use the creek to contain it to the east. Winds were out of the southwest and driving the fire in the direction of the previous day’s RX. Caleb began putting in a northern line, supported by a UTV and two firefighters. They continued to make good progress towards the west for the evening. As Keith arrived with DZ2, he was instructed to work on a firebreak on the FSR 109B. As he was putting in line, the fire came across the road, and the firefighters had to reorganize their effort. Keith then went to the southwest, and Norman with two firefighters worked to contain the fire at the northeast corner (right flank) by eventually tying it into the burn unit.

Norman and Neal then went down the road toward DP 10 to scout southern control line options. The road was passable for DZ2, so Neal had Keith install a dozer line from near DP 15 south down the road towards DP10. At the top of a small unnamed creek, the firefighters on foot worked south,

improving the creek with handline. Keith tied in to the DP 10 area north of some private land and pushed a dozer line west towards Grindstone Creek, finishing it with more handline. Norman hiked along the creek toward DP 46 and found some cold black on the southwest side of the creek near DP 46, likely where the fire had escaped.

Dispatch received an update that the 109B Fire was 50 percent contained at 1854, as the firefighters checked all of their control lines. Roughly an hour later, at 1953, Norman reported 90 percent containment to Dispatch. Shortly after 2000, Keith touched base with Alan with regards to the potential declaration. He also contacted Ron, and they discussed the availability of Smokey Bear IHC to assist with contain/control and patrol status of the Mill Creek burn. Ultimately, Keith decided that they had enough resources for the morning and that Smokey Bear would not be needed. At 2026, Norman reported to Dispatch that the fire stood at 300 acres; the AAR was complete; and all resources were released from the fire with plans for Alan and Norman to return in the morning.

Escaped Wildfire Declaration Confusion

As activities for that evening wound down, Ron would later recall that there was some confusion regarding the declaration and the response to the 109B Fire. Earlier that evening, administrative conversations about the fire resulted in confusion about whether Alan had officially declared the 109B Fire an escaped wildfire. Alan had a conversation with the RO Fire and Aviation Management (FAM) Assistant Director before the SO had heard of the fire regarding a “declared” status. In a 1700 conversation with John, Alan declared that he had a wildfire, which John interpreted as declaring an escaped wildfire. Knowing that this would activate a review, John contacted the Region 8 Fuels Program AD. Additionally, while operating the dozer on the fire line, Keith had a missed call from Ron but did not respond due to poor cell coverage. Around 2030, he was able to return Ron’s call.

Follow-up Events – March 30 and Beyond

Around 0800 on March 30, Ron reached out to Alan with regards to the potential declaration and availability of Smokey Bear IHC to assist with contain/control and patrol status of the Grindstone/Mill Creek RX units. Alan wanted to scout the fire area first and did not believe that Smokey Bear would be needed at that time. Before making an official escaped wildfire declaration, Alan hiked the fire area from DP 45 to DP 46. After much deliberation, Alan declared the 109B Fire an escaped wildfire shortly before 1200.



Figure 4. The cold black from the Grindstone RX on the southwest side of the creek near DP 46, near where the 109B Fire is believed to have escaped across the creek.

Enforcement and Investigations (LEI) out of Region 8 to determine the origin of the escape. LEI determined that the escape took place near DP 46 where Norman had observed the cold black, resulting in an ignition from the Grindstone RX.

On March 30, District staff consisting of Alan, Norman, and Alex arrived on the 109B Fire shortly after 0900. They discovered the lines were holding and improved one small section; the 300 acres reported last evening remained the same. Resources remained on scene until 1800 when Norman declared the 109B Fire 100 percent contained. On March 31, the fire was declared controlled and monitored by the local unit. The BKRd worked with Forest Service Law

Participant and Team Lessons Learned

The following section provides valuable and transferable lessons from both participants and the review team.

1. Holding and monitoring prescribed fire lines may be complex and difficult to complete; however, several adjustments may help reduce prescribed fire escapes.

A. Firefighters may have to walk firelines in remote areas, but only if access is safe.

A small section of line north of DP 46 had a visual check the following morning; however, because of time and a focus on Mill Creek to the east as the highest risk area because of predicted southwest winds, no one physically walked the last section of line.

B. Checking firelines at peak burn times will allow for morning fog and smoke to clear, making escapes easier to visually identify.

- i. Firefighters arrived on the RX units early in the morning while patchy fog and smoke lingered in the area. **Checks beginning later in the day** may have allowed firefighters to see the escape and manage it before it made a late-afternoon run.
- ii. **Addressing local conditions on the day after a prescribed fire, such as low RH, high winds, and values at risk, and increasing the number of checks needed in correlation with the increased risk may reduce the escape potential.** On March 29, the RH was predicted at 27 percent. However, RAWS observations showed that RH did not rise above 20 percent for a six-hour period, increasing the probability of ignition (POI) and receptive fuels in surrounding areas with adjacent private land and other values at risk.

C. Adjusting firing patterns and control lines to use roads, natural breaks, and firelines that are more accessible and easier to hold may reduce the escape potential.

- i. **Adapting and communicating firing plans using predicted weather for both the RX and the following day may reduce the escape potential.** The NFAL LRMP indicates a desire to fire adjacent to creeks to allow fire to back into these areas. However, it also offers the opportunity to fire from these areas when needed to maintain control. Occasionally, blacklining these creeks may be needed to adequately hold some areas during certain times of the year, such as spring transition periods.
- ii. **Updating Wyden or Cross Boundary Agreements may allow other features to be used for holding lines.** No Wyden Agreements were completed in FY 24 on the District because of landowner requirement changes. Access to areas with agreements would allow firefighters to use roads or larger natural features for easier firing and checking.

- D. Using available technology may reduce staff and time needed to complete firelines and conduct follow-up checks.**
- i. **Prioritizing UAS use** on units with higher escape risks as well as more difficult terrain may reduce fatigue and injuries and enhance monitoring capabilities.
 - ii. **Technological investments**, such as thermal heat detection devices, may increase firefighters' capability to detect fire outside of their control lines.
 - iii. Methods, such as state-cooperator **detection flights**, may support earlier escape identification and containment.
- 2. Programmatic burn plans are useful for administratively completing PMS 484 and FSM 5140 requirements on large landscapes; however, they may need additional considerations during development, planning, and execution.**
- A. When tailoring incident action plans (IAPs) or day-of packets for RX blocks identified and evaluated within programmatic burn plans, ensure that they include all critical information that an off-unit RXB2 may need when implementing the burn plan.**
- i. Information included in the RX briefing should be available in the IAP. These may include communication plans, organizational charts, contingency resources, medical plans, or other information resources requiring quick access.
 - ii. If using an IAP for documentation, ensure it includes required documentation elements and instructions such as weather observation requirements, fire behavior, test fire documentation, and a post-burn evaluation sheet and instructions.
 - iii. When IAPs are being used, a "field copy" of the burn plan will provide RXB2s with the most complete information regarding the RX. It is allowable to have a shorter IAP if the RXB2 has a field copy of the burn plan.
- B. When developing complex or programmatic burn plans, consider following the PMS 484 suggestion of sending the plan off-unit for technical review.** RXB2s are encouraged to have someone from off-unit technically review their burn plan, including validating changes or updates as they occur.
- C. To ensure policy updates or other changes have been reviewed, units may consider annually reviewing their burn plans in accordance with FSM 5142.6.** While the BKRD has a well-developed programmatic burn plan, some signature elements were outdated. Having a systematic time-based review may ensure all documents are signed accordingly.
- 3. Clearly identifying roles and responsibilities pre-season while calibrating the conversation to the field's needs may reduce miscommunication during critical events.**
- A. Identifying Forest-level pre-burn season roles and responsibilities may help field units understand expectations during RX, WF, and declarations.**

- i. **A facilitated pre-season meeting with all RXB2s, AAs, FMOs, and Line Officers will allow leaders to provide a common understanding of their roles and personnel filling them.** The NFAL had multiple actings and new hires both pre-season and during the RX season, making it difficult to host a meeting, which led to confusion and the necessity of individually briefing multiple positions.
- ii. **Having a dedicated pre-season meeting and simulation to discuss and practice the WF declaration** process may ensure that all responsible roles have a common understanding of the process, definitions, communication responsibilities, and criteria when making a WF declaration.
- iii. Using pre-season meetings may ensure that any **standard operating procedures (SOP) changes are clearly communicated** to everyone and provide a place to understand field-unit impacts.

B. Discussing the 2A process pre-season may ensure that everyone required to sign thoroughly understands the intent of communicating risk, expectations, and responsibilities.

- i. **Understanding the use of the 2A as a communication tool** between AAs, RXB2s, Duty Officers, and Line Officers pre-season may reduce confusion during the season. Having thorough conversations may lead to a greater understanding of any changes or documentation (such as a new complexity analysis or an amendment) that may be needed, as well as capacity and capability at the time the RX will be implemented.
- ii. Engaging with AAs and RXB2s pre-season may help identify **“best practices” during 2A conversations** from which new or developing AAs and RXB2s could learn. On the Grindstone RX, the AA documented key discussion items that he used to show his thought process as well as conversation shortcomings to avoid in the future.
- iii. **Discussing who needs to be notified during “critical communication elements”** pre-season may reduce miscommunication between AAs, RXB2s, DOs, FMOs, and others. Understanding which elements need to be communicated and by what method may provide opportunities to improve as a unit.
- iv. **Discussing multiple methods for 2A or 2B notifications pre-season** may ensure the intent of having responsible parties adequately notified. While critical notifications were made on the Grindstone and Mill Creek RXs, spotty communication by both text and radio led to communication delays.

C. Pre-season meetings and simulations may be useful for ensuring PMS 484 and FSM 5140 requirements are understood and being implemented. On the Grindstone and Mill Creek RX units, weather from the closest RAWS was being used although the policy indicates that RXB2s should be using on-site weather. The difference in RH percent between the two areas was between five to seven percent.

Exercises discussing these impacts pre-season may be useful to ensure policy is achieved and its intent is understood.

4. **Clarifying and standardizing radio communication to and from dispatch centers may ensure that critical communication is relayed to the appropriate people.**
 - A. **Developing a SOP for WILDCAD-E text notifications may ensure that all responsible parties are able to receive appropriate levels of communication.** While NFAL does have this SOP in place, not all AAs, Line Officers, or DOs are receiving consistent communication through text notifications. Refining the process may ensure that all roles know what level of texts they will be receiving.
 - B. **Developing a standardized reporting protocol regarding critical communications through dispatch centers may reduce the number of broken communications that dispatch centers receive.** While AL-ICC was documenting and recording communication from the unit, several voice recordings received were broken. Having a standardized check-in may ensure that Dispatch follows up these broken communications with a text or phone call if the radio is not functioning well.

Review Team Recommendations

The following recommendations the review team developed may have policy or program implications aside from the lessons learned.

1. **The Southern Region FSM 5140 supplement re-write needs to be completed to provide clear guidance to the field to include the following:**
 - A. **Provide Region-wide 5140 standardized language that captures the R8 intent.**
 - i. **Develop standardized processes, language, definitions, and roles and responsibilities for Element 18: Wildfire Declaration.** Copied from PMS 484, Element 18 in the Black Warrior Burn Plan did not clearly explain how the unit would achieve Element 18's objectives.
 - ii. **Define the R8 minimum staffing using production rates and reasonable holding expectations.** The Black Warrior Burn Plan indicated that minimum staffing levels for all RX would be three personnel. A clearer expectation in the R8 5140 would improve expectations to be written into burn plans.
 - B. **Refine the Region 8 expectation of Element 16: Holding Plan to include post-burn monitoring, frequency, types, etc.** Holding Plan expectations should call for increased holding line checks, to include peak-burn period checks and using risk-informed decisions based on predicted severe weather (low RH, high winds, dry fuels, etc.).
 - C. **Provide clarification and expectations for off-unit burn plan technical reviews.**
2. **Use of NFSE vs WFSE budgets for prescribed fire needs clarification.** Interviews and team discussions with AAs and Line Officers indicate that expectations for using NFSE budgets for prescribed fire are not clearly understood.

