COLD BROOK ESCAPED PRESCRIBED BURN

Facilitated Learning Analysis

THE STORY

On April 13, 2015 crews began what they thought was a typical day of operations on a prescribed burn. Hours later they would experience an escape and a UTV accident that no one anticipated.

Wind Cave National Park

South Dakota

Preface

The Cold Brook Escaped Prescribed Burn Facilitated Learning Analysis (FLA) was authorized at the request of the National Park Service Regional Director for the Midwest Region. An interagency team of subject matter experts was brought together to complete FLA. The FLA Team was directed to examine the events and circumstances during the time period beginning with the planning and implementation of the prescribed fire through the change to the suppression strategy. The FLA Team consisted of the following personnel:

Kristy P. Lund; Fire Staff Officer, US Forest Service, Coronado National Forest

Miranda Stuart; Wildland Fire Management Specialist, NPS, National Interagency Fire Center

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EXECUTIVE SUMMARY

On the morning of April 13, 2015, after examining fuel conditions as well as existing and predicted weather, the decision was made to proceed with the 1000-acre Unit 2 of the Cold Brook Prescribed Burn located within Wind Cave National Park in South Dakota.

Units to the north and south of the current burn unit had been burned the previous fall under similar conditions and with similar fuels. Resources assigned to this burn were almost all on the previous burns for this project and they expected much of the same challenges with line placement, fuel conditions and weather. They were therefore all on full alert as they proceeded taking fire down the east and west sides of the burn unit. Their full anticipation of possible outcomes however, did not include an unexpected spot fire almost two hundred feet off the main park road that would subsequently elude all suppression tactics and ultimately result in a conversion to a wildfire.

The resulting wildfire from the escaped burn would remain within National Park Service (NPS) boundaries, no structures would be lost, no injuries sustained and ecological benefits would be high. During initial attempts to suppress the wildfire, an incident-within-an-incident developed in which a Utility Terrain Vehicle (UTV) would roll onto its side and be consumed by the ever increasing fire behavior. No one on board the UTV was injured, both individuals moved easily into the black. However, one set of line gear was lost in the event as it could not be retrieved before flames overran the overturned UTV.

A Facilitated Learning Analysis (FLA) Team was mobilized to review the escaped burn and UTV rollover incident. The FLA Team's joint Delegation of Authority (DOA) from the Midwest Regional Director would cover reviews of both incidents. The FLA Team included Subject Matter Experts (SME's) from four regions and three agencies. They were asked to focus on the "event and circumstances during the time period beginning with the planning and implementation of the prescribed fire through the change to the suppression strategy".

METHODS

Using the "Facilitated Learning Analysis Implementation Guide", the FLA Team conducted facilitated discussion, site visits and individual interviews over multiple days. They gathered and analyzed photos, videos, maps, dispatch logs, IQCS records, weather data, burn plan, fire management program documentation and incident documentation to develop their findings in conjunction with the interviews that were conducted. The FLA Team also completed a "Declared Wildfire Review" per direction of the *Interagency Prescribed Fire Planning and Implementation Procedures Guide (PMS484).* The Team explored other products that could be generated to provide quality lessons learned messages and methods for distributing them.

REPORT STRUCTURE

The FLA Team developed the report structure based on the details of this escaped fire and ensuing UTV accident, the needs of the organization and FLA principles. This report has five key sections:

- ***Narrative:*** describes events surrounding the escaped burn and the UTV accident as well as management decisions prior to and post these events.

- ***Risk in Context***: gives context and perspectives for key decision points and actions. Shows how the risk was perceived for both the escaped burn and the UTV accident, how the risk was communicated, transferred at multiple levels of organization, and executed.
- ***Discussion and Analysis:*** examines the human and organizational factors shaping these events. Reviews the lessons learned from both the escaped prescribed burn and the UTV accident. Addresses the successes that developed out of both incidents.
- ***Recommendations:*** provides concrete action points for programmatic improvement developed by the SME's and individuals associated with the escaped burn and UTV accident.
- ***Products:*** provides product concepts for developing and methods for disseminating the lessons learned to the fire and NPS community.

NARRATIVE

The ***Narrative*** has three parts. The Background, which discusses the burn plan, timeline, and the chain of events. Part One will focus on the escaped prescribed fire. This burn was part of a larger project, the north and south units had been burned in the previous fall. Part One will explore the culture, decision making process and address the question: *What were the contributing factors to the escape?* Part Two examines the UTV accident and takes a "big picture" look at the NPS UTV policies and training as a whole. Part Two addresses the question: *How did the firefighters end up on a UTV in that location?*

The ***Narrative*** is written using an informal style in order to capture the stories of the firefighters involved in the incidents. This method makes the content accessible and relatable, thus providing a useful product for learning from the lessons that were identified from these two incidents.

BACKGROUND

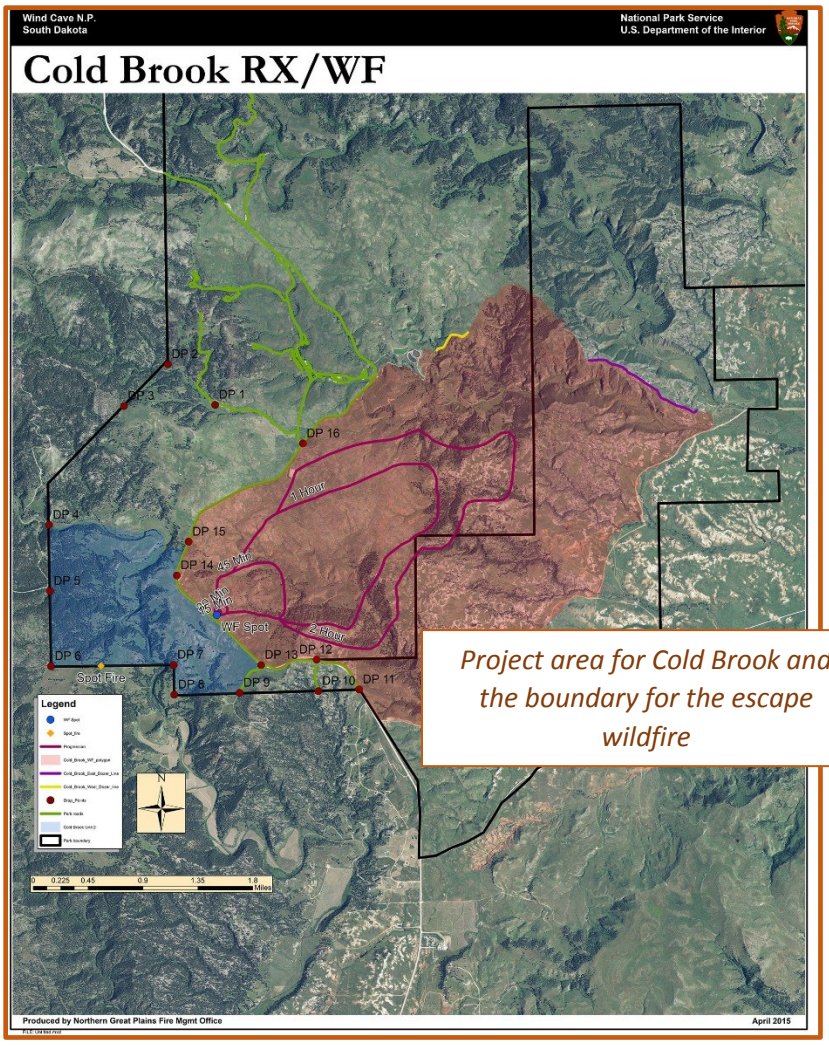
At 1330 on April 13, 2015 the Cold Brook Prescribed Burn was declared a wildfire. The burn was located in Wind Cave National Park (WICA) in South Dakota. The burn unit was comprised of grass understory with some brushy components in the draws along with both dense and open ponderosa stands. The unit was part of a larger project burn, the north and south components of which had been burned the previous October. The project area is in the wildland urban interface with several private residences located within a quarter mile of the project boundary.

The Cold Brook Prescribed Fire Project Area consists of three units. The fire history for the Cold Brook Prescribed Project Area indicates that Unit 1, the north side of the project, was burned in October (2014). Prior to that, it had burned in the Windy Fire in 1988 for a total of 1385 acres. Historic records indicate that 1,000-acre Unit 2, the intended burn unit for April 13, had not had any fire occurrence dating back to the 1930's. Unit 3 (Gobbler Knob Unit), to the south was also burned in October 2014 and prior to that in a prescribed fire in 1996.

On April 13, the objective of the Unit 2 burn was to achieve a reduction of thatch fuels by 60% or greater and decrease encroachment of ponderosa pine. Desired mortality of the ponderosa pine was 50-70% of seedlings within two years and 20-30% of pole size within two years. Conditions on the day of the burn indicated that there potentially could be a higher mortality rate of the ponderosa pine. This concern was communicated to the Chief of Natural Resources for WICA who fully supported the higher mortality rate. Blackened ponderosa pine creates desirable habitat for the black-backed woodpecker (under review as an endangered species) and most land management agencies in the area do not desire to

achieve ponderosa mortality with fire. Thus, this was a rare opportunity to create some highly desirable habitat. In addition, there was a need to burn on the higher end of the spectrum in order to meet ecological benefits and protect values at risk in the urban interface.

Prescribed fire activities were initiated at 0838 hours. A Prescribed Fire Burn Boss Type Two (RXB2) and a Burn Boss Trainee (RXB2t) were the overhead leadership for the day's operations. By the end of the day, the 1,000 acres of the prescribed burn would be successfully treated but an additional 5,420 acres would be consumed in a wildfire that resulted from the burn's escape. During initial suppression tactics a UTV with two passengers would roll, the passengers would escape unharmed but the UTV would be a total loss as it was consumed by the approaching flamefront shortly after the passengers exited the rolled-over vehicle.



Project area for Cold Brook and the boundary for the escape wildfire

Night suppression operations were planned and implemented with a burn operation to contain the fire within the Park boundaries. A Type Two Incident Management Team (Black Team) was ordered and would arrive the next day. While a Red Flag Warning was predicted for the next day, weather conditions worked in the firefighters' favor throughout the night. They were able to successfully burn and hold operations in the desired "box" within the Park boundaries. By the early morning hours of April 14 resources were slowly transitioned to incoming day resources. The Type Two Team was scheduled to arrive that afternoon. However, after assessing the situation, it was determined that the current Type Three Team had a strong handle on the fire and the Type Two Team was cancelled, leaving the Type Three Team in charge of the fire operations.

Weather continued to be in the firefighters' favor. Rain and cooler weather arrived on April 17 and continued through April 18—helping to support mop-up operations. Ecological benefits to the unit were successfully achieved. The prescribed burn—as well as the escape fire—provided optimum forage for bison. In addition, endangered species habitat was created within the burn unit.

It should be noted that personnel at Custer State Park north of WICA conducted a burn the same day as WICA in similar fuel types. Additionally, the Wind Cave National Park staff was aware that March had been unusually dry. Conversations between the Park Fire Management Officer (FMO) and Superintendent focused on waiting until there was enough moisture and a start to the green-up to help ensure that the prescribed burn would stay within containment lines. These conversations took place a week prior to the burn. When green-up did finally meet their anticipated levels to reduce risk sufficiently, they initiated the burn. There was a Fire Weather Watch issued for the day after the burn that was upgraded to a Red Flag Warning when the afternoon weather forecast was issued. However, the Park did not burn under a Red Flag Warning or Fire Weather Watch. This has been confirmed through the spot and local forecasts for the day and the National Weather Service officials who issued these notifications out of Rapid City, SD.

NARRATIVE PART ONE: THE ESCAPE

The morning briefing for the Cold Brook Prescribed Burn crews occurred outside the fire cache at Wind Cave National Park on April 13 at 0700 hours. Burn conditions were optimal with light winds and a clear sky. The burn's crews had worked together extensively throughout the year on previous burns and wildfires. In fact, most of the burn's personnel had conducted burns adjacent to that day's unit the previous October. Some resources had arrived that morning and received their assignments, but had no opportunity to see the burn unit or surrounding area prior to that day.

The RXB2t conducted the briefing. He had burned two weeks earlier in Nebraska where heavy downed cottonwoods had consumed entirely. He therefore warned the crews "that this would be a punchy burn".

The briefing was thorough. Particular emphasis was placed on safety concerns regarding the west and south lines where a perimeter fence would make escape routes and spot fires an issue. Values at risk in this area were high. Multiple landowners' properties were adjacent to these portions of the line. In addition, the timber fuels here were long overdue for fire. Despite the prediction for southwest winds, there was high concern for the ability to successfully hold these south and west sides of the burn. No one anticipated issues along the east side, which contained primarily flashy grass fuel that shouldn't present any spotting concerns. If spotting did occur on the east side, the spots would be close to the edge of the road and unlikely to fall far enough to be out of the unit. The RXB2, Fire Management Officer (FMO), RXB2t and other assigned resources never expected issues on the east side of the burn. The RXB2t would later explain that he did not get much opportunity to talk with the Task Force Leader (TFLD) assigned to the east side of the unit "but it was expected that he has the simple side of the burn". Greater emphasis was focused on the west and south sides. There were also safety concerns for the resources working along Highway 385 because of traffic.

Because of the abnormally dry conditions[1], Park staff was hopeful that this prescribed burn would consume some of the heavier, woody fuels—creating some desired mortality in the timber stands. Some staff noted that signs leading into the Park indicated a high fire danger. However, the weather forecast for that day indicated an ideal burn window with a Fire Weather Watch forecasted for the next day. It had been a dry March, which stalled any chance for an early green-up.

[1] This was determined as of April 7 US Drought Map, see Appendix 2 Maps. Abnormally Dry rating is the lowest possible drought rating on the scale

Fire behavior was as expected and desired during initial operations

Both the fire and resources program managers desired the higher end of the burn prescription to achieve desired objectives. (See Appendix 4 for documentation that supports how desired burn conditions would be met.) When the RXB2t was asked how he felt about burning under these abnormally dry conditions, he said that he "probably got sucked up into the momentum of the day. The FMO was so gung ho about how much consumption would occur that there was a strong momentum forward".

Firing operations moving south down Hwy. 385 on the east side of the unit

The RXB2t also noted that he may have put less weight on the conditions because he fell into the "let's burn" mindset. The desired level of green-up, however, made the Park resources and managers comfortable that they had mitigated risk, and moisture levels were higher than predicted.

At 0848 hours crews began the test fire along the NE corner of the burn unit (Drop Point 15). Crews were pleased with the fire effects they were observing. There was some surprise at the difference between predicted wind direction (SW) and the observed more SE winds. However, the observed fire behavior provided a comfort level amongst the crew. They also knew that when the unit to the north was burned in October the previous year it presented no holding problems. Crews therefore felt that they could successfully meet the burn's objectives. Seasonally predictable cooler temperatures had frozen the hose lay on the west side, the Burn Boss communicated to the Firing Boss Trainee (FIRBt) to take it slow and ease the fire along until the west side had their hoses flowing again. At 1002 hours, the hoselay was functioning properly and burn operations were able to commence. The crews moved in a southerly direction down the east and west sides of the unit.

Nothing seemed unusual. Most of the resources were familiar with this fuel type and with this Park. Operations went smoothly as fire was taken south by the two firing groups. Weather was as predicted. Nothing took crews by surprise with operations or weather that day.

Around 1200 hours firing operations for the east side of the unit completed the stretch along Highway 385 to the farthest south Drop Point of the unit (DP13). Crews were feeling confident with operations. They had established approximately 200 feet of blackline along the unit's east edge. Engine 45 (E-45) started their patrol going north to check for spots. Because the Engine Boss (ENGB) had concerns with the winds increasing, he instructed his crew to be on the lookout for spot fires over on the green side. He also proceeded up the line checking the unburned unit to the east for any unplanned fire.

As the engine moved slowly up the highway, they passed the pullout where the RXB2 was watching operations and fire behavior. The RXB2t was conducting media interviews and had turned operations over to the RXB2 during this time. They were within a few hundred yards of each other. As the media interviews wound down and cameras were being put away, the RXB2t felt a gust of wind that "caused him to have to hold onto his lid and protect his face with his arm". The RXB2 witnessed a dust devil cross the road coming out of the burn unit and into the green on the east side and thought "boy I sure hope that doesn't have any hot ash in it." At 1216 hours the RXB2 saw a spot fire well off the road where the dust devil had landed outside the burn unit. Following this huge wind gust, the RXB2t looked up and was motioned by the RXB2 that there was a spot and he headed towards his command vehicle and radio.

Resources began to respond to the spot. It was located approximately 168 feet off Highway 385 in the green to the east of the unit. It was quickly spreading. This spot fire activity was highly unusual for this area. Spotting distances are typically short range and occur along the edge of a unit. This spot carried across to the other side of the Highway 385. A "perfect storm" of conditions transpired. The spot happened to ignite in an area where suppression would be challenged due to topography. This topography created various wind direction influences—and right at that moment another unexpected significant wind gust occurred.

Note the initial spot fire in the bottom right of the green. Main column is to the west of the blackline

Active fire management on this Park gave responding resources a control advantage because this area had been treated in the past with fire. However, topography gave them a disadvantage as engines quickly reached terrain they could not access. UTV's and engines worked quickly to try and contain the north and south (right and left) flanks of the spot in an attempt to pinch it off. UTV's worked the left flank of the fire in tandem with an engine behind them. While the UTV's were maneuverable and able to access more terrain than the engines, they lacked the water volume capability that the engines had for putting out these flashy, fast-burning fuels. Resources kept noting "that they were surprised by how much rekindling kept occurring". The flame depth was approximately four feet deep. Believing they could hook it, the UTV's and engines continued to work the spot as it rapidly grew, driven by the high winds and topography.

The two UTV's in tandem with the engine—with the UTV's in front—worked the left flank while other engines worked in tandem on the right flank with an ATV as they tried to pinch off the head of the fire. "The folks in the UTV's were down right aggressive (in tactics, not operations) and were going to get outflanked because they weren't anchored in" one person observed. Others believed that because the fire was rekindling quickly, there wasn't enough pressure in the UTV hoses to extinguish the flames. The UTV operator and passenger on the trailing UTV felt they had good tactics, anchor point, and situational awareness as they continuously kept circling back to check their line. (All of the UTV operators on this prescribed burn had vast experience with the use of UTV's on suppression activities.) The engine behind the UTV's was picking up the rekindled areas and creating cold black.

Where the left flank pushed up the slope in front of the lead UTV (UTV1), its operator felt he could catch what he thought was the head of the fire at the top of this slope. However, when he crested the slope, topography, fire location, fire behavior, and rate of spread took the operator by surprise. Attempting to

Crews bring fire down the fenceline on the west side of the burn unit

outrun the unexpected fingers of fire, he turned to the left to drive side-slope. At this time, UTV1 slowly tipped over. The passenger and operator exited and ran into the black where they encountered the Task Force Leader (TFLD) (referred to as TFLD1) in charge of suppressing the spot. TFLD1 stated that "it crossed my mind to pull everyone out when UTV1 rolled to do a tactical pause but I didn't; I felt I had to catch the spot." No one had been injured and because they were in the early stages of catching the spot—where success was still perceived as possible—he made the decision to continue with operations.

The RXB2 realized the need to complete the current prescribed burn that was already in progress and transitioned with the west side TFLD (referred to as TFLD2) to give him command of the prescribed burn. Having released been stripped of as many resources as he could to the suppression efforts on the east side, TFLD2 continued forward with ignition operations on the original burn. Concurrent with the escape, a small spot developed along the fence onto the U.S. Forest Service land. This spot was caught, but required one individual to scale the fence several times to conduct suppression operations with the hose and move it as needed around the spot. After his fourth trip over the fence, resources arrived on the Forest Service side of the fence to assist him—where they could easily suppress the remaining fire activity. Resources remaining on the original burn managed to successfully complete ignitions; catch additional smaller spots that occurred due to continuous erratic winds, and conduct safe operations.

Still, the first spot on the east side continued to grow. Fueled by the winds, it quickly grew beyond the capacity of resources to hold it. At 1330 hours it was declared a wildfire. At that time, the FMO and the RXB2 had recognized that there were no immediate values at risk if they could keep the fire in park boundaries. They drew a "box" for containment and made a plan for catching it in the park. According to the prescribed burn personnel, they drew the correct "box". The FMO and RXB2 made well-informed decisions about where they could hold this fire using existing lines. In addition, they were supported by the Park Superintendent to implement some light-touch dozer work using old lines. Resources were ordered and responded quickly to support the park. A Type Three Incident Management team with a

State of South Dakota Incident Commander (IC) took command of the fire that same day. As a contingency, a Type Two Incident Management Team was also ordered. Three days later, on the night of April 16 when the Type Two Team was in place, they agreed that they Type Three Team had good control of the fire and a transition would not be necessary.

This link provides a time-lapse video showing the burn and the spot which develops into the declared wildfire:

https://www.youtube.com/watch?v=hYdFDeKynWY&feature=youtu.be

NARRATIVE PART TWO: THE UTV ACCIDENT

Spot fires in this region of South Dakota tend to be short distance and easily caught, especially in grass fuel types. Crews for this burn expected any spots on the east side of the burn to fall along the road and exhibit basic smoldering behavior. When the call came across the radio that there was a spot fire off the road to the east, the Firing Boss (FIRB) started jogging north from Drop Point 13. He quickly ran into the UTV (UTV1) and its operator. He motioned to the operator to move over and the FIRB jumped in as the operator (wearing his fireline gear) and they headed to the spot fire. As they reversed direction by circling, the UTV became unstable. Witnesses seeing this were concerned that the weight distribution and tank design had made the UTV unsteady[2].

The spot fire was about 168 feet off the edge of the burn unit burning in the same fuel type (grass) and was about ¼ acres when the FIRB and his passenger arrived on scene. There was another UTV already on scene (UTV2). They took the right flank of the spot while the FIRB and his passenger took the left flank. Resources continued to arrive. When the engine arrived on scene, UTV2 moved over to the left flank to back up the FIRB in his operations. By this time, the spot fire had grown to about 3 acres in a matter of minutes. While winds were pushing it along with terrain influences, the dominant fire movement was to the east. The UTV's were working in tandem attacking the left flank of the spot. An additional Engine (E-45) had fallen in-line behind them and was helping support the attack on the left flank.

Tactical operations for the spot fire consisted of working from the green for both the UTV's on the left flank. The passengers on both UTV's were running the nozzles, and all operations were being done with operators and passengers inside the UTV's making a rolling attack. Operations from the black for the left flank did not work with this configuration, in part due to the flame depth and also because it left the passenger spraying over the UTV operator. When the FIRB realized that UTV2 was behind him, and in tandem, he sped up because he knew that UTV2 would be watching his back door and was operationally sound.

[2] The Black Hills Module had made adjustments to the configuration of the UTV tank following another UTV rollover incident that occurred in 2013. They had removed the Honda gas pump, a significant amount of their normal load of plumbing and replaced a large hose reel with electric pumps.

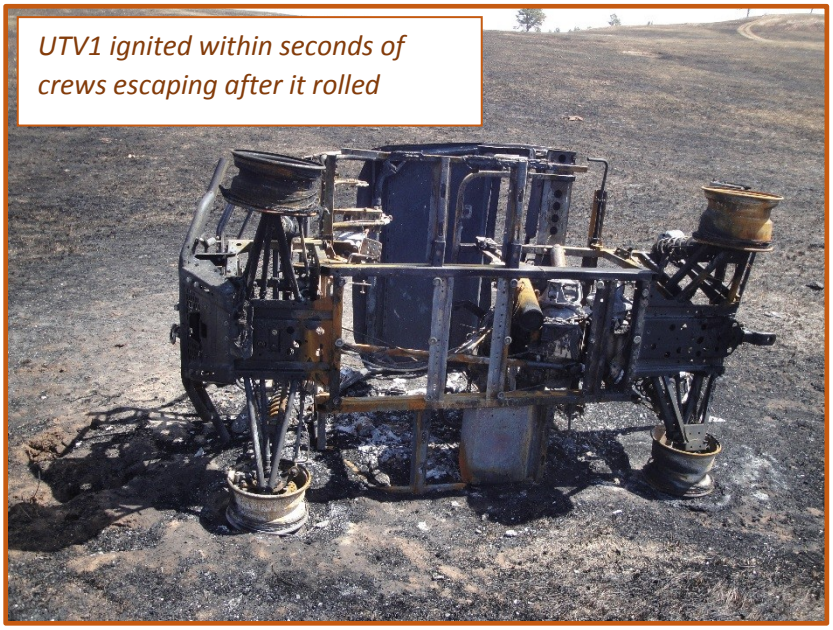
Area where UTV1 rolled onto its side was relatively flat, slope was not a factor in this accident

At this time, the smoke was thick, winds were blowing, and the fire was moving. While there was no clear visibility of the fire's right flank, the FIRB knew that it had moved over the knob to the south and down into the first big ravine east of the highway. Engines could not access that ravine. The FIRB looked ahead and saw a slope reversal and felt they could catch it at that point—if nothing more, herd the fire into the ravine which was south of them. However, the fire behavior proved to be greater than expected. The FIRB was surprised to learn that he'd been mistaken about the perceived slope reversal. As he crested the slope he found himself with fire ahead of him, and a finger running around and up the slope toward him and his passenger. He quickly circled to the left to get out ahead of the flame front. Because the FIRB had limited experience with this particular UTV—equipped with power steering (the only one in their UTV fleet to have this feature)—the vehicle turned sharper than he had expected. The FIRB was unaware that UTV1 was starting to tip when his passenger grabbed the roll bar and said "Whoa"—causing the FIRB to hesitate for a moment. In that instant, both he and the passenger felt a slow-motion tipping of UTV1 as it came to rest on its right side.

Both the FIRB and his passenger quickly exited UTV1. The passenger moved back from UTV1 about five feet. The FIRB grabbed the nozzle that had been in use and tried to spray the approaching flame front which, at this time, was approximately five feet away. The FIRB noted "that there seemed there was a lot more fire behind me than there should have been." Because UTV1 was on its side the pump had lost

its prime and proved ineffective. Both the FIRB and his passenger immediately realized that they could not salvage the equipment and jogged side-slope away from the fire until they had sufficient visibility to see their escape route safely into the black. The passenger stated "that it felt like we got out within seconds (from the tipped UTV1), saw the fire approaching, grabbed the nozzle, realized we didn't have water and ran off. All told, it was no more than 30 seconds. That fire was hot and that UTV torched right away".

Originally, as previously noted, the passenger had been the operator of UTV1. Following common firefighter practice, he had clipped his gear to the rack that was mounted in the front of UTV1[3]. That rack had been mounted specifically for the purpose of carrying gear—wearing gear while operating vehicles can hinder operations and maneuverability. There was no time to react and grab the clipped in line gear. The passenger therefore had to escape from the approaching fire with no gear or fire shelter. The FIRB had jumped in the UTV wearing his line gear and thus still had it on when he made a break for his escape route and safety zone.



UTV1 ignited within seconds of crews escaping after it rolled

Neither the FIRB nor the passenger had been wearing their seatbelts at the time of the accident. The policy in the *Interagency Standards for Fire and Fire Aviation Operations* (2015) states that "the operator and passenger(s) must wear seatbelts while the vehicle is in motion". The common practices and culture of fire, however, lends itself to a lack of seatbelts being worn during fire operations. Fire operations have individuals commonly getting in and out of UTV's quickly and often. If the operator or passenger has their gear on or radio worn in a harness or strapped to their side then seatbelts "become more of a danger" as noted by several of the firefighters involved in this incident. Indeed, this is a common concern across multiple agencies for firefighters. Both the FIRB and the passenger felt that if they had been wearing seatbelts when UTV1 tipped there was a possibility that they would not have been able to escape in time due to fumbling around trying to release the belt. The passenger and the FIRB confirmed that the FIRB, who was on the upside of the tipped vehicle, would have been suspended and attempts to release his belt would have been clumsy and difficult. The consensus of the passenger and the FIRB is that quite likely such a delay could have cost them their lives. When asked how they felt about the possibility of the passenger who was on the downside being pinned because they were not wearing their belts, they both acknowledged that was a concern to them as well. They both fully realized how close this call had been

[3] This particular UTV had a rack that set over the tank in the back that was intended for strapping line gear to but in this case the line gear was in front. It is standard practice for an operator to remove their gear and attach it to the UTV because driving and wearing their gear can create operational difficulties and dangerous situations.

for them. They both recognized that instead of a wildland fire accident, this incident-within-an-incident could have been a Serious Accident Investigation (SAI) with fatalities.

Other than the occupants there were no direct witnesses to the rollover of the UTV. Resources assigned to the burn and who responded to the escape provided insights to this incident. The RXB2t, who has extensive experience in operating UTV's for both prescribed fires and suppression activities, stated "the UTV was clearly aligned with the slope and it made no sense that it rolled". This individual is also an experienced ATV instructor. Because no formal UTV training exits, at this time the current training consists of using the approved ATV Safety Institute (ASI) All-Terrain Vehicle training.

Note the fire shelter from the gear that was strapped to the front

Resources that responded to the spot fire feel that the UTV's played a key role in the initial response because "they can get more places and be more nimble with less water. A good and experienced operator can make that go a long way". These resources also explained how because the UTV's were the first on scene, they provided a faster opportunity to catch the spot. Responding resources, including TFLD1, feel that "if they did not have the UTV's they would probably not have gone direct on the spot fire as it quickly got too steep for engines". Additionally, there is almost consistent agreement that once engines were on scene they were more effective in suppressing the spot fire and the UTV's should not have been in the lead of these pieces of equipment.

RISK IN CONTEXT

"Risk management is the systematic process of understanding, evaluating and addressing these risks to maximize the chances of objectives being achieved and ensuring organizations, individuals and communities are sustainable." – The Institute of Risk Management

Purpose

This section focuses on how individuals and groups perceived, transferred, accepted, and communicated the risk associated with prescribed burning, fire operations, and UTV operations. This section identifies key decisions and actions, and summarizes the context for those actions. The purpose is to show how key decisions and actions made sense at the time.