A. Standardizing the Regional Forester's intent on appropriate use of funds may increase WFSE capacity on smaller units.

- i. **Providing clear leader's intent will help field units implement the NFSE process with clear expectations.** Currently, some units are reluctant to host or allow NFSE on-unit employees RX opportunities without clear direction.
- ii. Units may need to reconsider the timing of WFSE resource requests (possibly earlier or later than typically anticipated). Units should be **directed to bring in resources when managing staffing levels for RX, IA, WF, and contingency resources.** Field units should be encouraged to work with the Forest-level DO to achieve these staffing levels apart from available NFSE employees.

3. Coordination and action with Land Mobile Radio (LMR) and Chief Information Office (CIO) need to be prioritized to provide adequate radio coverage for field units, dispatch centers, and other critical communication infrastructure.

A. An analysis of NFAL repeater coverage areas is needed to improve field-unit communications. A team analysis of the repeater coverage area shows that the Grindstone and Mill Creek RX area should have been covered by the existing repeaters. However, voice recordings provided by AL-ICC for both the RX and WF show that radio communications were poor throughout both days, regardless of the terrain (valleys, ridges, etc.) LMR needs to conduct further analysis to identify and implement solutions to frequent communication interruptions.

B. Continuity of Operations (COOP) responsibilities for field unit repeaters, base stations, and infrastructure needs to be identified and incorporated with LMR assistance. Field-going units on the BKRDR reported that they frequently lose communications due to internet or repeater outages. During both the RX and WF, resources assumed "the norm" of communication issues was caused by poor repeaters or internet loss as they continued operations.

- i. **Firefighters cited improved internet capability, generator backups, and more repeater sites as potential enhancements to current communications.**
- ii. **Investing in alternate communication systems** at the unit level should be considered to improve COOP capability.
- iii. **Increasing or improving current repeater sites** may be needed to adequately cover areas where firefighters and other field-going staff are more likely to lose communications.

C. Investing in updated technology for fire communications needs to be prioritized for firefighter health and safety.

- i. The responsibility of tracking and dispatching fire and aviation resources belongs with AL-ICC. With **aging and outdated repeater sites** and communication networks, they cannot complete their task. During the RX and WF, poor communication kept important messages from being quickly and accurately relayed to Dispatch.

- ii. Developing **an alternate and updated system** commensurate with cooperators' and partners' capabilities should be considered. Firefighters indicated that area partners and cooperators do not experience the same communication interruptions, indicating more reliable systems are available.

Conclusion

The Grindstone/Mill Creek prescribed fire was implemented on March 28, 2024. Seasonal weather was within normal to slightly above normal moisture conditions. The prescribed fire was conducted in a safe and effective manner with one Region 8 variance (wind speed) and one Forest variance (RH) in place. During the RX implementation, operations successfully met the objectives as laid out in the burn plan that went well from an operational standpoint.

The following day on March 29, 2024, the control lines for the prescribed fire were checked early in the morning. Weather conditions led to reduced visibility across the drainage near DP 46. Smoke was detected in the early afternoon to the east of the RX units and determined to be coming from a private-land burn. By late afternoon, two distinct columns were observed near the RX units, and resources were dispatched again to the area. Once on scene, the 109B Fire was identified to the west of the RX units. The wildfire was reported, and action was taken to suppress the fire with two DZIAs and multiple local firefighters. This action occurred through the early evening hours, and containment was reported at 90 percent around 2000 on March 29.

The local DR/AA and DFMO had conversations during the wildfire event as to whether this was an escape of the prescribed fire or a wildfire not associated with the burn. As the DR was informing the Forest Supervisor about the fire, they also had a conversation about the declaration, and after the call ended, confusion remained as to the type of incident underway. This confusion led to different messages working through the Supervisor's Office and the Regional Office.

On Saturday, March 30, the District Ranger declared the 109B Fire to be the Grindstone/Mill Creek escaped prescribed fire. The 109B Fire burned onto two separate parcels of adjacent private land for a total of approximately 100 acres. In total, the fire burned 300 acres.



Figure 5. The 109B Fire burned onto private land. The image above depicts a pine plantation in the background.

Appendices

Appendix A: Analyses and Assessments

#1: Analysis of seasonal severity, weather events, and on-site conditions

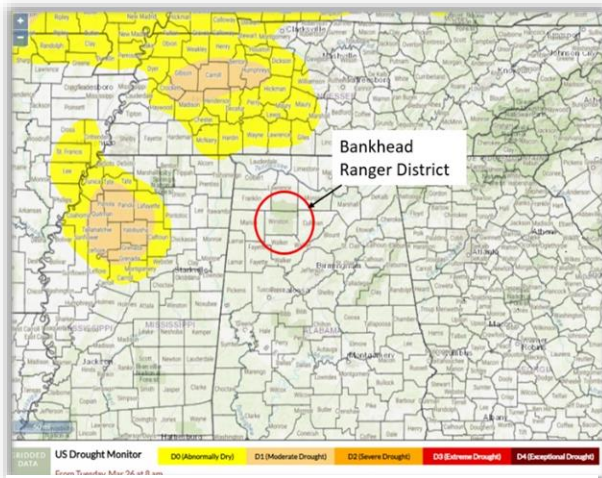


Figure 6. Seasonal drought conditions for the BKRK on March 28, 2024 (U.S. Drought Monitor).

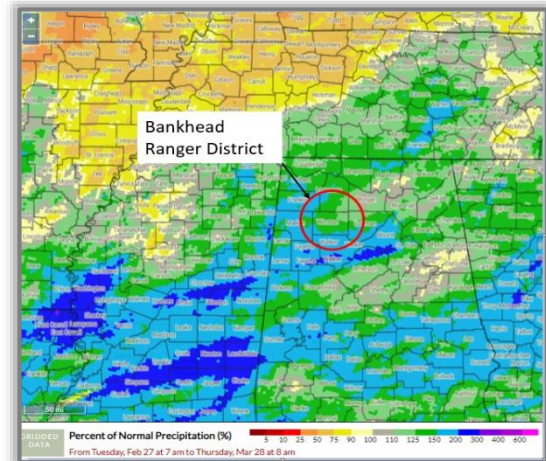


Figure 7. Percent of normal precipitation from February 27 to March 28, 2024, on the BKRK.

The BKRK experienced extreme drought in fall 2023, but frequent wetting rain events throughout the winter of 2023-2024 alleviated drought conditions for all of Alabama. By the time of ignitions on the Grindstone RX, the BKRK was no longer showing any drought conditions according to the U.S. Drought Monitor (see figures 6 and 7 above). A spring wildfire risk assessment was published for the Southern Area on March 11, 2024. This assessment projected normal to below normal wildland fire risk across the Southern Area, primarily due to a forecast for continued precipitation events through at least April 2024. During the 30 days prior to the burn, rainfall totals were between 110 to 150 percent of normal at the RX site.

The Energy Release Component (ERC) is a calculated output of the National Fire Danger Rating System (NFDRS). The ERC is a number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. The ERC is considered a composite fuel moisture index as it reflects the contribution of fuels to potential fire intensity. The ERC has memory. Each daily calculation considers the past seven days in calculating the new number. Daily variations of the ERC are relatively small as wind is not part of the calculation.

100-Hour Fuel Moisture (100FM) represents the modeled moisture content in dead fuels in the one- to three-inch diameter class.

Burning Index (BI) is a measure of fire intensity. BI combines the Spread Component and Energy Release Component to relate to the contribution of fire behavior to the effort of containing a fire.

The Keetch-Byram Drought Index (KBDI) is a continuous reference scale for estimating the dryness of the soil and duff layers. The index increases for each day without rain (the amount of increase depends on the daily high temperature) and decreases when it rains. The scale ranges from zero (no moisture deficit) to 800. The range of the index is determined by assuming that there are eight inches of moisture in a saturated soil that is readily available to the vegetation.

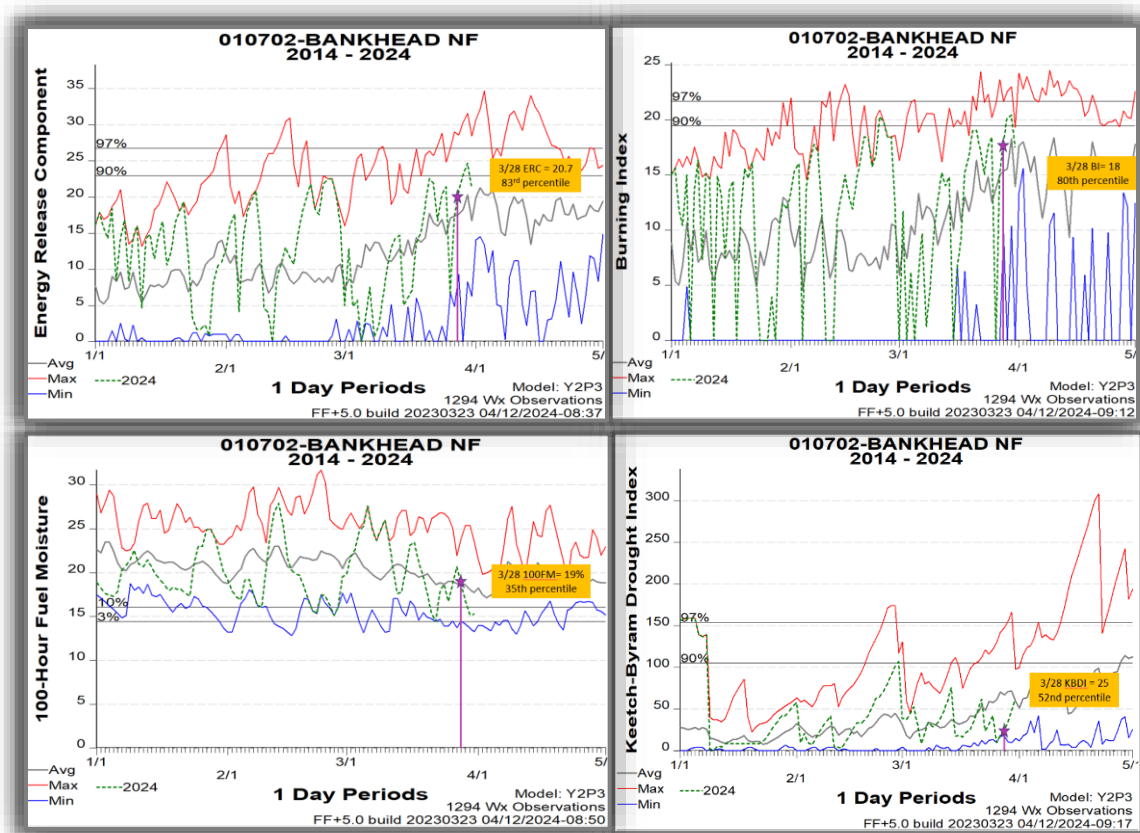


Figure 8. These four graphs show NFDRS Indices from the Bankhead RAWS with values and percentiles recorded on 3/28/24.

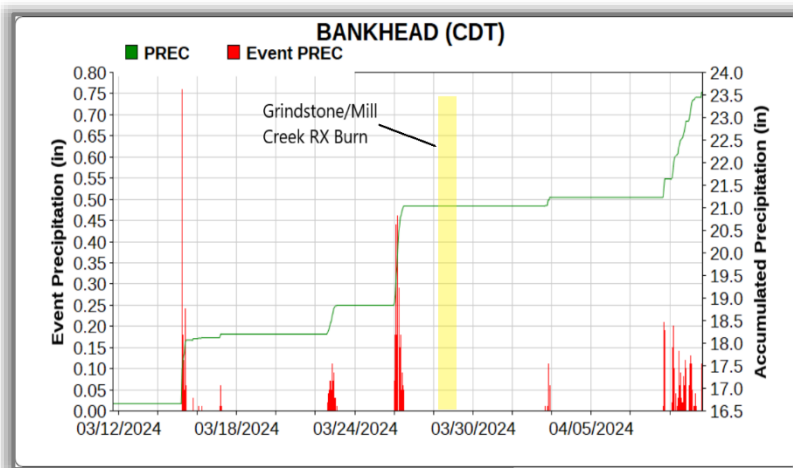


Figure 9. The precipitation graph from Bankhead RAWS for the week of the Grindstone/Mill Creek prescribed fire (Mesowest). The Grindstone prescribed burn period is highlighted in yellow.

Weather Events

The spot weather forecast for March 28, 2024, indicated favorable conditions for prescribed burning on the BKRD. Though the forecast for low RH (28 percent at 1500) was below the Forest prescribed burning parameter limit and forecast 20-foot wind gusts (23 mph at 0900) were above the R8 parameter limit, conditions for burning the hardwood leaf litter fuel were ideal. A 2.2” precipitation event two days prior to the prescribed burn (March 26) mitigated the forecasted dry and windy weather. During the burn, the observed RH dropped to 22 percent at 1800, and maximum wind gusts were recorded at 15 mph at 1500 at Bankhead RAWS.

Forecasts for that evening included a temperature drop to 39 degrees and an RH recovery of 82 percent. North winds were expected at five to six mph, becoming lighter and shifting to the southwest during the early morning hours. Observations at the Bankhead RAWS, located about nine miles north of the burn unit, were very similar to the spot weather forecast. Winds were light and variable, temperatures dropped to 40 degrees, and the relative humidities remained low (40 to 60 percent throughout most of the evening). Overnight, the maximum relative humidity recovery was 74 percent at 0400 on the morning of March 29, 2024.

Grinstone/Mill Creek

National Weather Service Huntsville

2024-03-28 4:19 AM CDT

Spot Forecast for Grinstone/Mill Creek...USFS

National Weather Service Huntsville AL

419 AM CDT Thu Mar 28 2024

Forecast is based on ignition time of 0800 CDT on March 28.

If conditions become unrepresentative, contact the National Weather Service.

.DISCUSSION...

Dry conditions will prevail today as breezy northerly winds advect in a drier air mass by the air mass. In turn, Min RH values will drop into the 25-30 percent range by the afternoon. Mixing heights will be 800 ft at ignition, but climb to around 5 kft by the afternoon.

.REST OF TODAY...

Sky/weather.....Sunny (0-5 percent).

Temperature.....41 at ignition...Max 64.

RH.....70 percent at ignition...Min 28 percent.

Wind (20 ft).....Winds north at 14 mph at ignition...otherwise North winds 7 to 14 mph.

CWR.....0 percent.

Chance of pcpn.....0 percent.

LAL.....1.

Mixing height.....800 ft AGL at ignition...otherwise 5000 ft AGL.

Transport winds.....North 13 to 21 mph decreasing to around 9 mph late in the afternoon.

LVORI.....2.

TIME (CDT) 8AM 9AM 10A 11A 12P 1PM 2PM 3PM 4PM 5PM

SKY (%).....1 0 1 1 0 1 1 1 2 1

WEATHER COV.....

WEATHER TYPE.....

TEMP.....41 45 51 55 58 61 63 64 64 63

RH.....70 60 46 40 36 32 29 28 29 29

20 FT WIND DIR..010 020 020 020 010 010 000 350 350 350

20 FT WIND SPD..14 16 14 13 12 10 10 10 9 8

20 FT WIND GUST..21 23 22 18 18 15 14 15 13 13

MIX HGT (KFT)...0.8 1.4 2.0 2.8 3.5 4.2 4.5 4.7 5.0 3.4

TRANSP WIND DIR.010 020 020 020 010 010 010 000 000 350

TRANSP WIND SPD.15 18 21 21 18 16 15 14 13 9

DISPERSION IDX..13 21 28 63 64 81 79 76 73 39

LVORI.....3 3 1 1 1 1 1 1 1 1

CWR.....0 0 0 0 0 0 0 0 0 0

CHC OF PCPN (%)..0 0 0 0 0 0 0 0 0 0

LAL.....1 1 1 1 1 1 1 1 1 1

Figure 10. The image above is the NWS 3/28/24 spot weather forecast for the Grindstone/Mill Creek RX units.

The following day, Friday, March 29, forecast temperatures were in the 50s; winds were three to seven mph out of the west and south; and relative humidities ranged from 85 percent at 0600 to a low of 27 percent at 1600. Observations at the RAWS station were somewhat hotter and drier than the spot weather forecast predicted. After reaching an overnight high of 74 percent, RH dropped precipitously to a low of 17 percent (the 1st percentile) at 1500 and remained below 20 percent from 1300 to 1900 Friday afternoon. Observed temperatures were a bit warmer and remained above 70 degrees for most of the afternoon. West-southwest winds of four to seven mph with gusts of 10 to 15 mph recorded at the RAWS.

.TONIGHT...													
Sky/weather.....Clear (0-5 percent).													
Temperature.....Min 39.													
RH.....Max 82 percent.													
Wind (20 ft).....North winds 5 to 6 mph early in the evening becoming light.													
CWR.....0 percent.													
Chance of pcpn.....0 percent.													
LAL.....1.													
Mixing height.....0 ft AGL.													
Transport winds.....Northwest 1 to 6 mph shifting to the southwest 2 to 3 mph overnight.													
LVORI.....3.													
TIME (CDT)	6PM	7PM	8PM	9PM	10P	11P	MID	1AM	2AM	3AM	4AM	5AM	
SKY (%)	2	2	0	1	0	0	0	0	0	0	0	1	
WEATHER COV.....													
WEATHER TYPE....													
TEMP.....	62	59	54	51	48	46	45	43	42	41	40	39	
RH.....	31	39	46	52	58	63	65	67	70	73	76	82	
20 FT WIND DIR..	340	350	350	330	330	330	320	310	260	220	200	210	
20 FT WIND SPD..	7	6	5	0	3	0	0	3	2	2	3	3	
20 FT WIND GUST..	10	9	6	6	6	6	6	6	5	5	6	6	
MIX HGT (KFT)...	1.9	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
TRANSP WIND DIR..	340	340	340	330	330	300	250	230	220	210	210	200	
TRANSP WIND SPD..	6	3	2	1	1	1	2	2	2	3	3	3	
DISPERSION IDX..	14	1	1	0	0	0	1	1	1	2	2	2	
LVORI.....	1	2	2	2	3	3	3	3	3	3	4	4	
CWR.....	0	0	0	0	0	0	0	0	0	0	0	0	
CHC OF PCPN (%)..	0	0	0	0	0	0	0	0	0	0	0	0	
LAL.....	1	1	1	1	1	1	1	1	1	1	1	1	

Figure 11. The image above is the NWS 3/28/24 evening spot weather forecast for the Grindstone/Mill Creek RX units.

.FRIDAY...

Sky/weather.....Sunny (5-15 percent).

Temperature.....Max 70.

RH.....Min 27 percent.

Wind (20 ft).....Light winds becoming southwest 5 to 7 mph in
the late morning and afternoon.

CWR.....0 percent.

Chance of pcpn.....0 percent.

LAL.....1.

Mixing height.....5300 ft AGL.

Transport winds.....Southwest 3 to 12 mph increasing to 13 to 16
mph in the afternoon.

LVORI.....3.

TIME (CDT)	6AM	7AM	8AM	9AM	10A	11A	12P	1PM	2PM	3PM	4PM	5PM
SKY (%).....	1	2	0	0	1	1	2	3	6	10	13	19
WEATHER COV.....												
WEATHER TYPE.....												
TEMP.....	39	38	41	48	57	62	65	67	68	69	70	69
RH.....	85	82	76	68	49	41	36	32	30	28	27	30
20 FT WIND DIR..	210	200	190	200	210	220	220	220	220	210	210	210
20 FT WIND SPD..	3	0	5	6	7	7	7	8	8	8	8	8
20 FT WIND GUST.	5	6	7	8	10	10	10	12	12	13	13	13
MIX HGT (KFT)...	0.1	0.1	0.8	1.6	2.3	3.0	3.8	4.5	4.8	5.0	5.3	3.6
TRANSP WIND DIR.	200	190	200	220	230	230	230	220	220	220	220	210
TRANSP WIND SPD.	3	3	6	8	10	12	13	14	15	16	16	14
DISPERSION IDX..	2	2	3	4	5	43	58	73	83	94	97	61
LVORI.....	4	4	4	4	1	1	1	1	1	1	1	1
CWR.....	0	0	0	0	0	0	0	0	0	0	0	0
CHC OF PCPN (%)	0	0	0	0	0	0	0	0	0	0	0	0
LAL.....	1	1	1	1	1	1	1	1	1	1	1	1

Figure 12. The image above is the NWS 3/28/24 spot weather forecast for Friday (the following day) for the Straw Riddle and Houston Riddle RX units.

On-site Conditions

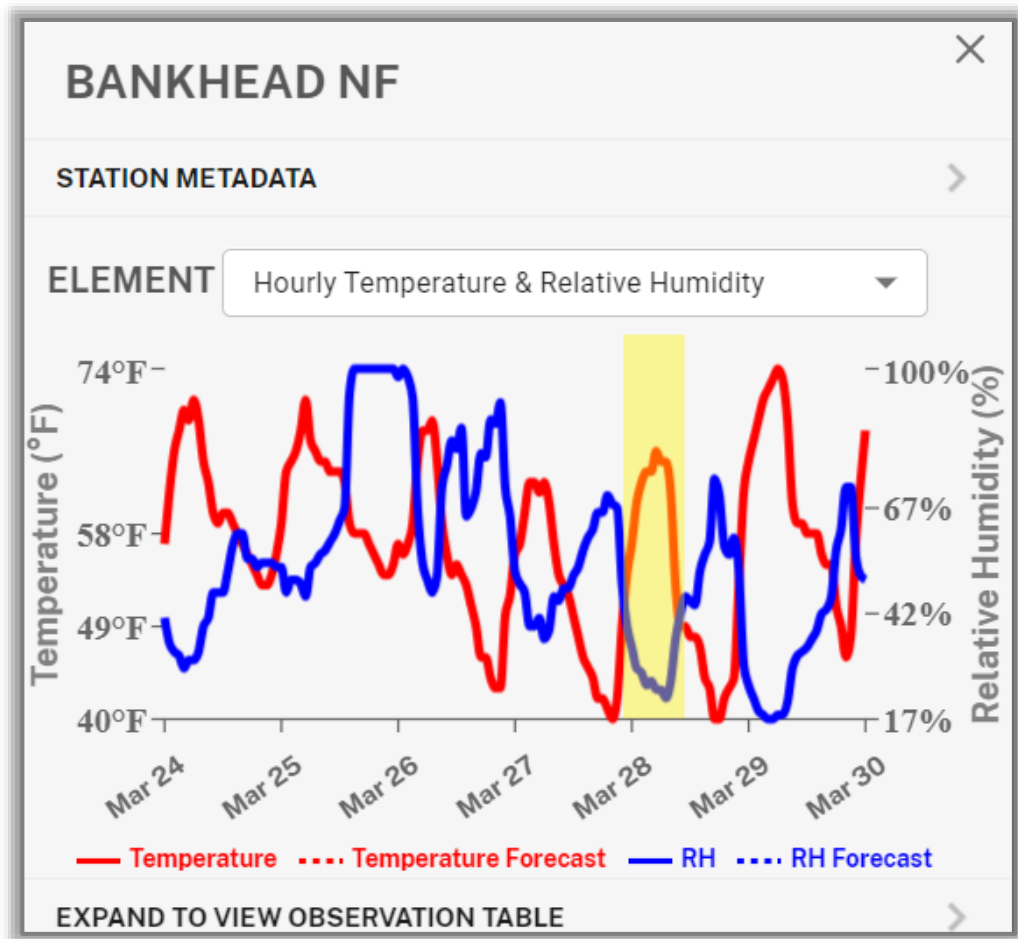


Figure 13. This figure displays the hourly observed temperature and relative humidity graph from March 24 through March 30. (FEMS). The burn period for Grindstone RX is highlighted in yellow.