To fill in the context around these key points, we will offer:

• Details from interviews and the narrative
• Background cultural information
• Perspectives and insights from Subject Matter Experts (SME's) who were not participants in the accident itself. Their contributions help paint the picture of normal work

The *Lessons Learned* portion will be from the participants and the *Recommendations* will be from the FLA Team and SME's.

Introduction

Hard Truths about Risk

While deliberating over the risk-based decisions that happened on this burn, the FLA Team kept returning to some hard truths about the nature of risk, and risk management. These are shared here, as a way of framing our **Risk in Context** section.

- **Conducting a burn means accepting risk, it is not possible to entirely mitigate all risk to zero.**

  This applies to all hazardous environments, and to the concept that we incur risk if we burn and if we do not burn. Fire is a part of the environment in this fuel type and a natural process that will occur regardless if it is a managed burn or unplanned wildfire. As stated by assigned resources "if you want to consume trees with fire you don't burn in the rain". Prescribed fire is being applied to protect the values at risk; such as urban interface and natural resources. At times, in order to achieve the desired results, burns need to be conducted at the upper end of the risk spectrum. A successful fire management program involves using fire and therefore reducing the risk to these values from the threat of a wildfire.

  Conducting burns at the lower end of the spectrum creates risk in the likelihood that burns will not be thorough; the fire will not consume adequate fuels and therefore not reduce fuel loading. Hence, in the event of a wildfire the treatment will be ineffective in reducing fire behavior. Control of any future wildfires could be difficult to contain if you burn on the low end of the spectrum.

  Additionally if you burn it on the low end of the spectrum and do not meet objectives, then you need to burn it again, which increases exposure for the firefighters and increases risk. Multiple exposures trying to achieve the desired objective does not put the safety of firefighters and the public first. We must try to burn units under the most ideal conditions to meet objectives.

- **If you choose not to accept the risk of prescribed fire, then you may be transferring risk.**

You may be transferring risk to:

- communities
- public (either in the immediate moment or at a later time)
- private lands
- neighboring jurisdictions
- a situation that is significantly less manageable than the current situation such as a wildfire
- natural resources; either in the loss of habitat due to removal of fire or devastation of habitat when a wildfire of much higher severity then a prescribed burn occurs
- other resources such as volunteer fire departments, other agency firefighters, EMT's, aerial resources etc.

In other words, there is no zero-risk option. It is a tradeoff. Risk is inescapable. By not conducting burns you might be avoiding a risk that you can understand and control right now, in exchange for undefined future risk. Prescribed burning mitigates long-term risk to safety of firefighters and the public. Even with the escape, the work done by the active fire management program at WICA made that escape manageable and it was successfully contained within the NPS boundary as a result. Lack of prescribed fire would have transferred that risk to not if, but when, a wildfire occurred due to lightning or human causes. There would have been a significant increase in risk in regards to a wildfire event including to the public and within the urban interface.

- **There is always an element of uncertainty when it comes to risk.**

  In this case, it seemed very unlikely the fire would escape to the east side. There was a chance but the expectation was that it would not spot. Should the spotting happen it was expected that it would not be difficult to catch because it was believed it would be short range spotting. Concern was for the west and south side of the units and for the potential for smoke in the community of Hot Springs. Crews did not expect the unexpected and it caught them off guard but response was successful and appropriate. The uncertainty of catching the escape was significantly reduced due to the active prescribed fire program in place at the park.

  Operating UTV's comes with inherent risk. Accepting this risk should make us safer in our jobs. Discussing this risk, mitigating it through training and through the use of Subject Matter Experts (SME's) to provide the safest possible equipment for the job is how we can mitigate risk. Removing UTV's from the scope of tools used in the application of fire is not the solution as this increases safety concerns for firefighters. It increases their exposure, the length of time to complete a burn or respond to an incident such as a spot or other issues and thus reduces the safety of operations if this tool is removed from fire. The NPS as a whole needs to better manage where the risk is; which is in the configuration of after-market and cargo loading, along with the proper training of UTV use for the job at hand, to make it a more effective and safer option. It is critical to recognize that removing UTV's from the fireline also transfers risk, not just to the firefighters but potentially the public if a spot fire develops and cannot be responded to in a timely manner.

If we don't accept risk we will either be more dangerous in our jobs or never accomplish the task.

- **Assessing/evaluating the amount of risk, and how acceptable this risk is—this involves human judgment and communication.**

  There is no way to avoid this. This is present at all levels, from Line Officers, Incident Commanders, to crew leaders and crewmembers. Acceptable levels of risk need to be communicated and understood at all levels of the organization. Leader's intent should include solid messages on this; all levels of the organization should understand the risk they are all assuming.

- **Everyone perceives risk through their own "lens," based on their own "world."**

  These lenses are not good or bad, they are just different lenses. Seeing risk differently is not about integrity or intelligence, it can be just a matter of perspective.

  Risk means something different to every individual. There is the perception of risk if we conduct burns but equally there needs to be a perception of risk if we do not burn. The risk of not burning is potentially far more significant then what is accepted when conducting prescribed burns.

  Communication of "acceptable risk" and the expectation of what that means between the Agency Administrator and Fire Leadership is a critical conversation that needs to happen. Are resources operating beyond that acceptable risk or too low within that spectrum?

- **There are factors that influence how humans perceive risk and acceptability.**

  These factors may include:

  - individual differences
  - role in the organization
  - personal experiences
  - agency culture, training, and mission
  - local history, including past fires or the fire you just came from
  - who you are currently talking to and hearing from
  - social and political factors (this is sometimes ignored, but agencies serve a public mission)
  - stakeholders (our actions affect others, and we can't pretend this doesn't matter or affect decisions. There is a sense of consideration/obligation/responsibility to stakeholders—a felt need to at least consider threats to their values)

- **Today, the greatest opportunities for reducing risk, fatalities and generating safety may have to do with**:

  - Inter-level Communication: Improving how information flows between levels and parts of the organization, and out to the public
  - Resilience: Better understanding resilient performance, and what the organization can do to help create the conditions for it

These areas may currently hold more potential than traditional emphases on compliance and prevention.

Avoiding these hard truths can add ambiguity and impede clear and direct communication about risk.

DISCUSSION AND ANALYSIS

The discussion and analysis portion of this report will focus on the lessons learned and observations from: the resources on the burn; park staff; additional interviews that were conducted; and the FLA Team. Interviews outside of the fire resources and park staff included interagency partners (state, federal and local) and the National Weather Service.

There are many notable successes that took place throughout this entire event. They are as follows:

- No one was injured
- Fire was kept within the park boundaries
- No structures were lost
- All resources demonstrated professionalism at all times
- Suppression training and experience that the resources had in their portfolio created a smooth and successful transition from the prescribed fire to the wildfire
- Crews completed the prescribed burn and met objectives
- Crews caught the spot on the south side of the prescribed burn quickly
- Interagency involvement, response and support for both the prescribed and wildfire side of operations was quick and supportive with no delays
- Night operations were heavily staffed and there was a risk that day ops would be thin as a result of this decision. However the night operations were where they felt they could catch this fire, and they succeeded. They took a calculated risk of working through the night, knowing that a Red Flag Warning was predicted for the next day, and played their tactics successfully
- Last minute improvements to the west and south lines the day prior to the burn allowed for the burn operations to continue successfully and safely with minimal resources when most of them got pulled for suppression efforts
- Leadership and overhead made the right decisions tactically in regrouping, creating a box for containment, creating the right box for that containment and implementing the strategies that led to successful containment
- UTV1 operator and passenger made the right decision in recognizing their situation once the UTV rolled in leaving the equipment for their safety zone. Lives saved is the priority to protecting equipment and there was no opportunity to safely protect the UTV
- The active fire management program at Wind Cave National Park provided not only the right opportunities for containing the escape but more importantly creates resilient landscapes and defensible spaces with urban interface in addition to creating multiple ecological benefits
- Resources were flexible in their organizational plan. Originally the TFLD assigned to handle any escapes was the one on the west side of the unit but when the spot unexpectedly

happened on the east side resources stayed fluid and flexible in transitioning to a change in leadership. The TFLD for the east side assumed suppression responsibilities for the spot and pulled necessary resources to respond

FIRE PROGRAM STAFFING LEVELS

Resources on the burn identified that they felt short on resources once the escape developed. Until that point it had been felt that they were well staffed, in fact they felt over staffed because additional resources had been called in above and beyond what the burn plan amendment identified as necessary. The escape quickly sucked up resources assigned to the burn in an effort to suppress the now declared wildfire. This left the operations completing the burn staffed, however some felt not adequately enough considering there were still high concerns for escape on the south and west sides of the burn. They had reduced resources to complete the burn but managed to do it successfully and skillfully. Despite a few short range spots that developed, they contained all activity and closed up the burn operations safely.

Was there an element of operating with complacency or were there adequate resources to handle the unexpected event and complete the necessary operation for the burn?

Staffing levels for the WICA fire program are in the same state of flux that is being experienced throughout the NPS. Reduction in resources while increasing responsibilities is overwhelming WICA fire staff. The WICA FMO reports to eight different superintendents within the larger Northern Great Plains (NGP) Fire Management Group; all with different programs and all with priorities for burning. The WICA fire program has taken the largest reduction in resources in the Midwest Region yet continues to operate with increased pressure to accomplish burns. Pressure from the Chief of Resources to accomplish the burn that day factored into the planning, there was a desire to see it burned on the high end of the prescription and there was pressure to make sure it got burned in the spring before the window was lost.

WEATHER CONDITIONS

The management staff at WICA had discussed at their squad meetings the need to delay the burn for about a week until they got more green-up and the decision to wait was made. Smoke dispersion was also a concern. They wanted the right wind direction in order to insure that smoke did not impact the community of Hot Springs. The Agency Administrator was very sensitive to impacting the residents and businesses with smoke. Conversations held with the meteorologist confirmed that April 13 would result in minimal to no smoke impacts to Hot Springs. This helped drive their decision to burn that day. Rain was forecasted to be coming in within a few days of April 13, which indeed it did. Crews and fire staff had no illusions of the fact that it was drier than normal. Green-up that occurred just prior to April 13 gave them the comfort level they needed to maintain and hold the burn as planned.

UTV OPERATIONS FOR WILDLAND FIRE

The FIRB was in the lead on the right flank of the escape and UTV1 had an Agricultural (Ag) Pump that had been installed instead of a Mini-striker. The Ag Pump is far easier to operate and maintain, but puts

out less volume and pressure then a Mini-striker.[4] Interviews with resources resulted in an overall consensus that the UTV's should not have been in the lead of the Engines (ENG's) once they arrived on scene. It was observed that "the mini-striker (on UTV2) was more effective and could knock down a substantial amount of fire" in comparison to the pump on UTV1. Several observers felt there was simply not enough force coming out of the Ag Pump.

The UTV accident during the escape is the bigger issue for this review. The close escape for the operator and passenger, and the evident possible outcome for their lives had they been delayed in exiting the UTV, is shown in the consumption of the UTV once the flame front hit it. Both the operator and the passenger said they had less than thirty seconds between the time it rolled and the flame front hit the UTV, making their escape very narrow. Both said that not having their seatbelts on allowed for them to make a quicker exit to safety.

How do we address the danger of not using seatbelts (and the fact that seatbelt use is policy) when there is a situation where using them may have contributed to fatalities because it would have delayed their escape?

THE FENCE

While the fence was not a contributing factor in this review, to either the escape or the UTV incident, the FLA Team felt that it raised enough comment and concern from the resources interviewed that it was necessary to address. The fence speaks to the bigger picture of safety concerns, planning and implementing prescribed burns, the need for looking at larger scale interagency burns and the accepted attitude of the park in regards to having that fence as part of the operations.

The fence being referred to in this review was the west boundary of the Cold Brook Burn Unit and was constructed to protect the bison and keep them within NPS boundaries. It is approximately eight feet tall. With the intent to keep bison contained it is therefore a solidly built fence. There is a mowed line on the NPS side of the fence (east side) and an old Forest Service (FS) road on the west side, Forest Service side, of the fence. The west side of the unit was considered the most critical side because of values at risk such as private land, urban interface and timber which holds high value for the FS. Relying on the ability of firefighters to scale this fence, should there be a spot on the other side, and not accounting for the danger to firefighters should they be trapped by fire against this fence raises significant concerns.

Has the fence been normalized by the NPS Staff? Should it be? What are the consequences of normalizing?

LESSONS LEARNED

Lessons learned are from the perspective of resources involved with the prescribed burn, the escape and the UTV accident:

[4] The Black Hills Module had conducted their own tests and felt the overall restricting factor would be the nozzle, not the pump outputs. After looking at the manufacture specs they timed what it would take to fill a five gallon bucket with just a mini striker with a 3.4 adjustable nozzle. They found it took an average 60 seconds. A four gallon a minute electric pump took an average 120 seconds. Pumps on their UTV's that day had a 5 gallon a minute electric pump and they assumed it to be 20% more efficient and would take roughly 96 seconds to fill the tank.

- Know your personnel and their skillset
- Maintain the big picture when unexpected events happen
- Become familiar with the big picture prior to operations beginning. Know the surrounding country and not just the area associated with the burn
- Plan for the "what if's" before igniting the test fire. Look at the possibilities for where fire could go and plan for how you will manage it should the fire get to those areas
- Expect the unexpected. No one expected a spot to happen on the east side. Their focus in the briefing and throughout operations was on any spots that would occur on the south or west side of the unit
- Pay attention to weather conditions that are long and short-term prior to the burn and take a closer look at how these might impact that snapshot of a moment when the burn is being conducted as well as long-term how will these weather patterns impact operations
- Stage unstaffed equipment closer to the burn unit
- Identify off-site contingency resources and confirm availability
- ATV Safety Institute curriculum is not adequate for operating a UTV on the fireline, recommendations ranged from requiring formal training to insuring quality On the Job Training (OJT)
- We accept risk, it is part of the job that we do. Knowing risk is inherent there is a need to build it into our plans with the big picture in mind. Risk should not be used to shut down programs, but must be used to strengthen the weak areas

RECOMMENDATIONS

The FLA Team made observations during the process of the review and has included these as recommendations per the direction of the Delegation of Authority (DOA). These recommendations are based on the observations of the team and their own experiences and expertise in regards to this review. Subject Matter Experts (SME's) were also consulted in developing these recommendations. These are not all applicable for just WICA and the NGP fire program but some extend to the NPS as a whole.

Fire Program

- Build a better understanding of current weather and fuel conditions. While there is a need to often burn on the upper end of a spectrum, a better understanding of conditions can help contribute to better planning for the burn in terms of: understanding how abnormally dry or short and long term drought will affect fuels, holding resources, weak spots, contingency planning and managing unexpected outcomes. Pocket cards are not utilized by the parks under NGP Fire Management Group and this is a tool that should be implemented. There needs to be a better understanding of the product, how it is used, what it indicates, how to mitigate and where fuels stand in regards to past large scale events. Experts in the use and development of pocket cards need to work with the fire staff at WICA to help them better understand and implement this tool. These experts can be provided at the request of the fire staff, park or region.