The Bankhead Remote Automated Weather Station (RAWS) is located about 7.5 miles from the northern perimeter of the Mill Creek/Grindstone burn unit and about 9 miles from the southern portions of the unit. Observations from the RAWS were used in lieu of on-site observations during the burn.

Fuel Moisture and Fire Behavior Modeling

Fuel moistures used to model fire behavior were derived from the Fine Dead Fuel Moisture Tool (FDFM), a tool within the BehavePlus 6.0.0 application. Using the inputs from the spot weather forecast, the tool predicted that the minimum FDFM for burn day was six percent. To estimate 10-Hour Fuel Moisture (10FM) one percentage point was added to the FDFM. The 100-Hour Fuel Moisture (100FM) was estimated by adding two percentage points to the FDFM. See the tables in figures 14, 15, and 16.

Dry Bulb Temperature	50 - 69 oF
Relative Humidity	25 - 29 %
Reference Fuel Moisture	5 %
Month	Feb Mar Apr Aug Sep Oct
Time of Day	14:00 - 15:59
Elevation Difference	Level (within 1000 ft)
Slope	0 - 30%
Aspect	West
Fuel Shading	Exposed (< 50% shading)
Fuel Moisture Correction	1 %
Fine Dead Fuel Moisture	6 %
Description	

Figure 14. This image displays the FDFM used to calculate dead fuel moistures for fire behavior calculations for the Grindstone/Mill Creek RX units.

Inputs: SURFACE, IGNITE	
Description	3/28 high end
Fuel/Vegetation, Surface/Understory	
Fuel Model	9
Fuel Moisture	
1-h Fuel Moisture	6 %
10-h Fuel Moisture	7 %
100-h Fuel Moisture	8 %
Live Herbaceous Fuel Moisture	
Live Woody Fuel Moisture	
Weather	
Midflame Wind Speed (upslope)	14 mi/h
Air Temperature	64 oF
Fuel Shading from the Sun	15 %
Terrain	
Slope Steepness	15 %

Figure 15. BehavePlus 6.0.0 was used to estimate Rate of Spread (ROS), Flame Length (FL), and POI for the Grindstone/Mill Creek RX units.

3/28 high end Head Fire	
Surface Fire Rate of Spread	47.7 ch/h
Surface Fire Flame Length	6.4 ft
Probability of Ignition from a Firebrand	53 %

Figure 16. This figure displays the high-end estimates for the Grindstone/Mill Creek RX head fire activity on 3/28.

#2: Analysis of the prescribed fire plan for consistency with agency policy

The Black Warrior Prescribed Fire Plan is a Programmatic Moderate Plan (also known as a Multiple Unit Plan) used for prescribed fire projects with multiple ignition units that can be ignited separately or concurrently. The Grindstone and Mill Creek units are separate units within the Black Warrior Programmatic Plan. For the Grindstone/Mill Creek RX project, portions of both units were burned as one contiguous unit.

The Black Warrior Prescribed Fire Plan is maintained in a project folder with ignition unit maps, complexity analysis, and a job hazard analysis (JHA). The BKRD uses an IAP for burn day documentation. The IAP includes information copied from the RX burn plan to build a daily briefing packet.

The packet for the Grindstone/Mill Creek RX project contains the following:

- Cover sheets for both units with basic required information, such as location (latitude/longitude and section, township, and range), size in acres, aspect, elevation, allowable wind directions, previous burn dates, unique features, Alabama Forestry Commission contact information, Wyden agreements, and evacuation location.
- Element 1: Signature Page with signatures/dates
- Element 2A: Agency Administrator Ignition Authorization with signatures/dates
- Element 2B: Prescribed Fire Go/No Go Checklist
- Notes Page (unit log)
- Element 7: Prescription Parameters
- UTV Torch Go/No Go Checklist
- Organizational Chart
- RX Fire Tailgate Safety Checklist
- Briefing Checklist
- Medical Plan (ICS 206)
- Smoke-Sensitive Areas Map
- Unit Operational Map

A number of IAP elements seem to have been maintained in a digital format instead of hard copy, including the following:

- Spot Weather Forecast
- Fire Behavior Modeling Documentation for Day of Burn (BehavePlus runs)
- Smoke Management and Modeling (AirNow maps, Hysplit model runs, PB-Piedmont model runs, and smoke sensitive receptor contact list)
- Morning NFDRS Forecast from AICC Dispatch

An ignition unit map was distributed to RX personnel that identified the number of acres being burned, control lines, designated DPs, and unique features such as pine plantations and wildlife openings. Table 1 below contains the Black Warrior Prescribed Fire Plan Analysis.

Table 1. Black Warrior Prescribed Fire Plan Analysis

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Element 1: Signature Page	Yes	No	AA annual review approval signature was not in the plan. SME signature lines are recommended. Note: AFMO was the technical reviewer on the Black Warrior Programmatic Burn Plan for the FMO, who was the preparer. No current policy requires an off-unit technical reviewer; consider adding this requirement in the R8 5140.	No
Element 2A: AA Ignition Authorization	Yes	Yes	NWCG PMS 484 requires documentation of AA key discussion points, and the 2A conversation needs to be documented for USFS policy. The RXB2(t) documented post-burn checks on the 2A.	No
Element 2B: Go/No Go Checklist	No	No	The RXB2 appears to have signed the Go/No Go checklist the morning prior to the burn (before the test fire was set and spot weather was updated); While signed the day of, it did not include the latest information available.	No
Element 3: Complexity Analysis Summary and Final Complexity	Yes	Yes		No
Element 4: Description of Prescribed Fire Area	Yes	Yes	Acreage figures differ between the burn plan and the IAP (possibly due to exclusions or day-of tactical decisions): - Grindstone = 670 and Mill Creek = 1,324 in the burn plan; the IAP shows Grindstone = 634 and Mill Creek = 1,082.	No
Element 5: Objectives	Yes	Yes	Plan includes objectives description of 3 NEPA areas (hardwood, shortleaf, longleaf), but recommend stating the desired range of fire-return intervals (FRI) for each of the NEPA areas separately to avoid confusion.	No
Element 6: Funding	Yes	Yes		No

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Element 7: Prescription Parameters	No	No	BehavePlus runs needed to validate prescription parameters. No BehavePlus documentation is included in original burn plan or Nov annual review except CONTAIN runs. Finish prescription parameter table with forecast and actual weather values during a burn as best practice. The RX BI on hard-copy plan is wrong (<22) but accurate in digital plan (<115).	No
Element 8: Scheduling	Yes	Yes	Thorough description of constraints and timeframes is flexible.	No
Element 9: Pre-burn Considerations and Weather	Yes	Yes	Spot weather was not included in the day-of supplement. It is recommended to include spot weather forecast in the day-of supplement. The RXB2 did a good job of documenting these weather observations on the 214 "notes page," but consider using the prescription parameter table for documentation.	No
Element 9 B: Method and Frequency of Weather and Smoke Management	Yes	No	Weather was taken every 2 hours from BKR D Black Warrior Work Center RAWS (8 miles away), not on site. R8 5140 (2011) requires on-site weather observation documentation in Element 7 (not in 2005 version). Chief's Review Quality Assurance Checklist recommends on-site weather observations unless local NWS forecasting office is consulted and off-site RAWS is determined representative. Spot weather should be requested or AA should approve/document exemption. Include a smoke-sensitive contact list per PMS 484 with a burn-plan link or appendix for plan update. RXB2 needs hard-copy contact list on burn day.	No

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Element 10: Briefing Checklist	No	No	The PMS 484 briefing checklist requires a medical plan and wildfire declaration to be briefed, but the medical plan and wildfire declaration are not in the burn plan or on the supplement checklist. The Grindstone Burn Plan uses R8 5140 (2005) suggested briefing checklist that does not include these two elements. R8 5140 (2011) does not have a suggested briefing checklist, so it falls back to the PMS 484 as policy.	No
Element 11: Organization and Equipment	Yes	Yes	Thorough description of line production capability requirements is included. Appendix E has line production rates of common holding resources, which is good! No contingency resources are identified nor is there a description of which resources are contingency on org chart. No resource assignments are identified within the day-of supplement. It is recommended to add these details to the org chart as a best practice.	No
Element 12: Communications	Yes	Yes	All potential command, tactical, and air ops frequencies are included in the burn plan, but specific communication frequency(ies) used on the burn are not documented in the day-of supplement.	No

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Element 13: Public and Personnel Safety, Medical	Yes	Yes	PMS 484 suggests adding a statement: "All personnel who are within the active prescribed fire area are required to wear PPE," but PPE requirements are only defined in Appendix G, Safety Briefing Checklist and in supplement. Please Reference Appendix G and JHA in Element 13. PMS 484 also requires unit-specific safety hazards spelled out for individual RX projects. The Grindstone RX supplement has a standard safety briefing checklist that may suffice. ICS 206 and MIR are included in the day-of supplement. It is recommended to add unit-specific medical plan element information for each individual burn.	No
Element 14: Test Fire	No	No	USFS RX Fire Template requires test fire documentation, including conditions on-site and test fire results. No test fire space is in IAP even though burn plan says to see IAP. 214 documented only that the "test fire was successful." Document weather and test fire results in Element 7.	No
Element 15: Ignition Plan	Yes	Yes	A good narrative was included for the Minimum Ignition Staffing section and Flexibility of Ignition Devices Statement.	No
Element 16: Holding Plan	Yes	No	The intent of the Chief's Review is to specify standards for post-burn patrol for the burn unit (minimum personnel, interval, actions, and duration), but standards are not this specific in the burn plan or supplement/IAP. It is recommended to add verbiage to require checking creeks used as control lines (walking, UAS, etc.) in next burn plan update.	Yes – Did not follow Element 16.B.1 to patrol all control lines, stating that creeks may need to be walked. Specifies the burn must at least be checked prior to 1000. Resources checked too early and should check again at peak burning period.