The Value of Pocket Cards

- What is Fire Danger Rating?

  A decision *aid* that describes the factors - fuels, weather and topography - which affect the initiation, spread and difficulty of control of wildfires on an area.

  We emphasize *aid* because fire danger rating information is not the answer by itself; it must be considered along with local knowledge of an area.

- What will the Fire Danger PocketCard do?

  The Fire Danger PocketCard is useful in initial fire size up, initial attack and extended attack.

  The Fire Danger PocketCard gives firefighters a general indicator of the potential for the fuels to support extreme fire behavior and of the difficulty of control.

- What won't the Fire Danger PocketCard do?

  The Fire Danger PocketCard will not provide site specific fire behavior predictions.

- How Do Firefighters use the Fire Danger PocketCards?

  Compare current and predicted local fire danger to historical local fire danger in order to enhance situational awareness.

  Use this information to be aware of indicators that predict the potential for extreme fire behavior.

Why pocket cards? (from http://fam.nwcg.gov/fam-web/pocketcards/objective.htm):

The Fire Danger PocketCard is a tool based on the National Fire Danger Rating System (NFDRS) to help the firefighter develop an awareness of the current fire situation that you are about to step into.

The prime objective of the NFDRS is to provide a measure of the seriousness of local burning conditions. The PocketCard provides a visual reference of those conditions and how they compare to previous fire seasons.

- Conduct a program review using resources from other Agencies and Regions to provide outside perspective on the fire program at WICA and for the parks supported under it for fire activities.

- Maps in the Incident Action Plan (IAP) should include one that is large scale zoomed out, or provide a large size overview map to lead resources (TFLD, RXB etc.) so that in the event of an escape there is advance knowledge of the surrounding area, topography, fuels, hazards and potential lines. Keep a big picture view, consider all possible weak areas.

- Larger scale, interagency burns conducted on a landscape scale need to be considered by WICA and all of the Parks under the Northern Great Plains fire organization. They need to consider this scale of burning in order to meet desired fuels treatment targets more effectively and safely. Far more can be accomplished with much greater benefits to the safety of the firefighters, the resource objectives you are burning for and the long range management of a program by conducting larger burns. Interagency burns, particularly those done to create resilient landscapes, are more likely to be funded for fuels work in the future planning of the NPS.

- Have burn plans done in advance, shelf ready and updated yearly as necessary with signatures. Currently WICA and parks under WICA Fire (known as the Northern Great Plains Group or NGP) have their plans written approximately a month in advance. This does not allow for much pre-planning and opportunities to work with cooperators on large scale interagency burns without more of a window of planning. There is a lack of pre-planning that exists in not having burn plans done in advance.

Units that are done on a regular rotation can use the same burn plan each time if a quality product was developed and it is checked for currency on signatures, objectives, contacts and other relevant information prior to the year that it is planned for treatment. Long-term vision and planning on this level will greatly reduce workload on staff once it is implemented. There are two Wildland Fire Modules (WFM's) in the Midwest Region, Buffalo River and Black Hills Modules. These resources need to be utilized to write burn plans, work with Superintendents and staff at parks to coordinate priorities and to plan and implement burns across the Northern Great Plains fire program. WFM's have qualified staff to write burn plans and oversee the implementation of these burns. This will greatly reduce the workload on the NGP FMO and create a more effective prescribed fire program across the Region. Guidance to program management for creating this level of planning can be provided at the request of the fire staff, park or region.

- Consistently the FLA Team heard how resources were disappointed there was no After Action Review (AAR). The Team recommends that an AAR is held despite the length of time that has passed to help the program talk with all resources that were involved and allow for any necessary healing. AAR's should be conducted in the future with all participating staff for any fire activity as close to the event as possible. See Appendix Four (Supporting Documents) for a recommended AAR format to follow for all NPS activities, not just for fire.

- WICA currently sends out a press release prior to the beginning of each prescribed fire burn window and posts this information on its website and Facebook page. Once conditions look favorable, and a day has been selected to conduct the burn, the park sends out a Media Advisory inviting local media to cover the burn. Public outreach on the day of the burn extends to local law enforcement, local fire departments, and other land management agencies.

- WICA FMO serves eight parks at this time each with different resource objectives; similar burn windows; and different expectations from each Superintendent in regards to the fire program. They have taken one of the biggest hits in the Region to their Fire Staffing over the last few years due to the current NPS Future Target Organization. Despite staff reduction, the program maintained the same demands. Regional oversight and involvement in helping to manage these expectations; address the future target organization and what that means to the fire programs at each park; and support for finding funding to accomplish burns on an interagency scale will reduce the pressure on a program that has lost significant staffing but not workload.

- Contingency resources were built into the plan, perhaps not the way many other planners approach this concept. In conversations with the NGP Fire Management Officer and Regional Prescribed Fire Specialist the Midwest Region of the NPS requires an "Adequate Holding Resource Worksheet" for all prescribed fire plans written. It is understood that the intent of this worksheet (Appendix F in the Plan) is to identify the Line Building Rate for predicted Fire Behavior Outputs such as Rate of Spread and Flame Length (ROS/FL) given a range of anticipated environmental factors. The contingency resources are those resources on scene during implementation. It is the philosophy of the FMO, supported by Regional Prescribed Fire Specialist that contingency resources are to be on the burn and not staged either on the burn unit or at another location. The FMO stated several times, "If I need the resources (i.e. contingency resources) identified in the Adequate Holding Resources Worksheet I want them on

the burn."

  - There were additional resources (equipment type/location/anticipated response time) identified in the prescribed fire plan that were not on scene.
  - In the Complexity Analysis, in two locations, it mentions that to mitigate risk only key overhead that have local knowledge of the ignition unit, local fire conditions and WICA would be used. The team believes this stipulation was intentional. Although not directly tied to contingency resources, it may indicate the thought process of the FMO, who was the plan writer on contingency actions. FLA Team members feel that specific contingency actions were not well defined within the body of the Prescribed Fire Plan. However the local knowledge and experience of contingency resources that responded were largely responsible for keeping the escape within NPS boundaries.
  - The Adequate Holding Resource Worksheet underestimated resistance to control due to dry/drought conditions. ROS and FL may not have exceeded what was listed on the worksheet as anticipated fire behavior, but personal observations on part of the team has demonstrated that light fuels burning in drought conditions take considerable more effort to control as more of the fuel bed (duff) is available to combustion. This would explain why even in the light grassy fuels they kept having 'rekindling' along the fire edge where they had taken action. It was noted by several individuals that they had to keep turning around to pick up areas that reignited. This is generally not normal in lighter fuels.

- Job Hazard Analyses (JHA's) for the park are older with some dating back to 2005. These should be updated for content and currency-specifically to address wildland fire operations for both prescribed fire and suppression because those can be very different functions. The UTV/ATV JHA should pertain to operations during prescribed fire and wildfire operations. Address the difference between operating UTV's with power steering vs. non-power steering and operating UTV's with loads in the back and/or front.

- As is the case for the entire NPS, the NGP FMO is spread over a large jurisdiction and answers to eight Superintendents. He is responsible for the programs at all levels. The NGP future target organization shows no additional positions being added as support roles. There is a need to coordinate with all of the parks, their Superintendents and resources staff, and create a manageable workload so the pressure to complete burns doesn't encroach on decision making within the fire organization.

- It was identified by the park staff that there was a level of chaos and lack of understanding how to manage the volume of incoming calls when the public became aware of the escape at WICA. Creating an SOP for how incidents of this level will be managed and by whom will make a better quality experience for park staff and the public as they seek information. This practice does not apply specifically to fire but could be implemented for any level of emergency activity such as a wildfire, SAR activities and other large-scale operations that might interest the public. Create standard talking points that are available to all staff who may be attending the phones, develop SOP's for managing these incidents (identify what needs to be done and who is responsible for

each task) and make sure on an annual basis that the information is accurate and current.

- Confirm that all resources being used are current in their fire qualifications.. While this was not a contributing factor to the burn or the UTV incident it is a policy issue that needs to be addressed, as one individual assigned did not meet qualifications due to an expired Work Capacity test.

- Better organization of critical files. It was discovered that there was not clear handling of critical documents such as the amendment made to the burn plan regarding holding resources, the go-no go checklist, the original signed burn plan, the annual review of the FMP, preparedness checklists that are required on an annual basis and other important documentation. This needs to be better structured and should be available without extensive search and time.

Training and Qualifications

- Individuals who may be designated as an Acting Superintendent must have a level of knowledge which allows them to understand the implications of the fire management decisions they may be asked to make. The knowledge gained by attending the Local Fire Management Leadership (LFML) or National Fire Management Leadership (NFML) course provides a foundation for effective fire program oversight. It is recommended that designated acting superintendents who may sign Wildland Fire Decision Support documents or approve prescribed fire documents and go/no-go decisions, take the LFML or NFML course.

- To effectively track this requirement, it is recommended that NPS policy reflect that all superintendents and their acting's be assigned the Agency Administrator (AADM) qualification in the Incident Qualification and Certification System (IQCS). The requirements for this qualification include:
    - Introduction to Incident Command System (ICS-100)
    - National Incident Management System (IS-700)
    - NFML or LFML

- Fire Management Officers who are designated as acting superintendents could be excluded from the requirement to attain the AADM qualification due to their background knowledge of Fire Management Policy and procedure.

  The recommendation is made with the understanding that the LFML/NFML courses are undergoing revision and will reflect increased emphasis on prescribed fire implementation oversight. Additionally, it is recommended that the Prescribed Fire Training Center's Prescribed Fire for Agency Administrators course be added under "Additional Training Which Supports Development of Knowledge and Skills" for the AADM position in the Federal Wildland Fire Qualifications Supplement document.

  It is extremely important to recognize the suppression experience that the majority of resources on this burn had in their portfolio. Their experience created a fluid transition between implementing the burn and acting in a suppression mode that contributed significantly to the fast actions taken, the quick decision making, the confidence in leadership and their ability to

catch this escape successfully within park boundaries. Resources involved in prescribed fire need to have this continued exposure to suppression activities in their experience portfolio. Given the nature of prescribed fire and the potential for escape, continued emphasis on building a "suppression" skillset should be an emphasis in NPS workforce development. This is beneficial not only during the implementation phase, but may be even more critical during the planning and design phases of project development, allowing for realistic and effective contingency plans to be considered.

- The NPS does not have a Burn Boss Refresher Course requirement at this time. It is recommended that the Fire Management Leadership Board task the Fuels Advisory Team to 1) determine if a refresher should be required for NPS personnel holding a burn boss qualification and 2) if it is determined that it should be required, what steps are necessary to implement the requirement and what should the basic content areas include.

Equipment

- The WICA fire program has had two UTV rollovers in three years, both while conducting prescribed fire operations. This raises serious concern, as the team feels that the UTV accident is the far greater issue at stake with this FLA. Seconds defined the difference between this being a Wildland Fire Accident investigation and a Serious Accident Investigation. There needs to be an interagency review taken with this program before investing in further equipment and outfitting it. It is the request and hope of the FLA team that UTV's should continue to be part of the program, but that before they engage with further operations they consult expertise in the field of UTV's such as is recommended in the remainder of this report. Because there was equipment damaged, a Wildland Fire Accident Investigation was required and was conducted in the form of the FLA which is approved for the agency in the Redbook. To be clear and fair, UTV accidents are a widespread NPS issue and the FLA Team believes they occur far more often than is reported. Only the ones involved in serious accidents are noted, but fire is not the only part of the organization that makes after-market changes to the equipment or loads them with equipment for transport. These issues extend beyond just the WICA fire program to NPS as a whole, however there is extended concern directed here due to the fact that they have had almost back to back accidents that reflect a degree of similarity.

- UTV Training in the NPS includes no elements for learning to operate the equipment for the fireline. There are significant differences in operating a UTV off-road with the load and tanks in the back of the equipment while acting to ignite and hold a fire, than operating one on a flat field as is done in the training course. There are no specific additional training courses or requirements for learning to operate one within the scope of normal fire operations. A Standard Operating Procedure (SOP) for pump and roll and ignition operations should be developed and included in training. A tasking from the FMLB to the Operations Advisory Team about a strategy to implement this requirement is recommended.

- UTV specifications for after-market additions would benefit from being standardized. Currently there are no guidelines or standards for tanks, pumps, gear placement etc. and Polaris states that "never operate with non-Polaris approved accessories - they may seriously affect stability."

However Polaris does not have the most ideal tank and pump in their product line for fire activities. Options are to either work with Polaris to design and sell the desired product or leverage the tools that currently exist such as: NFPA requirements for our regular trucks, center of gravity calculations, basic front/back side to side weight scales. Design a deliverable that addresses if a UTV is going to be designed with a water handling apparatus, this is the model of UTV you buy, this is the slip-on unit you buy, and this is how it gets mounted. Create specifications that identify what type of UTV can be purchased and standardize a few options of models and variance in specs for each of those models. Providing only one option of UTV could significantly hamstring the agency, there are different needs based on terrain, fuel types, etc. for UTV's and specifications need to provide some variance of options for programs to purchase the model that best fits their program. Identify what the specifications are for each model, what is by policy permitted for add-ons to the equipment and what is not permitted. This won't guarantee absolute safety. It will still be a "best available" based on our collective knowledge and understanding. Will need periodic updating as equipment evolves.

- We have had other incidents of UTV rollovers within the NPS fire organization. There have been similar incidents of rollovers while responding to a slop-over and during other operations on prescribed burns or suppression operations. Incidents where no one is hurt and no damage occurs to equipment may go unreported. Continuing to operate UTV's without addressing the factors causing these rollovers may eventually result in a fatality; our agency cannot afford to wait until we have such an incident before we explore the causes and determine some working solutions so that UTV operations are made safer for our operators. UTV's are a critical piece to the success of fire implementation and suppression but the Agency needs to explore the methods for making this safer and standardized equipment.

- The National Park Service Equipment and Facilities Programs Manager created a proposed framework for motorized off-highway vehicles specifications for wildland fire use that is in Appendix 3. This document provides quality recommendations and concepts that the NPS should consider implementing. At this time as WICA looks to replace the lost equipment they should take this approach under consideration before purchasing new equipment and outfitting it for use on the fireline.

- The Ag Pumps that were switched out for the Mini-strikers do not provide enough power to be successful during aggressive suppression activities and can be marginal for catching spots. Fire programs should look closely at what equipment they are using and working with SME's develop options and discuss the pros and cons of each option in regards to pump options for wildland fire operations. Know the limits of each decision, for example an Ag Pump works well for the simple fact it mitigates operator errors but lacks the flow to be as effective in suppression operations. Exploring all options and knowing the limitations of equipment allows for programs to create SOP's for operations during different activities. This makes for safer and more effective operations with equipment.