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Element 17: Contingency Plan	No	No	PMS 484 states "The Burn Boss will verify and <u>document</u> availability of contingency resources and response time throughout each phase of implementation as described in the plan." Contingency resources were not expressly identified in the day-of supplemental organizational chart. A note in the technical reviewer checklist said to "clarify recommended resources." Consider adding a statement to the contingency plan on R8 exemption to 30-minute maximum response time requirement next time the plan is updated if the BKNF uses this exemption or plans to use in future. Consider using PACE model when developing the Contingency Plan.	No
Element 18: Wildfire Declaration	Yes	Yes	This element met policy; however, roles and responsibilities for notifications should be made clear in the burn plan and R8 5140.	No
Element 19: Smoke Management/Air Quality	Yes	Yes	The AirNow printout for 03/28/2024, Hysplit run kml, and PB-Piedmont run for Grindstone were on file with the RXB2. It is recommended to include hard-copy printouts in the day-of supplement. The smoke-sensitive areas map should be included in the day-of supplement.	No
Element 20: Monitoring	Yes	Yes	Element 20 states that weather will be monitored on-site, but weather was taken from BKRK Black Warrior Work Center RAWS. Monitoring was an element of the briefing checklist, but it was not checked as being briefed. The burn plan states in Element 20: Monitoring that a post-burn evaluation will be completed, and the post-burn evaluation form states that it should be completed immediately after the burn. No post-burn evaluation has yet been completed for this burn.	No

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Element 21: Post-burn Activities	Yes	Yes	Post-burn checks are documented in the Grindstone day-of supplement at end of Element 2A.	No
Appendix A: Vicinity, Project (Ignition Units)	Yes	Yes		No
Appendix B: Technical Review Checklist	Yes	Yes	PMS-484 recommends an off-unit technical reviewer and that technical review should be completed annually. The BKRD AFMO tech-reviewed the Grindstone Burn Plan on 01/18/2023. Consider recommending a change to the Region 8 5140 to require an off-unit technical reviewer.	No
Appendix C: Complexity Analysis	Yes	Yes		No
Appendix D: JHA Risk Assessment	Yes	Yes		No
Appendix E: Fire Behavior Modeling Documentation	No	No	The Chief's Review Quality Assurance Checklist requires the documentation of fire behavior modeling used in preparing Element 7: Prescription to be accurately reflected in this appendix. No fire behavior modeling is in the burn plan for building prescription parameters in Element 7, but there are BehavePlus CONTAIN runs in the plan to inform Element 17, Contingency Plan. The RXB2 completed a BehavePlus run for the Grindstone unit on the morning of the burn.	No
Appendix F: Smoke Management Plan and Smoke Modeling Documentation (optional)	Yes	Yes	Smoke-sensitive areas map was included in plan and day-of supplement. Include smoke-sensitive contact list for next burn plan update. The smoke-sensitive map shows that these units can be burned with any wind direction, but the review team was told in interviews that these units must be burned on a north wind to avoid smoke-sensitive receptors to the northwest.	No

Prescribed Fire Plan Elements	Policy Consistent (NWCG)	Policy Consistent (USFS)	Comments	Contributing Factor?
Appendix H: Post-Burn Evaluation	Yes	Yes	Element 20: Monitoring states that a post-burn eval will be done. Could use Appendix H.	No
Overall Comments: (1) Prescribed Fire Name and Ignition Unit Name in the USFS template is required at the top of each burn-plan page. The Grindstone RX plan only has the RX fire name and ignition unit name in Element 1 and the supplement cover page. (2) Element 16.D.2 suggests increased patrol during or after peak burning period, but the burn was only checked Friday morning prior to peak burning time. (3) For Element 17 Contingency Plan, consider the Primary Alternate Contingency Emergency (PACE) model for identifying contingency resources based on conditions. (4) It is recommended to take a hard-copy burn plan to the field. (5) The supplement must match the signed burn plan, not the digital version. (6) No spot weather was requested specifically for Grindstone unit on 03/29/2024 - spot weather was requested for Straw Riddle and Houston Riddle units only. (7) It is recommended to use on-site weather observations instead of RAWs, and discrepancy exists in RAWs vs on-site weather requirements between Elements 9 and 20. (8) Ensure a communication plan is included in the IAP as best practice, so assigned frequencies are clear to entire crew. (9) A hard copy of the plan was not taken to the field, only the supplement.				
Amendment Process: The Grindstone Element 7 prescription parameters show a max wind speed of <=20 mph (same as the Region 8 standard). Maximum winds on spot weather were 23 mph, so a plan amendment was required. The AA signed and approved the amendment at the end of the 2A Ignition Authorization, but the only verbiage is "RH, winds." PMS 484 requires identification of the affected sections; the reason for the change(s); and to have the changes clearly identified. For amendments, the AA will determine and justify the need for additional technical review in writing. Prescribed fire plan amendments must consider effects to the prescribed fire's complexity, and therefore the final complexity rating must be reviewed and a new complexity analysis performed if the proposed amendment(s) will result in a change to the risk or technical difficulty of one or more elements in the complexity analysis.				

#3: An analysis of prescribed fire implementation for consistency with the prescription, actions, and procedures in the prescribed fire plan

Table 2 below illustrates the burn plan prescription, inputs, and source used for implementation of the Grindstone RX. Forecasted values indicate that all prescription parameters were met except for RH below the Forest standard (<=29%) and winds greater than the Region 8 standard (<=20 mph). Twenty-foot winds on the spot weather were forecast to be 23 mph at 0900 on the morning of the burn. The Grindstone RX Burn Plan prescription for the upper limit of 20-foot winds is <= 20 mph, so the AA signed a change approval (amendment); however, the change approval did not document the reason for the amendment with sufficient detail as required by NWCG PMS 484, aside from stating "RH and winds" on the change approval form. The low relative humidity was forecast to be 28 percent at 1500 according to the spot weather request, which is one point below the NFAL's Forest standard of <=29%. Per Region 8 policy, the RXB2 requested and received approval for both the Forest variance for RH and Region 8 variance for winds prior to the test fire.

Table 2. Burn plan prescription, inputs, and source used for the Grindstone RX implementation.

Environmental Parameters of Prescription	Regional or Forest Standard	RX Prescription	Forecast	Source
Date/Time			3/28/24	
Fuel Models (FBPS)		FM 9	FM 9	Burn Plan
1-HR Fuels %		N/A	6	Fine Dead Fuel Moisture Tool
10-HR Fuels %	>=6percentopen >=6 10percentclosed	6% min	7	Fine Dead Fuel Moisture Tool
*Live Fuel Moisture (Herb) %		30-120	70	Estimate based on RAWS
*Live Fuel Moisture (Woody) %		30-300	100	Estimate based on RAWS
Temperature (F)	80 max/ 95 max	80° F Dormant	64	Spot WX FX
Relative Humidity %	>25percent/ >=29	20%	28	Spot WX FX
20-Ft Wind (mph)	<=20 MPH	<=20MPH	16 G23	Spot WX FX
20-Ft Wind Direction		Any direction	N	Spot WX FX
Midflame Wind Speed (MPH)	<6	<6	4.2	BehavePlus
Midflame Wind Speed Direction	N/A	N/A	N	Spot WX FX
Transport Wind Speed (MPH)	> 7 MPH	> 7 MPH	21	Spot WX FX
Transport W/S Direction		Any direction	N	Spot WX FX
Mixing Height (Min)	N/A	N/A	5000 @ 16	Spot WX FX
Smoke Dispersion	N/A	<21	81	Spot WX FX
NFDRS Parameter (BI)	22	22	16.9	WIMS
Probability of Ignition (%)	<60	<60%	53	BehavePlus
KBDI	300 max/450 max	<300 Dormant	11.8	WIMS
Firing Technique		Head, Backing, Flanking, Spot		
Ignition Method		Ground/Aerial		
Days Since Rain		N/A	2	BehavePlus
Flame Length (Ft)		2-10'	3.6 ft	BehavePlus
Rate Of Spread (Chs/Hr)		8-25 upslope	13.6	BehavePlus
Contingency Resources with Adjacent Clear Cuts Downwind		3 Dozers with 20-ft winds greater than 15 mph	N/A	
*Fuel moistures may be determined utilizing Bankhead Raws Station 010701. Issuance of a burn permit from the state demonstrates compliance with State Smoke Management Regulations.				

Overall, implementation of the Grindstone/Mill Creek RX Project was largely consistent with the prescriptions, actions, and procedures outlined throughout the 21 elements and appendices within the Black Warrior Prescribed Fire Plan. However, a few discrepancies and inconsistencies exist between implementation of this RX project and what was stated in the burn plan, such as the following:

- It was evident that the briefing checklist in the burn plan and IAP were used to brief the burn crew, but a few topics on the briefing checklist lacked documentation, specifically the medical plan and wildfire declaration. The RXB2 may have included these topics in the morning briefing, but no check marks documented their inclusion.
- Element 14. The test fire in the burn plan references the day-of burn IAP for documentation of on-site weather conditions and results, but the Notes Page unit log notes only state, “Test fire was successful.”
- Element 16.B.1 of the burn plan states, “Patrol control lines and roads with public access until there are no immediate threats minimum one chain or farther if there is potential for the threats to cross a control line” and “Creeks may need to be walked or flown and snags mitigated by cutting or raking around them.” Element 16 also states that the RXB2 will decide patrol standards, depending on several factors, including, “Proximity of private land and values at risk adjacent to creek boundaries.” At the end of the burn and while checking the burn the following day, burn staff did not walk the creek between DP 17 and DP 46 to check for control issues.
- Element 20. Monitoring of the burn plan states, “On-site fire weather should be taken throughout the duration of the burn.” Weather observations were documented every two hours from the Bankhead RAWS at the Black Warrior Work Center (7 to 9 miles from the burn site), but no weather observations were taken on-site during the burn.

#4: The approving agency administrator’s qualifications, experience, and involvement

Alan is the AA of record for the Grindstone/Mill Creek prescribed fire and the 109B Fire. He is qualified as a RXA2 and WFA2.

Alan has been the BKRDR Ranger for over seven years. He has served as RXA for multiple years on the District. The District annually averages 20 to 30 prescribed fires involving 18,000 to 22,000 acres. He has also served as the qualified AA for multiple districts on the Forest due to a lack of qualified AAs on these districts over the last few years.

Alan was directly involved in the key planning and developments during implementation of the prescribed burn. He held conversations with RXB2 Steve for multiple days preceding ignitions, including weather and unit selection topics. He was also on the variance request call on March 28. Alan did sign the 2A ignition authorization and filled out comments in the key discussion items. He also helped respond to smoke reports on the day of the burn. Alan held key discussions with the District FMO, Forest Supervisor, and Regional Office personnel before declaring the prescribed fire a wildfire.

#5: The qualifications and experience of key personnel involved

Grindstone/Mill Creek Prescribed Fire Staff

Key RX personnel included an RXB2, an RXB2(t), the DFMO, and the AFMO. Other permanent and auxiliary firefighters made up the crew that totaled 10 individuals.

The Burn Boss is a qualified RXB2. This was his first prescribed fire as a qualified Burn Boss, and he was a visiting resource.

The Burn Boss (trainee) is a qualified RXB2(t). He is the District EC and has two successful evaluations serving in this position.

The DFMO is a qualified FFT1. He often serves as a RXB2 or other positions on the District's prescribed fires.

The AFMO is a qualified FFT1. He often serves as a RXB2 or other positions on the District's prescribed fires.

109B Wildfire Staff

Key WF staff included an IC and two DZIAs, including one who served as the DO. Other permanent and auxiliary firefighters made up the crew that totaled seven individuals.

The IC is a qualified ICT4. As an EC, he has years of experience as an IC.

One qualified DZIA who also served as the DO is the DFMO with many years of experience in initial response.

The other qualified DZIA is the District Equipment Operator with many years of experience in initial response.

Appendix B: Grindstone/Mill Creek Prescribed Fire Units Map

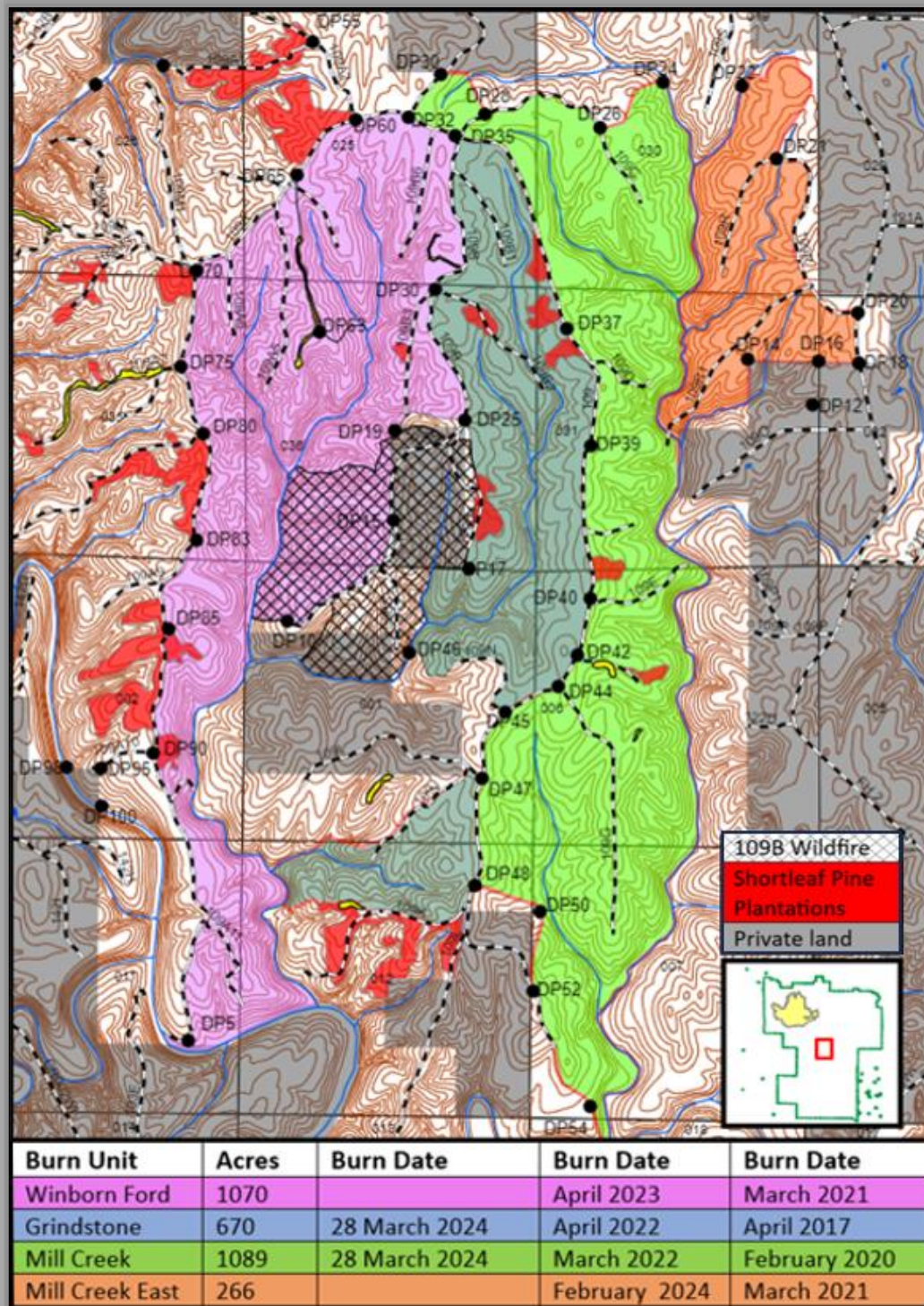


Figure 17. This map depicts the Grindstone and Mill Creek RX units as well as nearby units. It includes DPs discussed in the narrative and other locations.

Appendix C: Contributing Factors or Conditions

Category	Contributing Factor or Condition	Mark "X" If Observed
Planning	Burn area boundaries not aligned with favorable locations for fire containment.	
	Interdisciplinary team coordination lacking during design and planning of the treatment.	X
	Lack of proficiency using fire behavior and related modeling tools.	
	Insufficient holding plan.	
	Insufficient ignition plan.	
	Insufficient mop-up and patrol plan.	
	Insufficient contingency plan.	
	Insufficient technical review.	
	Complexity rating did not adequately reflect the conditions actually experienced.	
Operations	Burn could not be completed and secured before forecasted worsening weather arrived.	
	Test fire did not provide accurate representation of fire potential.	
	Actions taken inconsistent with those described in the burn plan.	X
	Insufficient patrol after burn boss transfers control to local unit.	X
Communications	Unit boundaries or special features not communicated or identified accurately.	
	Instructions not given or well understood.	
Equipment	Malfunction or breakdown.	
	Equipment not set-up and tested prior to need.	
Fire Environment	Extended fire persistence – 2 weeks or more in patrol status.	
	Actual weather experienced was outside what was forecast.	X
	Severe drought conditions contributing to unusually dry fuels.	
Fuels	Higher than typical fuel quantity/loadings.	
	Large machine piles.	
	Hand piles.	
Human Factors	External influences or distractions.	X
	Internal stress or fatigue.	X

If applicable, list contributing factors or conditions identified by this review not already found in the table above to consider for long-term tracking:

1. Post-burn activities
 - A. Lines not thoroughly checked.
 - B. Post-burn evaluation not completed.
2. Equipment
 - C. Necessary equipment unavailable. (UAS availability would have allowed scouting the creek the day after the RX, however was not available.)

Appendix D: Delegation of Authority



Forest Service

Southern Region

1720 Peachtree Road, NW
Atlanta, GA 30309
FAX: 404-347-4448

File Code: 5140

Date: April 4, 2024

Route To:

Subject: Delegation of Authority – Grindstone Rx Burn Wildfire Declaration Review

To: Jeremiah Zamora and Heath Bell – Review Team Co-Leaders

This letter formalizes your appointment as Review Team Leader to complete a Complex Declared Wildfire Review for the Grindstone Prescribed Fire (RX) initiated on March 28th, 2024, that resulted in the 109B Wildfire (WF) on the Bankhead District of the National Forests in Alabama. To ensure an objective and insightful review, I have approved your review team roster that includes diverse subject matter expertise.

As Team Leader, you have the authority of my office to execute and complete a thorough review as described in the enclosed Expectations document. Your Point of Contact for assistance and coordination with Southern Region Fire and Aviation Management is Michael Ward, Regional Fuels Program Manager, 470-446-2247, michael.d.ward@usda.gov. Your Point of Contact with the National Forests in Alabama is Martel Knipe, Forest Fire Management Officer, 334-241-8106, martel.knipe@usda.gov.

For necessary travel, equipment, salary, or other costs related to this review use the 109B charge code P8RT5S24 with override code 0801.

Your authority includes, but is not limited to:

- Controlling, organizing, managing, and directing the review.
- Maintaining the confidentiality of the process.
- Protecting and managing the integrity of documents, media or other artifacts collected.
- Authorizing requests for additional personnel, including technical specialists, to support the Team and releasing them upon completion of assigned duties.
- Authorizing and coordinating the expenditure of funds.
- Coordinating all media releases about the review with Tammy Freeman-Brown, 334-242-8144, tammy.freemanbrown@usda.gov.
- Issuance of Safety Alerts, if warranted, in coordination with Chantz Birch, 334-222-2555, chantz.birch@usda.gov.
- Providing myself or my designee with status updates as described in the enclosure.

As clarified in the attached expectations from your team, it is my intention that no punitive



America's Working Forests – Caring Every Day in Every Way

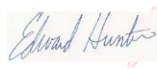
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actions, such as removal or termination from their position, will be taken by the Forest Service against any employee as a result of information provided to any member of your team. Information provided to your team may however be used by individual supervisors at their discretion to inform discussions with employees pertaining to their individual performance.

I want to thank you for your willingness to lead this important review. Please contact Kashima Gresham at 404-347-4177 or kashima.gresham@usda.gov to schedule meetings or status updates.

Approved By:

 Digitally signed by
Edward Hunter
Date: 2024.04.04
18:05:41 -04'00'

Edward Hunter Jr, Deputy Regional Forester

Accepted By:

/s/ **JEREMIAH
ZAMORA** Digitally signed by
JEREMIAH ZAMORA
Date: 2024.04.05
07:03:20 -04'00'

Jeremiah Zamora, Co-Team Lead

/s/ **HEATH
BELL** Digitally signed by
HEATH BELL
Date: 2024.04.05
08:59:19 -04'00'

Heath Bell, Co-Team Lead

Enclosures: Expectations for Conduct of Grindstone Declared Wildfire Review

cc: Anthony Edwards, Martel Knipe, Shardul Raval, Andrew Baker, Michael Ward

Appendix E: Law Enforcement Synopsis

USDA Forest Service

FS-5300-45 (2/2008)

 USDA Forest Service		Wildland Fire Origin and Cause Supplemental Incident Report (Reference FSH 5309.11, Chapter 20)				Incident Number MALG33Y									
						Incident Date 3/29/2024									
LOCATION															
Fire Name 109B	Dispatch # ALALF - 2024 240187	Account Code P8(0801)	Region 08	Forest 01	District 02	State AL	County 133								
Origin Location: geographical landmarks, highways, roads, trails, etc. Approx 0.6 miles south of the intersection of FSR 109 and FSR 109B			Township ---	Range ---	Section ---	1/4 Sec ---	Base Meridian ---								
			Latitude (D - M' - S") 34 12 25		Longitude (D - M' - S") 87 19 40										
JURISDICTION															
USFS Only X	Unified: Identify Other Agency ---	Lead Origin & Cause Investigator LEO S. Reece / SA Ready				Cost > 40K X	Injuries none								
EVENT SEQUENCE															
Estimated Time of Ignition		Time Fire Reported		Time Origin Protected		Time Origin Released									
Mo. 03	Day 28	Year 2024	HHMM ---	Mo. 03	Day 29	Year 2023	HHMM 1530	Mo. 04	Day 06	Year 2024	HHMM 1400	Mo. 04	Day 29	Year 2024	HHMM 1530
Who LEO S. REECE		Who FMO K. CLARK		Who LEO S. REECE		Who LEO S. REECE									
FIRE BEHAVIOR															
Estimated Acres 296	Fuel Type @ Origin Material First Ignited Detritus		Weather Observer (On Scene) N/A		Date ---	Time ---	Temp ---	RH ---	Wind Dir ---	Wind Speed ---					
Slope % 40	Aspect: N E S W West	Elevation 660	Weather Station RAWS		Date 3/29/24	Time 1537	Temp 73	RH 17	Wind Dir WSW	Wind Speed 5-13					
CAUSE DETERMINATION CODE: (I) = INCLUDED, (E) = EXCLUDED, (P) = PARTIALLY-INCLUDED/EXCLUDED (EXPLAIN IN NARRATIVE)															
E Lightning		(Detection Method)													
No signs of a lightning strike were found in the area of the origin. No signs of a lightning strike were found when using lightning strike.org (See attached lightning strike map).															
E Equipment Use		(Exhaust, Brake Shoe, Mechanical, Friction, Aircraft, Vehicle Fire, Other)													
No sign of equipment use was found in the area of the origin. The slope in the area of the origin is steep without a road nearby and access is limited to foot traffic only.															
E Smoking		(Tobacco, Other)													
According to page 208 of the April 2016 Guide to Wildland Fire Origin and Cause Determination, a cigarette can only start a fire when the relative humidity is below 22% and the ambient temperature is 80°F +. According to the RAWS data, when the RH dropped below 22% from 1137 hours to 1537 hours the air temperature never above 73°F (See attached RAWS data).															
E Campfire		(Cooking, Warming, Ceremonial, Other)													
There are no established or user created camp sites near the area of origin. The slope in the area of the origin is steep without a road nearby and access is limited to foot traffic only. No signs of a campfire were found near the area of origin.															
I Debris Burning		(Land, Slash, Refuse, Other)													
On March 28, 2024, the Bank Head National Forest was conducting the Grindstone prescribed fire across Grindstone Creek from the 109B Incident.															
E Railroad		(Ignition Activities Associated with Railroad Companies)													
The slope in the area of the origin is steep and without a railroad nearby.															
E Incendiary		(Ignition Component / Material First Ignited)													
No devises were discovered in the area of the origin.															
E Children		(Ignition Activities Associated with Children; 12- years and younger)													
The closest inhabited residence from the intersection of FSR 109 and FSR 109B is 1.5 miles. The area of origin is another .6 mile south of the intersection. The slope in the area is steep and without established or user created trails.															