- 6x6 UTV's are far more stable configurations, especially when installing a low profile water tank and for operating during fire operations. The downside is they are less maneuverable. However

in terms of safety may be the better equipment to consider for future purchases. It is recommended to bring in SME's to explore the options and design the best fit of equipment along with after-market add-ons (such as tanks and pumps) for the programs. Create SOP's for the use of equipment and insure that all operators are familiar with the limitations and how equipment handles. The Equipment and Facilities Programs Manager at the National Office would be available to work with programs to guide them to the SME's that would be most appropriate for guidance.

- Tactics for the spot fire: attack from the black with the hose operator walking alongside the UTV. This does several things: puts them in the black where they are always going to be in a safer position; gives them the speed necessary to implement successful suppression operations. In this situation the UTV's were not anchored in because they did not have the water volume to suppress the fire in the flashy fuels, they were effective at a quick knock-down of the fire but not in securing good black and suppression of the flamefront at the speed they were moving. Safe practices dictate that suppression activities are implemented to attack from the black. If it is too hot to attack from the black then moving in front of the approaching flamefront is not the best tactic for reasons of safety. When it was too hot to attack from the black it should have become a point where resources recognized the limitation of equipment and disengaged. Engines at this point would have been more effective.

    - In this context consider the construction of the UTV and its use on fire activities:
        - Is current training for UTV and ATV training suitable for learning how to operate the equipment during fire operations?
        - Are we purchasing the safest equipment?
        - Do the apparent equipment modifications affect the center of gravity and therefore the corresponding safe slope operating parameters?
        - How is the combination of accessories affecting the center of gravity for the UTV/ATV?
        - What policies, plans and expectations are in place for use of the equipment? Are these the same as using them for everyday functions and for operating during fire operations? Should they be?
        - ATV equipment configuration implies a single operator/engineer pump and roll operations option. OK/Not OK? How about in a UTV?
        - Do we have the right operators with the right fire qualifications for the job on the right equipment for safe fire operations?

PRODUCTS

- Sandtable exercise that is developed for this escape and incident-within-an-incident through the Lessons Learned Center (LLC). The Black Hills Wildland Fire Module should provide the script and baseline for the exercise and utilize the resources at the LLC to refine and finalize the product and distribute it for learning purposes on a National and Interagency level.
- Create a powerpoint presentation that is presented at the next annual Regional FMO meeting as a lessons learned

- Create a module for the Wildland Fire Safety Training Annual Refresher (WFSTAR) on escaped burns and incident-within-an-incident that is used in the firefighter refresher for 2016. This module should be written by the WICA Fire Staff, Black Hills and Buffalo River Wildland Fire Modules to give them a voice in the process, experience in creating training products and ownership in the process. The WFSTAR group should coordinate with them in creating the final presentation products and funding for this project should be sought out through the Midwest Regional Office or National Office.
- Google Earth products that should be developed by the Midwest Regional Office and used in line officer trainings such as LFML, the Prescribed Fire Training Centers Agency Administrator workshop and in other line officer meetings and trainings.
- WICA creates programs that they do at community events and as programs in the Park about prescribed fire and tells the story about the history of fire here; the need for burning ecologically and for urban interface protection; and creates information for their webpage along these lines as well.
- WICA does town hall meetings at the start of each prescribed fire season to talk about such topics as their upcoming prescribed fire season, the units they intend to burn, resource objectives, mitigations and benefits to urban interface. This meeting is held with the WICA fire staff, the Park Superintendent and the Park PIO.

Appendix One

Declared Wildfire Review

Appendix One: Declared Wildfire Review

The Cold Brook Facilitated Learning Analysis (FLA) Team was also requested to conduct a Declared Wildfire Review on the escaped prescribed burn. The management direction for Declared Wildfire Reviews comes from the *Interagency Prescribed Fire Planning and Implementation Procedures Guide* (PMS 484) published by the National Wildfire Coordinating Group (NWCG).

The *Guide* states:

> "Although other type of reviews may be required by agency policy, the minimum requirement of the declared wildfire review is to help prevent future wildfire declarations. This will be accomplished by analyzing key prescribed fire plan and implementation interactions and gathering knowledge and insight from the local participants for improvement of their own prescribed fire planning and implementation. The analysis and lessons learned are then disseminated for the benefit of the broader prescribed fire community."

Since this was a planned event, a great deal of information was available to the FLA Team. FLA Team members reviewed the prescribed fire plan, analyzed fire behavior and weather information both from onsite observations as well as from local RAWS (Remote Automated Weather Station) and NFDRS (National Fire Danger Rating System) data. Information from key individuals was gathered from both the group dialogues as part of the FLA, as well as individual and small group interviews. Photos were available from firefighters involved in the burn, as well as the Public Information Officer (PIO) assigned to the burn. The Midwest Regional Prescribed Fire Specialist had also set up a time-lapse camera to the southeast of the burn, which captured the entire event, from the ignition on the morning of April 13, through the escape and suppression actions into the early morning hours of April 14.

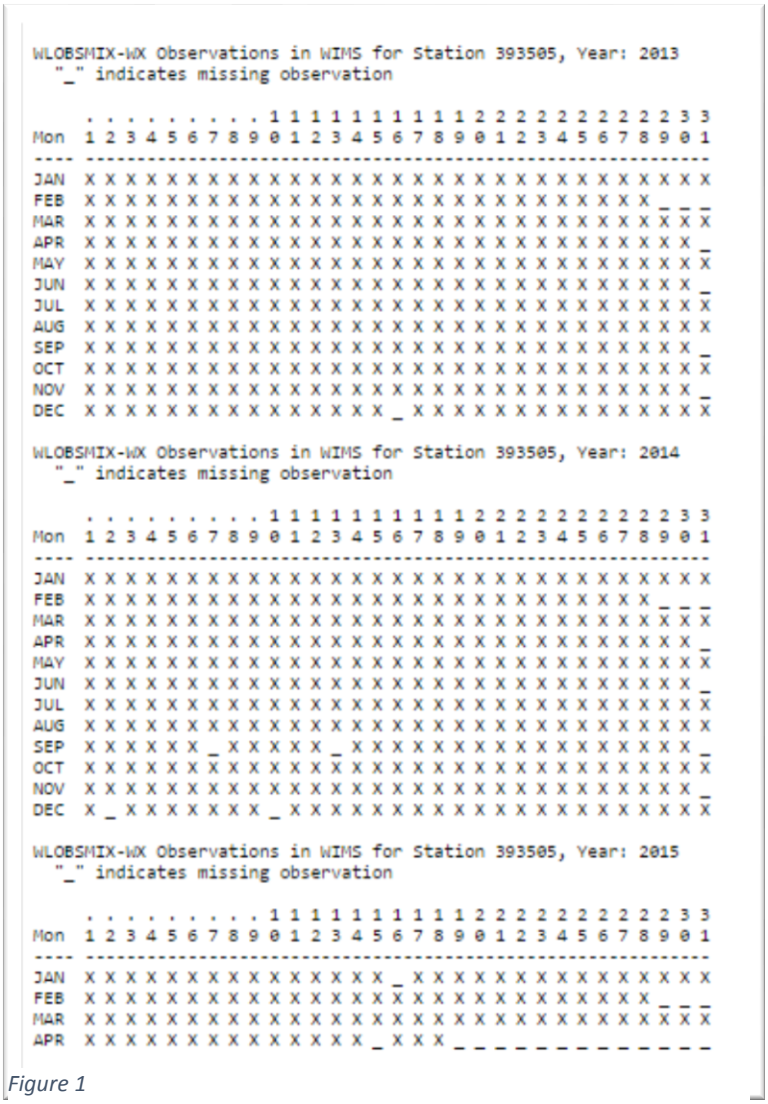
Using all this documentation, the *Guide* states:

> "In addition to the common outcome review elements, the declared wildfire review must include the following analysis and may be addressed in a separate review:
>
> - An analysis of the seasonal severity, weather events, and on-site conditions leading up to the wildfire declaration.
> - An analysis of the prescribed fire plan for consistency with agency policy and guidance related to prescribed fire planning and implementation.
> - An analysis of prescribed fire implementation for consistency with the prescription, actions, and procedures in the prescribed fire plan.
> - The approving agency administrator's qualifications, experience, and involvement.
> - The qualifications and experience of key personnel involved.
>
> When addressing these topics, it is recommended to clearly separate the analysis from the lessons learned process. The analysis of these topics can usually be accomplished through review of documentation."

The recommendation to separate the analysis from the lessons learned process has been resolved by making the Declared Wildfire Review an Appendix to the FLA report itself.

An analysis of seasonal severity, weather events, and on-site conditions leading up to wildfire declaration.

This analysis was completed using onsite weather observations from the Wind Cave Remote Automated Weather Station (RAWS); WICA Elk Mountain, 393505.



WLOBSMIX-WX Observations in WIMS for Station 393505, Year: 2013
"_" indicates missing observation

Mon	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
JAN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FEB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	_	_	
MAR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
APR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
MAY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
JUN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
JUL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
AUG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SEP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
OCT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NOV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
DEC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

WLOBSMIX-WX Observations in WIMS for Station 393505, Year: 2014
"_" indicates missing observation

Mon	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
JAN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FEB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	_	_	
MAR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
APR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
MAY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
JUN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
JUL	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
AUG	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SEP	X	X	X	X	X	X	_	X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
OCT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NOV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_
DEC	X	_	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

WLOBSMIX-WX Observations in WIMS for Station 393505, Year: 2015
"_" indicates missing observation

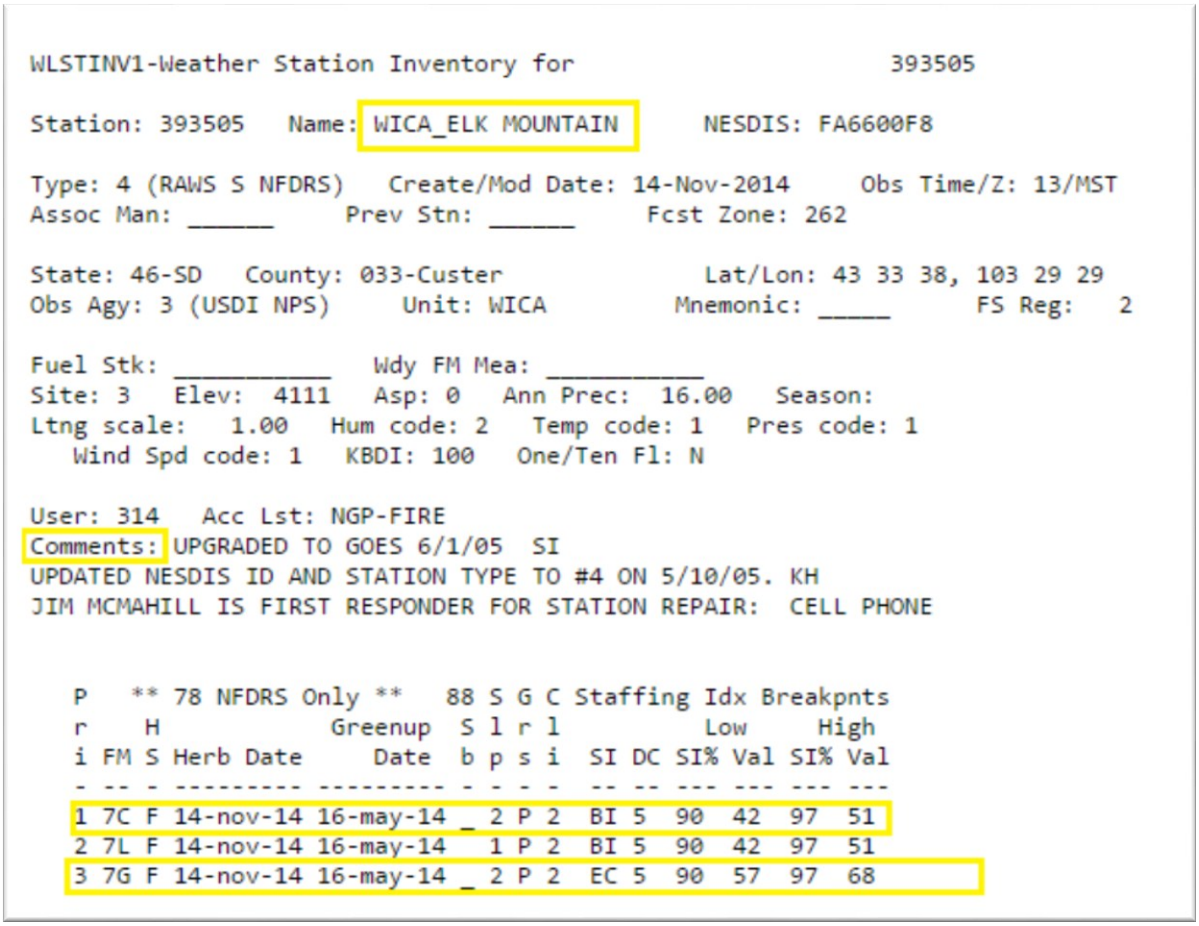
Mon	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1
JAN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FEB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	_	_	
MAR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
APR	X	X	X	X	X	X	X	X	X	X	X	X	X	X	_	X	X	X	_	_	_	_	_	_	_	_	_	_	_	_	_	_

Figure 1

Prior to a unit FMO or National Weather Service (NWS) forecaster using weather data from a RAWS station to make predictions and forecasts, a great deal of knowledge and maintenance is needed to best serve the fire management organization, and ultimately serve the safety of the firefighting resources. The good news is once this is understood, the upkeep is relatively simple, and can be used as an exceptional decision making tool. Fire weather is gathered using a local unit RAWS station. The integrity of the data collected and its subsequent use is highly dependent on the station maintenance and upkeep of the station.

A brief audit of the last 2 years of the Weather Information Management System (WIMS) inputs show the park completing the required input at almost a 100% completion rate. This, in effect, provides a high degree of data integrity over time, as once a RAWS empirical data is lost, it cannot be recovered. The longest a station can go without validation of observations is 18 months. As observations are regularly and accurately inputted, the integrity of the data allows for a much more refined analysis in FireFamily Plus.