E	Miscellaneous	(Blasting, Structure, Fireworks, Welding, Cutting, Grinding, Pest Control, Power Line, Glass, Target Shooting, Spontaneous Combustion, Other)						
There are no power lines in the area of the fire. There is no established shooting range in the area of the origin. After a thorough search of the area of origin, no brass or other signs of shooting was discovered. After a thorough search of the area of origin no firework debris was discovered. No signs of work involving cutting or grinding was discovered in the area of origin.								
Cause Determined: State brief reason & explain in the narrative				Cause Undetermined: State brief reason & explain in the narrative				
The fire was caused by windblown embers from the Grindstone prescribed fire.				N/A				
PREPARED BY	LEO S. REECE	Date	4/06/2024	Submitted to	PC E. WILEY	Date	4/18/2024	
ATTACHMENTS - IF INCLUDED	LE Incident Report	☒	Supplemental Reports	☒	Interviews	☐	Statements	☒
	Fire Stat Report	☒	Sketches / Diagrams	☒	Maps	☒	Photographs	☒
 USDA Forest Service	Wildland Fire Origin and Cause Supplemental Incident Report (Reference FSH 5309.11, Chapter 20)				Incident Number	MALG33Y		
					Incident Date	3/29/2024		
(CODE: S – SUBJECT, W – WITNESS, V – VICTIM, RP – REPORTING PARTY, O – OTHER)								
Name (Last, First, Middle)				Alias	DOB	Race	Gender	
RP [REDACTED]				None		W	F	
Address (Home)				Phone (Home)	Hair Color	Eye Color	SSN	
Address (Business) (Tax Identification Number if Required)				Phone (Work)	Height	Weight	License / ID	
Name (Last, First, Middle)				Alias	DOB	Race	Gender	
Address (Home)				Phone (Home)	Hair Color	Eye Color	SSN	
Address (Business) (Tax Identification Number if Required)				Phone (Work)	Height	Weight	License / ID	
Name (Last, First, Middle)				Alias	DOB	Race	Gender	
Address (Home)				Phone (Home)	Hair Color	Eye Color	SSN	
Address (Business) (Tax Identification Number if Required)				Phone (Work)	Height	Weight	License / ID	
VEHICLE INFORMATION (CODE: D – DAMAGED, E – EVIDENCE, I – IMPOUND, S – SUBJECT W – WITNESS, O – OTHER)								
---	License Number	State	VIN	Year	Make	Style	Other Information	
---	---	---	---	---	---	---	---	
---	License Number	State	VIN	Year	Make	Style	Other Information	
---	---	---	---	---	---	---	---	
---	License Number	State	VIN	Year	Make	Style	Other Information	
---	---	---	---	---	---	---	---	
---	License Number	State	VIN	Year	Make	Style	Other Information	
---	---	---	---	---	---	---	---	

EVIDENCE / PROPERTY INFORMATION (CODE: D – DAMAGED, E – EVIDENCE, I – IMPOUND, O – OTHER)					
Code	Description	Disposition	Date	Time	Who
	None				
INSURANCE INFORMATION (HOME, AUTO, LIABILITY, OTHER)					
Insurance Company	Policy Number	Insurance Agent	Address	Phone Number	
PREPARED BY		DATE	SUBMITTED TO		DATE
S. Reece		4/06/2024	E. Wiley		4/18/2024

Appendix F: Chronology of Events

Grindstone Prescribed Burn-109B Declared Wildfire

Tuesday, March 26 – Saturday, March 30, 2024

National Forests in Alabama

Bankhead Ranger District

Jasper, Alabama

March 26, 2024

- RXB2 arrives on the BKRD from NFAL SO with the intention to conduct RX on 3/28.
- RXB2 begins coordinating with the NWS for a 3/28 spot weather forecast for the selected unit, Grindstone.

March 27, 2024

- The RXB2 requests an updated 3/28 spot weather forecast for Grindstone.
- The RXB2 tentatively schedules a 0700 3/28 meeting with the DO for R8 (wind speed) and Forest (RH) variance approvals.
- The RXB2 and AA have a conversation about the smoke-sensitive area north of Grindstone.
- The RXB2 and the District EC talk about the planned RX for 3/28 and discuss burning the adjacent Mill Creek unit along with Grindstone.
- The RXB2 decides to proceed with a plan to burn two adjacent RX units: Grindstone and Mill Creek on 3/28.
- The RXB2 requests an updated 3/28 spot weather forecast for both Grindstone and Mill Creek.
- The RXB2 confirms a scheduled variance meeting with the DO at 0700 on 3/28.

March 28, 2024

- 0630 – The RXB2 and AA meet to prepare for the variance meeting.
- 0700 – The RXB2, AA, and FDO meet to request an R8 variance for wind speed and a Forest variance for relative humidity.
- 0730 – The AA authorizes the ignition and signs the 2A after the variance meeting with the caveat that the authorization was contingent on the variances being authorized.
- 0730-0838 – The RXB2 begins finalizing fire behavior modeling, smoke modeling, permitting, and notifications, then leaves office for the burn unit.
- 0800 – Burn resources, including a dozer, mobilize to the Mill Creek RX unit to finish unit preparation.
- 0859 – The RXB2 arrives on the burn unit.
- 0900 – The RX briefing begins at DP 48.
- 0936 – The RXB2 is notified that the R8 (wind speed) and Forest (RH) variances are authorized.

- 0946 – The 2B Go/No-Go checklist is completed; test fire is lit.
- 0955 – The test fire is deemed successful.
- 1000 – Firing operations begin on the south end of the burn unit(s).
- 1025 – Firing operations are brought to Grindstone Creek on the burn's west side.
- 1100 – UTVs are moved into DP 45-46, Grindstone north, to continue ignition operations.
- 1100 – Ignitions are tied into creek near DP 54.
- 1100 – Weather is documented.
- 1150 – The south end of Grindstone baseline is complete.
- 1150 – Grindstone north of DP 45-46 is complete.
- 1258 – Weather is documented.
- 1316 – Forty to 50 percent of ignitions are complete with no concerns.
- 1405 – A small spot is caught north of DP 30.
- 1430 – The last ignitions are DP 35 Grindstone and DP 24 Mill Creek.
- 1450 – The Ranger District receives a smoke report south of the burn unit. The DR plans to check smoke.
- 1459 – Weather is documented.
- 1500 – The south line is looking good, with no columns or drift smoke.
- 1504 – The FMO responds to an FAA-reported smoke report north of the burn. The smoke is determined to be coming from within the burn units.
- 1504 – The DR and Silviculture Forester are enroute to check the smoke report south of the burn.
- 1529 – Exterior ignitions are complete across the burn unit.
- 1551 – The southern smoke report is determined to be Grindstone drift smoke.
- 1704 – The AAR is completed, all lines are checked, and resources are being released.
- 1730 – A smoke column is spotted and checked using a UTV used on the burn.

March 29, 2024

- 0733 – Resources arrive on the burn unit to monitor holding lines.
- The EC and seasonal firefighter walk line beginning at FSR 109 to DP 54; then DP 47 to the creek, and ending from DP 46 down to the creek,
- The Equipment Operator walks line from DP 17 to the creek.
- 0942 – Having completed checking lines, resources return to the work station.
- 1030 – The RXB2 completes paperwork and returns to Supervisors Office.
- 1030 – Many resources go home for the day. The DFMO, EC, and Seasonal Firefighter stay on duty.
- 1115 – The DR observes smoke in the general vicinity of the RX and drives to the smoke to assess.
- 1134 – The DR determines that the smoke is to the east of the burn area and is a private prescribed fire not associated with the Grindstone/Mill Creek RX burn.
- 1349 – From his home, the Equipment Operator calls the DFMO to report smoke in the vicinity of Grindstone/Mill Creek.

- 1500 – The DFMO observes two distinct columns on east and west of the Grindstone/Mill Creek RX.
- 1530 – The DFMO arrives at the 109B Fire and calls the Engine to come to Grindstone RX/109B Fire.
- 1542 – The DFMO and EC +1 began initial response to 109B Fire.
- 1546 – The DFMO notifies DR of 109B Fire.
- 1617 – The DR attempts to call Forest Supervisor concerning escaped burn.
- 1619 – The EC as IC notifies AL-ICC with size-up of 109B Fire.
- 1628 – The IC asked if he has a need for 7bh; IC says no.
- 1700 – The DR and Acting FS have a conversation about the 109B Fire, with confusion about whether it is a declared fire from the Grindstone/Mill Creek RX burn.
- 1854 – Dispatch is updated that the 109B Fire is 50 percent contained.
- 1953 – Dispatch is updated that the 109B Fire is 90 percent contained.
- 2026 – The IC updates Dispatch that the fire is set to 300 acres; the AAR is complete, and all resources are released from the fire.

March 30, 2024

- 0910 – Resources arrive on the 109B Fire.
- 1215 – The AA declares the 109B Fire an escaped wildfire.
- 1545 – Dispatch updates that lines are holding with one line improved; acreage remains at 300.
- 1806 – The IC declares the 109B Fire 100percentcontained; resources head back to station.

Appendix G: Glossary of Key Terms

The main reference glossary for this guide is the National Wildfire Coordinating Group (NWCG) Glossary, which is updated periodically: <http://www.nwcg.gov/>.

AA – Agency Administrator.

AAR – After-Action Review.

AD – Administratively Determined.

AFMO – District Fuels Assistant Fire Management Officer.

AL-ICC – Alabama Interagency Coordination Center.

BehavePlus – The [BehavePlus fire modeling system](#) is a Windows®-based computer program that can be used for any fire management application that needs to calculate fire behavior. It uses specified fuel and moisture conditions to simulate surface and crown fire rate of fire spread and intensity, probability of ignition, fire size, spotting distance, and tree mortality.

BI – Burning Index.

Blackline/Blacklining – Preburning of fuels adjacent to and within a control line before igniting a prescribed burn. Blacklining is done prior to main ignitions to reduce heat on holding crews and lessen chances for spotting across control line.

Broadcast Prescribed Burning – Prescribed burning activity where fire is applied generally to most or all of an area within defined boundaries for reduction of fuel hazard, as a resource management treatment, or both.

Burn Boss (RXB2) – Person responsible for supervising a prescribed fire from ignition through mop-up. The Burn Boss is responsible for writing prescribed fire plans, determining when the prescribed fire is in prescription, obtaining smoke clearance and weather forecasts, notifying officials of the upcoming fire, and obtaining all qualified personnel and equipment needed to conduct and patrol the area. The Burn Boss must also ensure all operations are conducted in a safe manner and considers personnel and public safety during and after the prescribed fire.