The Northern Great Plains Fire organization should be commended for this effort. **Figure 1** is a screen shot of WIMS input and missing data over the last 2 years and demonstrates this commendable effort.



```
WLSTINV1-Weather Station Inventory for                    393505

Station: 393505   Name: WICA_ELK MOUNTAIN     NESDIS: FA6600F8

Type: 4 (RAWS S NFDRS)   Create/Mod Date: 14-Nov-2014     Obs Time/Z: 13/MST
Assoc Man: ______     Prev Stn: ______     Fcst Zone: 262

State: 46-SD   County: 033-Custer              Lat/Lon: 43 33 38, 103 29 29
Obs Agy: 3 (USDI NPS)     Unit: WICA         Mnemonic: _____      FS Reg:   2

Fuel Stk: ___________   Wdy FM Mea: ___________
Site: 3   Elev:  4111   Asp: 0   Ann Prec:  16.00   Season:
Ltng scale:   1.00   Hum code: 2   Temp code: 1   Pres code: 1
   Wind Spd code: 1   KBDI: 100   One/Ten Fl: N

User: 314   Acc Lst: NGP-FIRE
Comments: UPGRADED TO GOES 6/1/05  SI
UPDATED NESDIS ID AND STATION TYPE TO #4 ON 5/10/05. KH
JIM MCMAHILL IS FIRST RESPONDER FOR STATION REPAIR:  CELL PHONE


   P   ** 78 NFDRS Only **   88 S G C Staffing Idx Breakpnts
   r    H            Greenup  S l r l          Low     High
   i FM S Herb Date     Date  b p s i  SI DC SI% Val SI% Val
   - -- - --------- --------- - - - -  -- -- --- --- --- ---
   1 7C F 14-nov-14 16-may-14 _ 2 P 2  BI 5  90  42  97  51
   2 7L F 14-nov-14 16-may-14   1 P 2  BI 5  90  42  97  51
   3 7G F 14-nov-14 16-may-14 _ 2 P 2  EC 5  90  57  97  68
```

Figure 2

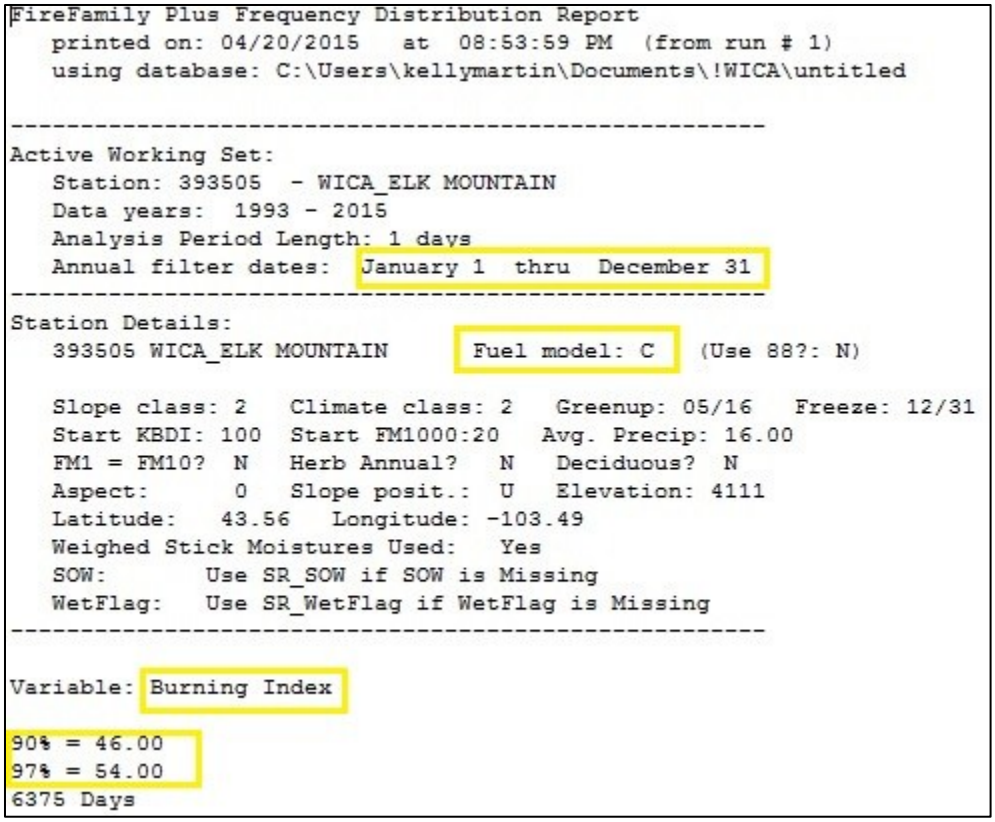
Park units differ on who will ultimately have the responsibility for updating and maintaining the unit RAWS station. More often than not, dispatchers are responsible for inputting WIMS observations and are the likely individuals to assist the fire management organization in updating the station catalog on an annual basis. Most units are unaware they can and should document changes in the station catalog so that others will be able to confirm calibrations have been made and by whom.

Commendations

It is commendable that the park is able to maintain a RAWS station that is very particular to the park's prescribed and wildfire needs. The station has summertime observations going back to 1993 and year round observations dating back to 1997 (highly commendable). It is often left up the local unit to ensure sensors are swapped out on a regular basis to ensure a high degree of accuracy in data collection.

Adjusting and calibrating inputs in WIMS

- Primary Fuel Model used is "C" – pine/grass savannah. Good choice; continue to use.
- Current breakpoints set in WIMS at the 90th and 97th percentile are set at 42 and 51 respectively (**Figure 2**). Unknown as to when the last time breakpoints were calibrated. Changes to a



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FireFamily Plus Frequency Distribution Report
   printed on: 04/20/2015    at  08:53:59 PM  (from run # 1)
   using database: C:\Users\kellymartin\Documents\!WICA\untitled

-----------------------------------------------------
Active Working Set:
   Station: 393505  - WICA_ELK MOUNTAIN
   Data years:  1993 - 2015
   Analysis Period Length: 1 days
   Annual filter dates:  January 1  thru  December 31
-----------------------------------------------------
Station Details:
   393505 WICA_ELK MOUNTAIN      Fuel model: C   (Use 88?: N)

   Slope class: 2   Climate class: 2   Greenup: 05/16   Freeze: 12/31
   Start KBDI: 100  Start FM1000:20   Avg. Precip: 16.00
   FM1 = FM10?  N   Herb Annual?   N   Deciduous?  N
   Aspect:      0   Slope posit.:  U   Elevation: 4111
   Latitude:   43.56   Longitude: -103.49
   Weighed Stick Moistures Used:   Yes
   SOW:       Use SR_SOW if SOW is Missing
   WetFlag:   Use SR_WetFlag if WetFlag is Missing
-----------------------------------------------------

Variable: Burning Index

90% = 46.00
97% = 54.00
6375 Days
```

Figure 3

station's breakpoints can and should be included in the station catalog narrative. If the park was to keep the 90th and 97th percentile these breakpoints would change to 46 and 54 respectively (**Figure 3**).

- Constraining the data from March through October yields little to no change in the breakpoints. The park may look at adjusting the breakpoints to reflect additional years of data in consultation with the Regional Fuels/Operations Specialist. The recommendation would be to reduce the breakpoints to the 80th and 95th percentile. This small adjustment has the effect of the park entering very high fire danger at an earlier stage. This would be a good business practice consideration due to the windy conditions that can greatly affect the ability to contain fire spread. If the park were to adjust the breakpoints to the 80th and 95th those values would change to 39 and 51 respectively (Figure 4).

Fuel model "L" (**Figure 4**)

- May not yield additional or beneficial information relating to fire danger. WICA may consider deleting this secondary National Fire Danger Rating System (NFDRS) choice. (**Figure 2** as secondary NFDRS)

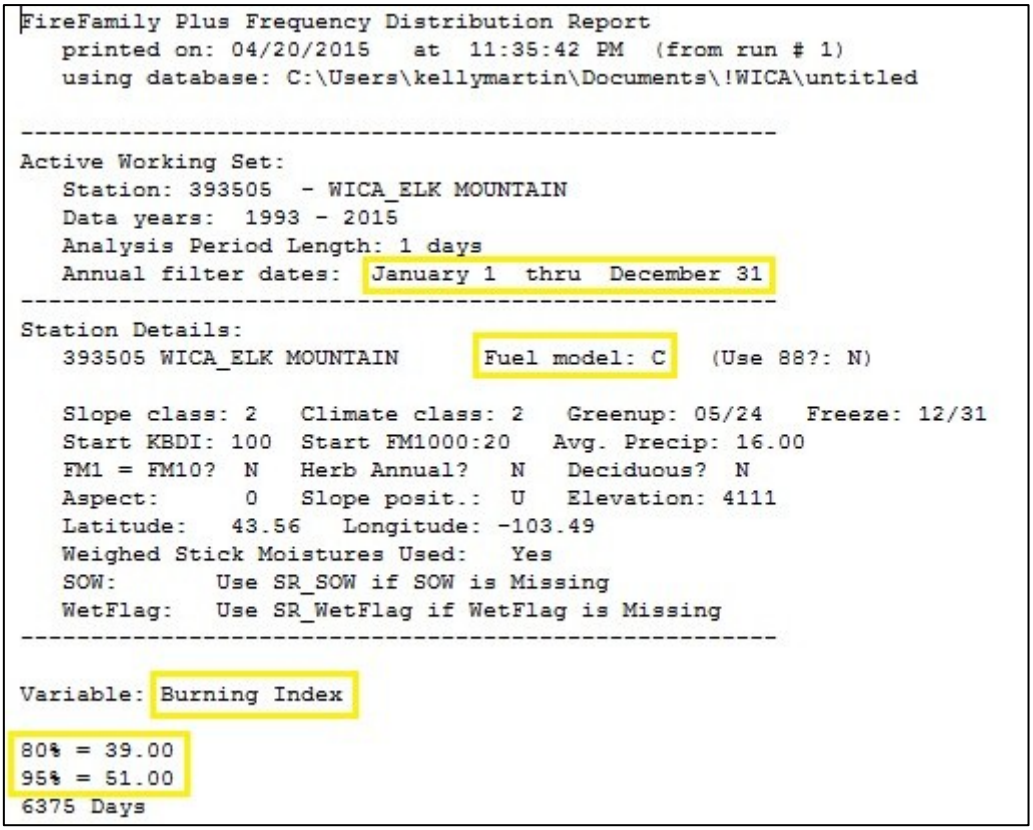
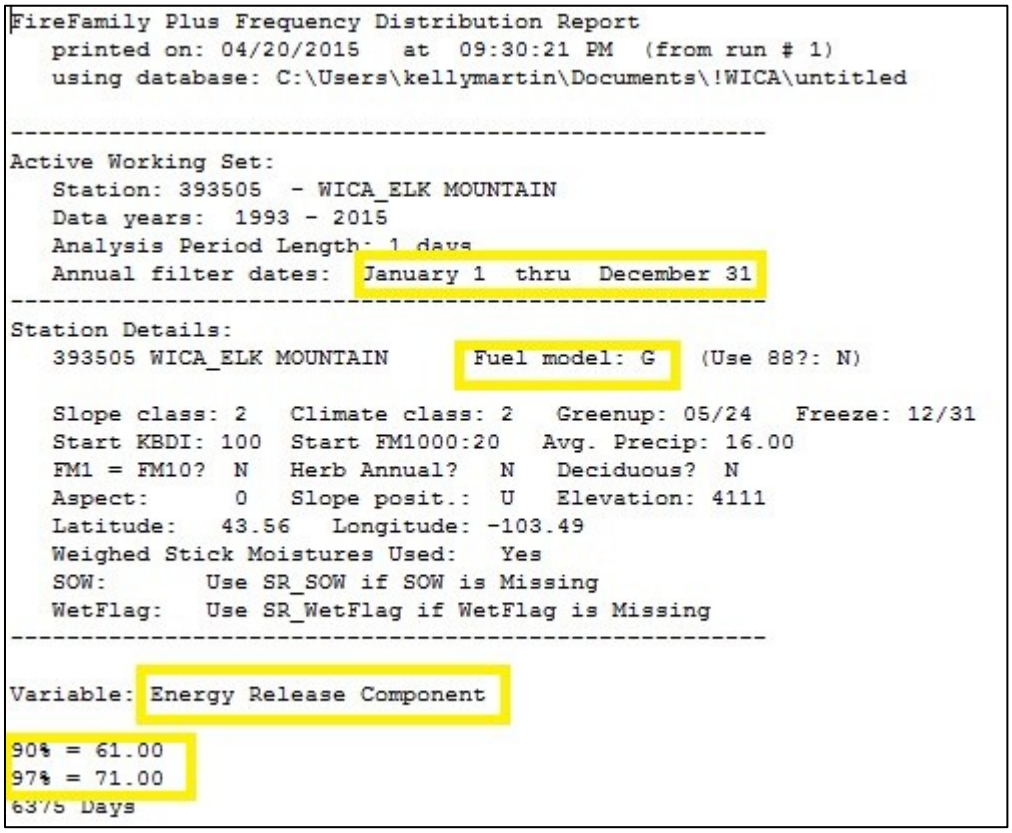


Figure 4

Fuel Model G (**Figure 5**)

- A heavy dead and down fuel model combined with an Energy Release Component (ERC) is an excellent choice for tracking longer term drought and drying trends. The park is encouraged to continue to use this combination as a stable gauge of seasonal severity and situational awareness.

- It is unknown when the last revision was made to the Fuel Model G ERC breakpoints. Current breakpoints in WIMS are set to the 90th percentile as 57 and a 97th percential at 68. A more recent run in Fire FamilyPlus determines the 90th percentile to be 61 and the 97th percentile to be 71.



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FireFamily Plus Frequency Distribution Report
   printed on: 04/20/2015   at  09:30:21 PM  (from run # 1)
   using database: C:\Users\kellymartin\Documents\!WICA\untitled

-------------------------------------------------------
Active Working Set:
   Station: 393505  - WICA_ELK MOUNTAIN
   Data years:  1993 - 2015
   Analysis Period Length: 1 days
   Annual filter dates:  January 1  thru  December 31
-------------------------------------------------------
Station Details:
   393505 WICA_ELK MOUNTAIN      Fuel model: G   (Use 88?: N)

   Slope class: 2   Climate class: 2   Greenup: 05/24   Freeze: 12/31
   Start KBDI: 100  Start FM1000:20   Avg. Precip: 16.00
   FM1 = FM10?  N   Herb Annual?   N   Deciduous?  N
   Aspect:      0   Slope posit.:  U   Elevation: 4111
   Latitude:   43.56   Longitude: -103.49
   Weighed Stick Moistures Used:   Yes
   SOW:       Use SR_SOW if SOW is Missing
   WetFlag:   Use SR_WetFlag if WetFlag is Missing
-------------------------------------------------------

Variable: Energy Release Component

90% = 61.00
97% = 71.00
6375 Days
```

Figure 5

Recommendations:

Regional support for station maintenance

With a large and regular prescribed fire program at WICA, it is recommended that the park and region continue to support the operation and maintenance of the Elk Mountain RAWS station. Some Regions maintain a list of NPS owned stations and are able to contact each park unit to ensure compliance.

Station Documentation

The station owner has the ability to use the station comment block to document sensor changes, breakpoint changes, pre-green (1978 model) and green-up. The last known entry to the catalog looks to be 2005. Taking this small step will ensure high data integrity when needed for determining accurate fire danger ratings throughout the year. It is therefore recommended that the data manager for the station uses the station block to document relevant information.

Year round NDFRS and/or use during prescribed fire season

Due to the fact that WICA has the potential to complete prescribed burning early in the spring and late in the fall, the primary dispatch center should be able to provide NFDRS ratings to the FMOs and

firefighters, which will in turn help with situational awareness on seasonal severity. With some vetting, NFDRS ratings can also be used to support desired fire behavior predictions in the prescribed fire plan, affirming resource management objectives (too cool /low fire danger) and resource objectives won't be met; conversely burning too hot to increase mortality to meet a higher resource management objective may challenge containment efforts. This delicate balance between meeting resource objectives and containment objectives can be enhanced using NFDRS to validate seasonal and day-to-day severity. (**Figure 6**)

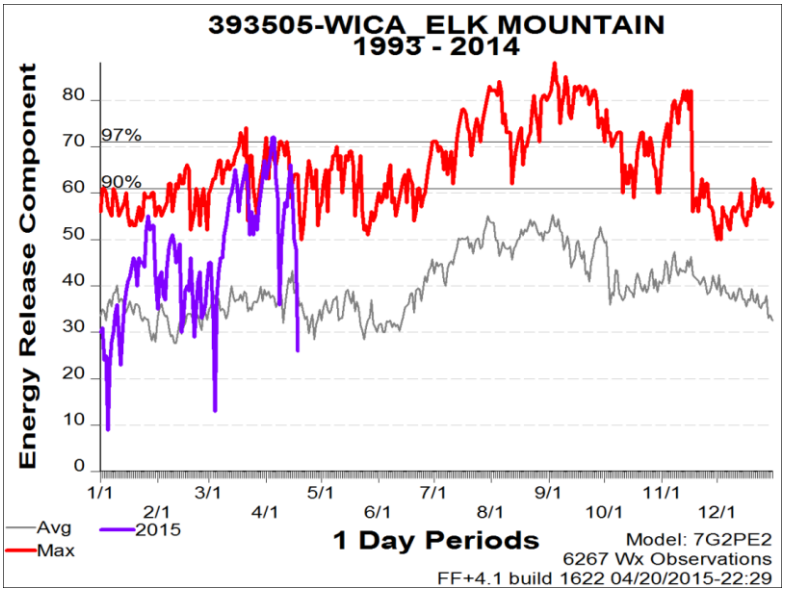


Figure 6

<u>An analysis of the prescribed fire plan for consistency with agency policy and guidance related to prescribed fire planning and implementation.</u>

A review of the Cold Brook Project Area Prescribed Fire Plan was conducted. All elements of the plan were found to be consistent with existing agency policy and the Interagency Prescribed Fire Planning and Implementation Procedures Guide (April 2014).

The prescribed fire plan was written for the Cold Brook Project Area. (**Figure 7**) This project area encompasses 2,199 acres. The Cold Brook Project Area is broken into three ignition units; Units 1, 2 and 3. Unit 1 is 1070 acres and lies on the north portion of the project area. Unit 2 is 1,000 acres and lies in the middle of the project area. Unit 3 is 129 acres and lies in the south-eastern corner of the project area.

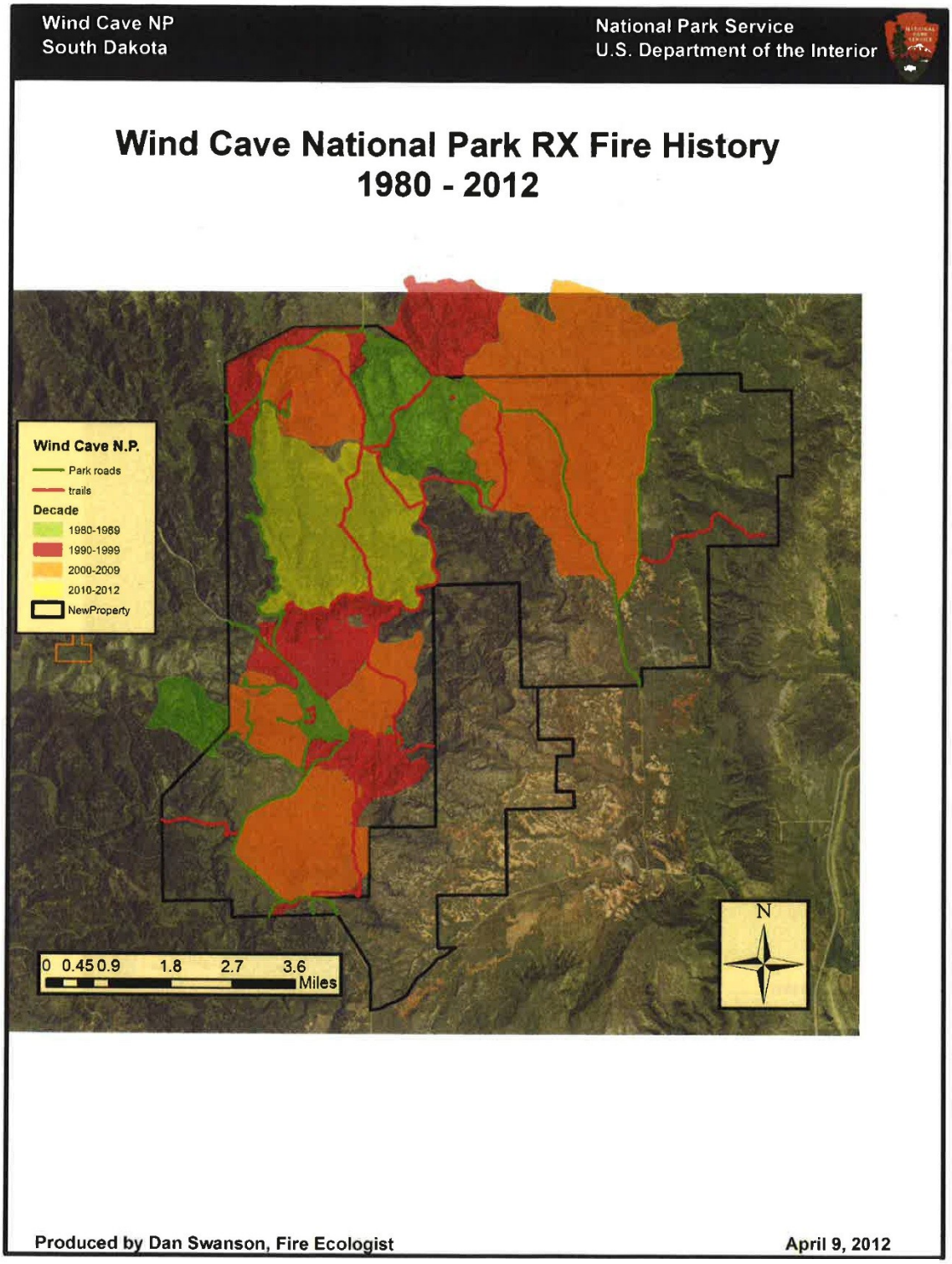


Figure 7: Map of the Cold Brook Project Area and burn history from 1980 to 2012

Ignition units 1 and 3 were implemented successfully in October of 2014. Implementing these two ignition units provided secure boundaries for a portion of ignition unit 2.

An amendment was written, reviewed and approved for ignition unit 2, reducing the number of required personnel from 52 to 30. The justification provided in that amendment was the length of perimeter to secure was less than if the entire project area was implemented at one time with the implementation of ignition units 1 and 3 in the fall of 2014. The prescribed fire plan did not include separate staffing organizations for separate ignition units, except ignition unit 3. The amendment was written by the Fire Management Officer, reviewed by Regional Office Fire Management Staff and approved by the Acting Superintendent. The NPS Midwest Region has additional requirements beyond what is required in the Interagency Prescribed Fire Planning and Implementation Guide, an Adequate Holding Resources Worksheet. The intent of this worksheet is to guide the prescribed fire plan preparer in determining minimum holding capability needed for a specific project. A new Adequate Holding Resources Worksheet was completed by the unit Fire Management Officer to match the new organization listed in the amendment. There were 38 individuals assigned to the implementation of the ignition unit on April 13th, exceeding the minimum listed in the approved amendment organization.

The Cold Brook Project Area Prescribed Fire Plan's summary complexity rating given was a Moderate Complexity project. One element in the Cold Brook Project Area Prescribed Fire Plan Complexity Element received a final rating of High. This was Element 6, in Risk category. A high preliminary and final rating was given due primarily size of the organization requiring certain expertise in critical positions. The final rating in the Technical Difficulty category of Element 6 was reduced to low based on; "All critical overhead positions will be filled with locally familiar personnel. There (is) strong interagency cooperation among agencies and each is very familiar with the other organization." All overhead positions on the organizational chart of the Cold Brook Ignition Unit 2 Incident Action Plan; including the RXB2, RXB2(t), both TFLDs and both FIRBs were either from the local area, had experience burning at Wind Cave National Park or burning in the local area.

The Cold Brook Prescribed Fire Plan was written in April of 2014 by WICA fire management staff. The prescribed fire plan received a Technical Review by a qualified NPS Fire Management Officer outside the WICA NP organization. The prescribed fire plan also received an additional review by the NPS Midwest Regional Office fire management staff. The prescribed fire plan was revalidated by the Agency Administrator on April 13, 2015.

The conversion of the Cold Brook prescribed fire to a wildfire followed procedures outlined in the approved prescribed fire plan, with required contacts and actions being made.

An analysis of the prescribed fire plan for consistency with the prescription, actions, and procedures in the prescribed fire plan.

The fire personnel at WICA stated that the month of March seemed warmer than most spring seasons. As such, managers felt they might have a window to complete a prescribed fire given these unusually dry conditions. A condition of burning in the spring is the onset of green-up where the grass is just beginning to sprout due to an increase in soil temperature. Due to the warm spring and prior to green-up the decision was made to attempt a 1,000 acre prescribed fire unit. Using a fuel model G (heavy down and dead to determine the dryness of heavier fuels) and ERC, the previous graph (**Figure 6**) validates this warming trend throughout March and into the beginning of April of 2015. This analysis confirms what local fire managers surmised; a prescription window that was dry enough to meet resource objectives. What is less obvious from this data is the effect wind also plays on increasing fire danger.

Analyzing Fuel Model C (pine/savannah fuel type) with a burning index as the primary NFDRS index (**Figure 8**) the correlation to an increase in fire danger occurred on April 14 where the fire danger rating nearly tied the 20 year high threshold for that date in time. The National Weather Service upgraded the Fire Weather watch to a Red Flag warning on the afternoon of April 13th. The warning was issued for the morning of April 14th.

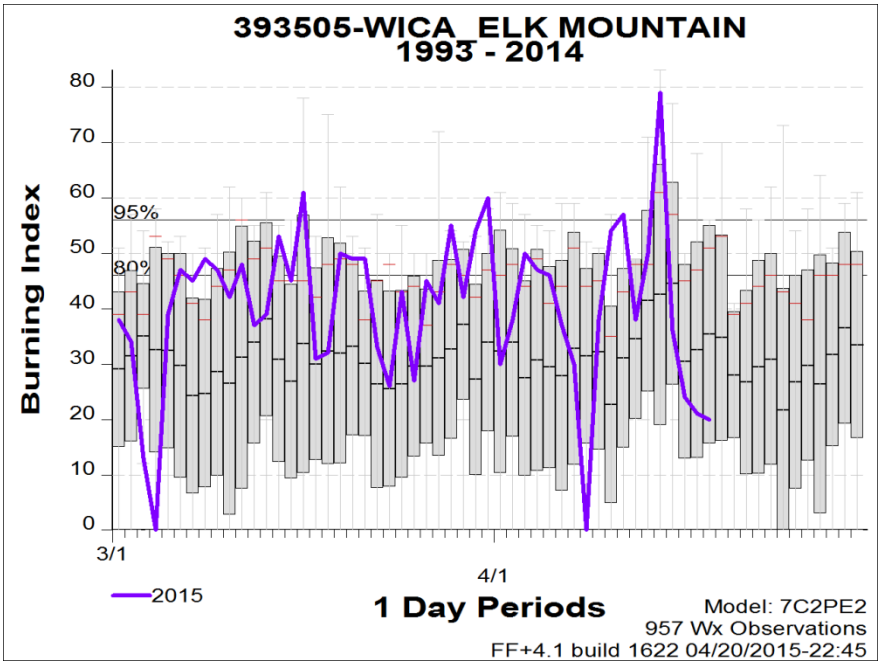


Figure 8

This Red Flag Warning is confirmed by the data that was collected at the WICA RAWS site. High, sustained wind speeds began at 1000 on April 14th and registered between 12 and 22 mph between the times of 1000 and persisted through 0300 on April 15th. (**Figure 8**)

During the ignition of the prescribed fire on April 13th, wind speed (**Figure 9**) was well within the prescription parameters of the prescribed fire plan. This documentation should suffice to validate that the prescribed fire was not ignited during this period of significant high winds that occurred on April 14th. This station information is corroborated by onsite weather observations that were taken by the Fire Effects Monitor (FEMO).

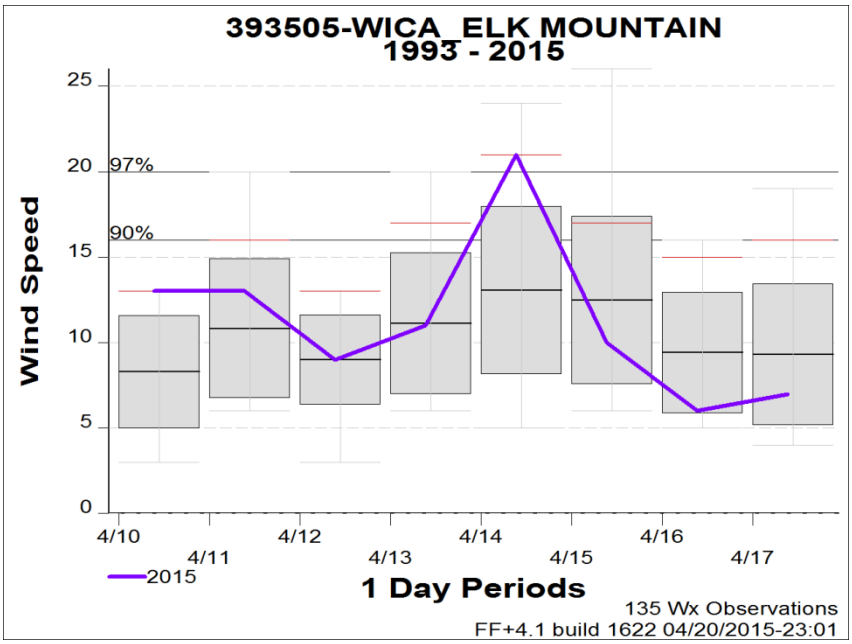


Figure 9

Commendations

The ignition of the prescribed fire was within the prescription parameters set forth in the prescribed fire plan, it was not ignited during a fire weather watch or warning and the burn was expected to be completed prior to the next day, April 14th. The fire management personnel assigned to the prescribed fire were aware of the approaching cold front with high winds the following day on April 14th. Once the fire escaped containment lines on the afternoon of April 13th, fire personnel were quick to develop contingency actions to contain the fire over the course of the following 24 hours prior to the arrival of high winds. This local knowledge of secondary containment opportunities and the ability to complete firing and black lining on the night of April 13th and the early morning of April 14th of these secondary containment lines likely contained significant additional fire spread that could have occurred during red flag conditions on April 14th.