Burning Season (In-Season Burning) – The number of days available each year for prescribed fire implementation is constrained by weather variables such as temperature, wind speed and relative humidity. In many areas, the season for prescribed fire implementation is late winter to early spring. Often, a narrow window of weather parameters is required due to safety issues, policy, and regulation, which will reduce the number of available days.

Chain – Unit of measure equaling 66 feet.

Chains Per Hour – The rate of fire spread is measured in “chains per hour.” A chain is 66 feet.

Chief’s Review – Chief’s 90-Day Prescribed Fire Program Review.

CIO – Chief Information Office.

COOP – Continuity of Operations.

Cross Boundary Cooperation – Voluntary behavior in which adjacent or nearby landowners use shared cooperative or stewardship agreements to improve forest health and resiliency across management jurisdictions.

Crown Fire – A fire that advances from top to top of trees or shrubs more or less independent of a surface fire. Crown fires are sometimes classed as “running” or “dependent” to distinguish the degree of independence from the surface fire.

CRWB (Crew Boss) – A person in supervisory charge of usually 16 to 21 firefighters and responsible for their performance, safety, and welfare.

Declared Wildfire Review – Per Forest Service Manual (FSM) 5140, all prescribed fires that result in a wildfire declaration must be reviewed according to the procedures found in the [NWCG Standards for Prescribed Fire Planning and Implementation, PMS 484](#).

DFMO – District Fire Management Officer.

Dispatch – Alabama Interagency Coordination Center (AL-ICC)

Dozer – DZIA, DZ1, or DZ2.

DR – District Ranger, specifically the BKRD District Ranger.

Drop Point – A previously agreed upon rendezvous or supply location noted on situational maps.

Dry Bulb Temperature – The ambient air temperature that is measured by a thermometer.

Duty Officer (DO) – Individual working for a jurisdiction or agency responsible for coordinating that agency (Wildland Fire Response) on a given day.

EA (Environmental Assessment) – A requirement of National Environmental Policy Act (NEPA), an EA evaluates the potential impacts of proposed actions, such as a prescribed fire, on the environment and suggests alternatives, or mitigations, to reduce or eliminate these impacts.

EC – Engine Captain.

EIS – Environmental Impact Statement.

ENGB (Engine Boss) – The Engine Boss (ENGB) leads a single fire Engine and attached personnel and is responsible for the crew’s safety on wildland and prescribed fire incidents.

ERC (Energy Release Component) – Index of the National Fire Danger Rating System (NFDRS) relating to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. It is a cumulative or “build-up” type of index and is an indicator of potential fire intensity.

Escaped Prescribed Fire – A prescribed fire that has exceeded or is expected to exceed prescription parameters or otherwise meets the criteria for conversion to wildfire. Criteria are specified in “Interagency Prescribed Fire – Planning and Implementation Procedures Reference Guide.”

FAA – Federal Aviation Administration.

FAM – Fire and Aviation Management.

FDFM (Fine Dead Fuel Moisture) – The moisture content of dead organic fuels, expressed as a percentage of the oven dry weight of the sample, that is controlled entirely by exposure to environmental conditions.

FDRA – Central Fire Danger Rating Area.

FEMO (Fire Effects Monitor) – The Fire Effects Monitor is responsible for collecting the on-site weather, fire behavior, and fire effects information needed to assess whether the fire is achieving established resource management objectives.

FEMS – Fire Environment Mapping System.

FFMO – Forest Fire Management Officer.

FFPv5 (Fire Family Plus) – Software for summarizing and analyzing daily weather observations and computing Fire Danger indices based on the U.S. National Fire Danger Rating System

FFT1 (Firefighter) – A working leader of a small group (usually not more than seven members), who is responsible for their performance, safety, and welfare.

FFT2 (Firefighter) – Firefighter Type 2.

Fine Fuels – Fast-drying dead or live fuels, generally characterized by a comparatively high surface area-to-volume ratio, which are less than 1/4-inch in diameter and have a time lag of one hour or less. These fuels (grass, leaves, needles, etc.) ignite readily and are consumed rapidly by fire when dry.

FIRB (Firing Boss) – The Firing Boss reports to the Prescribed Fire Burn Boss and is responsible for supervising and directing ground and/or aerial ignition operations according to established standards in the Prescribed Fire Plan.

Fireline – The part of a containment or control line that is scraped or dug to mineral soil.

FLA (Facilitated Learning Analysis) – A non-punitive accident review process that seeks to understand the events of an accident through the process of “sensemaking.” The FLA process seeks to understand “how” it made sense to those involved, rather than “how” it makes sense in hindsight.

FlamMap (Fire Behavior Mapping and Analysis Program) – A fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.).

Flash Fuels – Highly combustible fine fuels such as grass, leaves, draped pine needles, fern, tree moss and some kinds of slash that ignite readily and are consumed rapidly when dry.

FM – Fuel Moisture.

FM9 – Fuel Model 9, as described in LANDFIRE.

FOBS (Field Observer)—this position is responsible for collecting and reporting situation information for an incident.

Foliar Moisture – The moisture content of the conifer needles in tree crowns. It is used along with surface fire intensity and crown base height as input to the crown fire initiation model.

FS – Forest Supervisor.

FSR – Forest System Road.

Fuel Loading – The amount of flammable material that surrounds a fire. Fuel load is measured by the amount of available fuel per unit area, usually tons per acre. A small fuel load will cause a fire to burn and spread slowly, with a low intensity.

FVS (Forest Vegetation Simulator) – The FVS is a forest growth simulation model that simulates forest vegetation change in response to natural succession, disturbances, and management.

GACC – National Geographic Area Coordination Center

Haines Index – Is an index developed by meteorologist Donald Haines in 1988 that measures the potential for large fire growth (Plume-Driven). The index is derived from the stability (temperature difference between different levels of the atmosphere) and moisture content (dew point depression) of the lower atmosphere. The data may be acquired from radiosonde information. The index is calculated over three ranges: low elevation (950---850mb), mid elevation (850---700mb), and high elevation (700---500mb). A Haines Index of 6 means a high potential for large fire growth. 5 means medium potential, 4 low potential, and anything less than 4 (2 and 3) means very low potential.

HYSPLIT Model – A HYSPLIT (Hybrid Single Particle Lagrangian Integrated. # Trajectory) Model simulates the dispersion and trajectory of substances transported and dispersed through our atmosphere, over local to global scales.

IAP – Incident Action Plan.

IC – Incident Commander.

ICS – Incident Command System.

IDT – Interdisciplinary Team.

IHC – Interagency Hotshot Crew.

Incident – An occurrence either human-caused or natural phenomenon, that requires action or support by emergency service personnel to prevent or minimize loss of life or damage to property and/or natural resources.

INVF – Wildland Fire Investigator.

JHA – Job Hazard Analysis.

KBDI – Keetch-Byram Drought Index.

Kestrel – The brand name of an electronic, handheld instrument used to measure weather observation elements including temperature, wind and humidity.

LANDFIRE – A data management program that delivers spatial data related to vegetation, fuel, disturbance, and fire regimes. Designed to be used at a landscape-scale to support strategic

vegetation, fire and fuels management planning to evaluate management alternatives across boundaries and facilitate national- and regional-level strategic planning and reporting of wildland fire management activities.

LEI – Law Enforcement and Investigations.

LMR – Land Mobile Radio.

LRMP – Land and Resource Management Plan.

Mechanical Treatment – Mechanical fuel treatments involve the use of hand tools, such as chainsaws and rakes, or large machines, like bulldozers and wood chippers, to reduce the amount of vegetation or fuel that has built up to dangerous levels.

MIR – Medical Incident Report.

National Wildfire Coordinating Group (NWCG) – An operational group designed to coordinate programs of the participating wildfire management agencies.

NFDRS – National Fire Danger Rating System.

NFS – National Forest System.

NFSE – National Forest Salary and Expense

NWS – National Weather Service.

PACE – Primary Alternate Contingency Emergency.

PL – Preparedness level.

PMS – Publications Management System.

POI – Probability of Ignition.

Prescribed Fire Burn Boss – Type 2 (RXB2) – Person responsible for supervising a prescribed fire from ignition through mop-up. See definition for “Type” below.

Prescribed Fire Plan – A plan required for each fire application ignited by management. It must be prepared by qualified personnel and approved by the appropriate Agency Administrator prior to implementation. Each plan will follow specific direction and must include critical elements and how to mitigate each element.

Prescription Guidelines – Guidelines used to show upper and lower reaches of a prescription.

Rapid Lesson Sharing (RLS) – A process for field personnel to quickly share lessons with others. RLS can be used to document and share lessons learned as a result of close calls, minor accidents, successes, efficient ways of performing work, adaptations, or anything from which wildland fire personnel can learn.

RAWS (Remote Automatic Weather Station) – A weather station that transmits weather observations via GOES satellite to the Wildland Fire Management Information system.

RD – Ranger District.

RH – Relative Humidity.

RO – Regional Office (specifically Region 8).

ROS – Rate of Spread.

RX – Prescribed Fire.

RXB2 – Burn Boss.

SFDI (Severe Fire Danger Index) – A Fire Danger index developed by Dr. Matt Jolly that combines two separate Fire Danger indices: Energy Release Component (ERC) and Burning Index (BI).

SME – Subject-Matter Expert.

SO – Forest Supervisors Office.

SOP – Standard Operating Procedure.

Spot Fire – Fire ignited outside the perimeter of the main fire by a firebrand.

Spot Weather Forecast (NWS) – A site-specific forecast issued by the National Weather Service (NWS) to fit the time, topography, and weather of a specific incident. These forecasts are issued upon request of the user agency and are more detailed, timely and specific than zone forecasts. On-site weather observations or a close, representative observation is required for a forecast to be issued.

Spotting – Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Type 1/2/3 – Refers to resource capability. Resource typing provides managers with additional information in selecting the best resource for the task.

UAS – Unmanned Aircraft System.

USDA Forest Service – United States Department of Agriculture Forest Service.

USFS – Forest Service.

USGS – United States Geological Survey.

UTV – Utility Task Vehicle.

Wet Bulb Temperature – Dry bulb and wet bulb are used to calculate relative humidity. Wet bulb temperature is measured by sling psychrometers within a belt weather kit using thermometers that are wrapped in wetted wicks. The higher the difference between the dry bulb and wet bulb temperatures (called the depression), the greater the felt effect is on the discharge air temperature.

WF – Wildfire.

WFA2 – Wildfire Agency Administrator Type 2

WFDSS (Wildland Fire Decision Support System) – Map-based application that displays information to agency administrators, line officers, fire managers, and analysts as they move

through the risk-informed decision process for wildland fire. Combines desktop applications for fire modeling into a web-based system.

WFSE – Wildland Fire Salary and Expense.

WildCAD-E – A Commercial Off the Shelf (COTS) Computer Aided Dispatch (CAD) system developed by Bighorn Information Systems for wildland fire agencies.

Wildfire – An unwanted wildland fire.

Wildfire Crisis Strategy – “Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America’s Forests.”

Wildland Fire – Any nonstructural fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires.

Wildland Urban Interface (WUI) – The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

WIMS – The Weather Information Management System (WIMS) is a comprehensive system that helps users manage weather information. WIMS serves as the host for the National Fire Danger Rating System (NFDRS), incorporating both the 1978 and 1988 fuel models.

Wyden Amendment – Allows managers of federal lands to spend funds to conduct treatments on adjacent non-federal lands to improve the viability of, and otherwise benefit, fish, wildlife, and other biotic resources.

Appendix H: 109B Declared Wildfire Review and Investigation Teams

Declared Wildfire Review Team

Co-Team Lead

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Risk Management Officer
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Atlanta, GA

Co-Team Lead

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District Ranger
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