The approving agency administrator's qualifications, experience, and involvement

The Agency Administrator completed the required Agency Administrator training, Fire Management Leadership, in 2009. The Agency Administrator has been at WICA since 2005, where 14 individual ignition units has been implemented. The Agency Administrator has been on detail to the Regional Office since 2014, but returned to WICA NP specifically to be on scene during implementation of this

ignition unit. The Agency Administrator did sign the Cold Brook Prescribed Fire Plan and Agency Administrator Go-No Go. An acting Agency Administrator signed the amendment. The Agency Administrator was involved from the planning phase to implementation phase of all ignition units of this project area. The Agency Administrator participated in the morning briefing and was on scene during implementation of the prescribed fire and subsequent conversion to an escaped prescribed fire.

The qualifications of key personnel

Qualification/Assignment	Qualified/Current		Remarks
	Yes	No	
Agency Administrator	X		Completed FML (National)
Fire Management Officer	X		
Prescribed Fire Burn Boss (RXB2)	X		
Prescribed Fire Burn Boss (RXB2), Trainee	X		
Taskforce Leader (TFLD), East Side	X		
Taskforce Leader (TFLD), West Side		X	Less physical fitness, expired April 9, 2015
Firing Boss (FIRB), East Side	X		Also qualified ATVO.
Firing Boss (FIRB), West Side	X		
UTV Operator 1 (ATVO)	X		Agency Certification
UTV Operator 2 (ATVO)	X		Agency Certification
Engine Boss 1 (ENGB) , East Side	X		
Engine Boss 2 (ENGB), East Side	X		

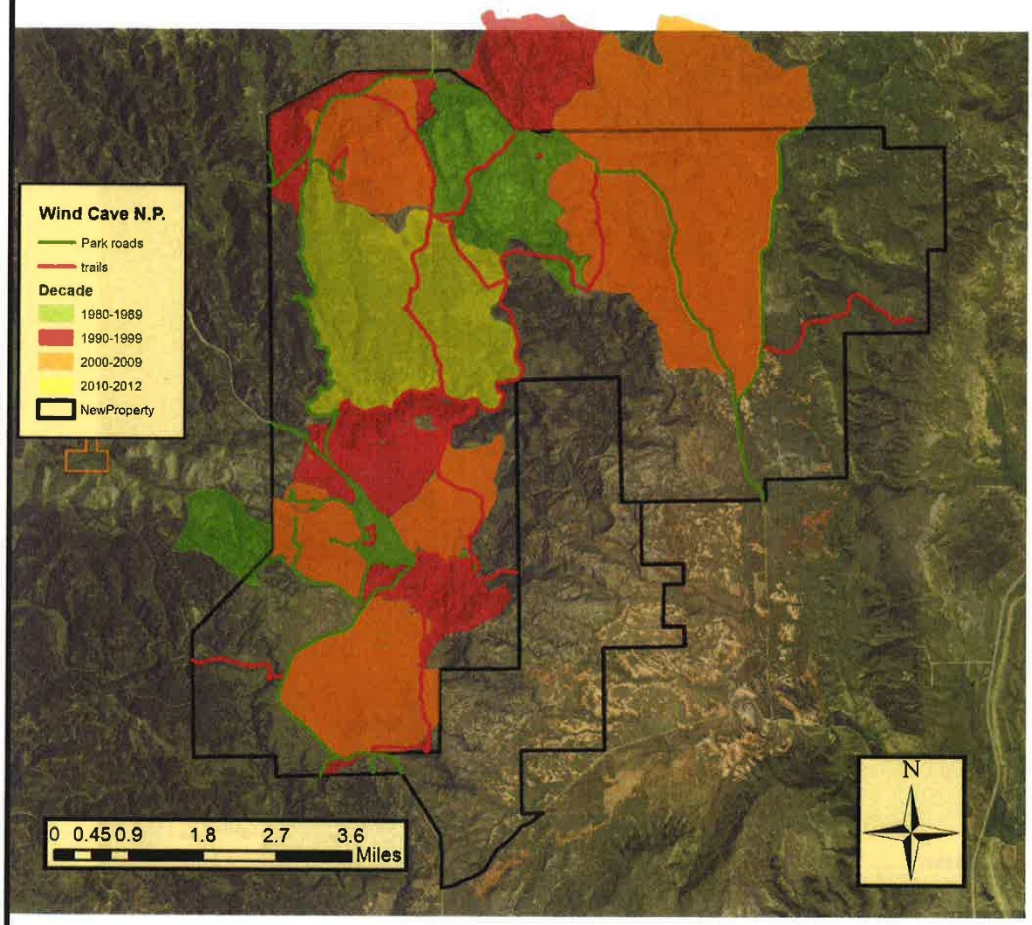
Appendix Two

Maps

Wind Cave NP
South Dakota

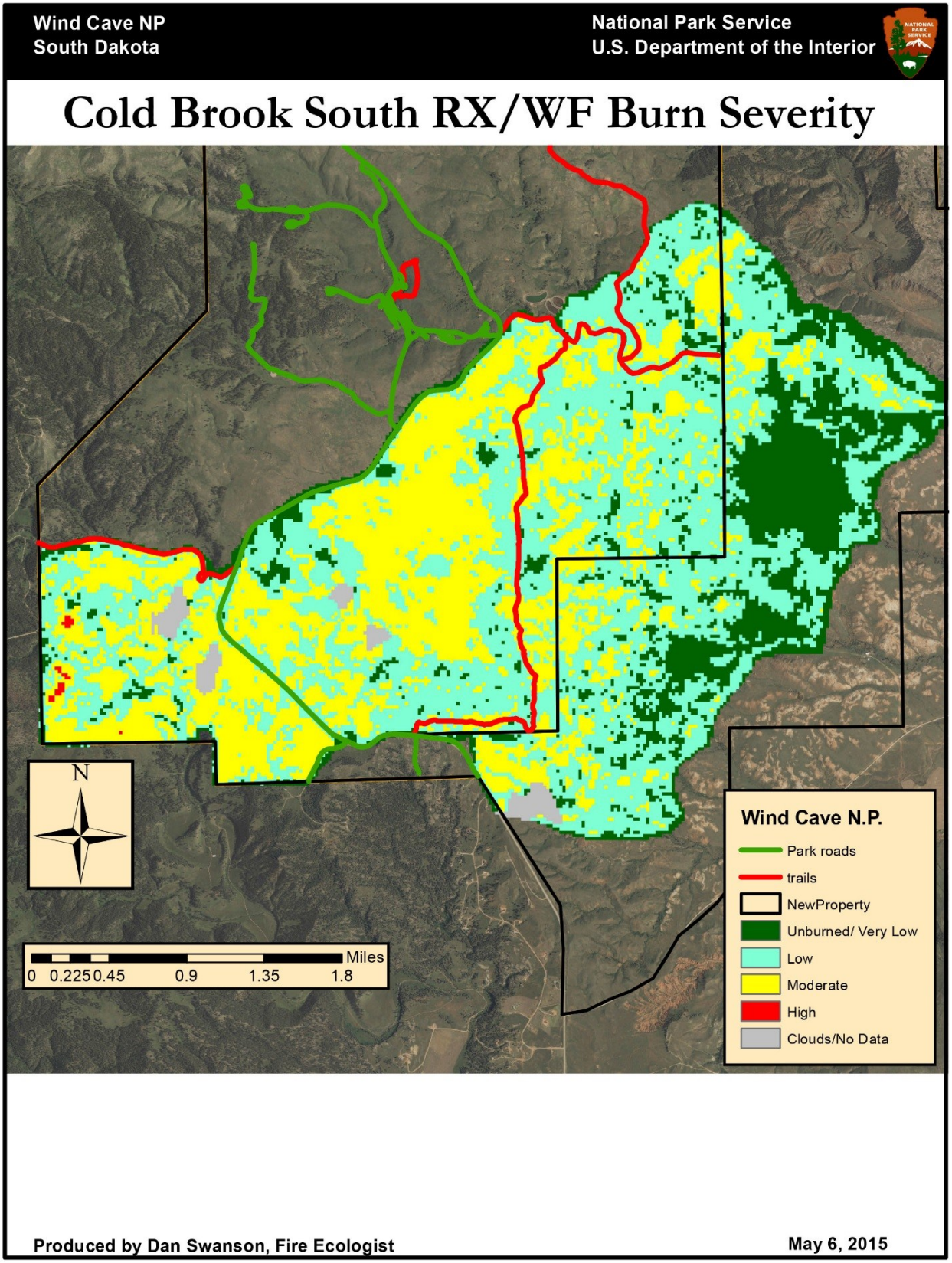
National Park Service
U.S. Department of the Interior

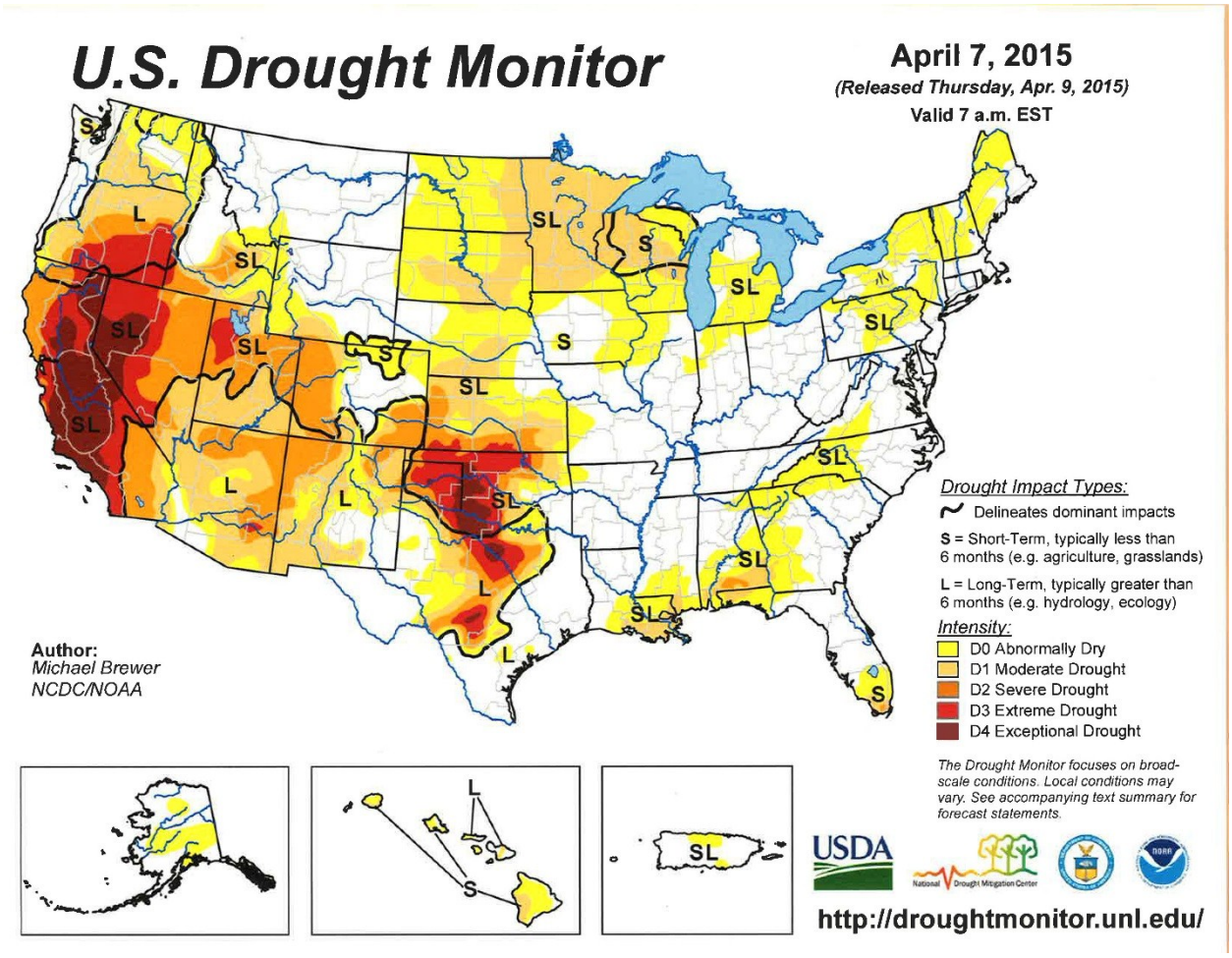
Wind Cave National Park RX Fire History
1980 - 2012



Produced by Dan Swanson, Fire Ecologist

April 9, 2012


Wind Cave NP
South Dakota
National Park Service
U.S. Department of the Interior
Cold Brook South RX/WF Burn Severity
N
Miles
0 0.225 0.45 0.9 1.35 1.8
Wind Cave N.P.
Park roads
trails
NewProperty
Unburned/ Very Low
Low
Moderate
High
Clouds/No Data
Produced by Dan Swanson, Fire Ecologist
May 6, 2015


U.S. Drought Monitor
April 7, 2015
(Released Thursday, Apr. 9, 2015)
Valid 7 a.m. EST
Author:
Michael Brewer
NCDC/NOAA
Drought Impact Types:
Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
USDA
National Drought Mitigation Center
http://droughtmonitor.unl.edu/

Appendix Three

Equipment Recommendations

OVERALL PROBLEM/OBJECTIVE STATEMENT (*Describe the problem, how the work is currently being done, and why improvement is needed*):

There are a number of different industry standards; ANSI/SVIA-1-2010, SAE J2258 Light Utility Vehicle 2010-12-08, ANSI/ROHVA 1-2011, and ANSI/OPEI B71.9-2012 Standard for Multipurpose Off-Highway Utility Vehicles for a variety of vehicle types, known generally as all-terrain vehicles (ATVs), utility-terrain vehicles (UTVs), light utility vehicles or off-highway vehicles (OHVs). For the purpose of this project proposal these will be referred to as Motorized Off-Highway Vehicles (OHV).

OHVs are;

- motorized,
- operator-controlled
- designed to travel on four or more tires
- not generally legal for operation on public highways

OHV use is increasingly prevalent on wildland fires. This mobile equipment is procured locally with decisions on type, size, and configuration left to the end-user. In addition, after procurement OHVs are often modified with the addition of manufacturer provided and/or third-party after-market accessories. Currently, there is not an equipment standard which OHVs used in wildland fire applications are required to meet.

This standard would;

- clarify names, definitions and requirements by type
- include the requirement to comply with a designated industry standard(s)
- provide minimum and maximum performance requirements
- supplement the standard with more restrictive requirements as necessary
- guide safe addition and/or modification of accessories

PROPOSED TECHNOLOGY & DEVELOPMENT WORK (*Describe your concept of the end product, such as a new equipment design, a Power Point presentation, a video, a handbook, Web site, CD, etc.):*

The proposed work for the Technology and Development program is;

- Research safety reviews and accident investigation to determine potential equipment related issues which have contributed to accidents, injuries or near misses from OHV utilization during wildand fire operations.
- Develop a wildland fire standard for equipment, configuration and performance requirement of motorized off-highway vehicles (OHVs) which augments industry standard(s) in order to ensure safe equipment configuration for use in the fire environment. The standard may include but is not limited to;
    - additional testing requirements
    - mandatory safety equipment additions
    - optical/audible or reflective warning devices

- limitations or requirements for equipment modification or alteration
- more restrictive accessory selection and/or mounting or minimum/maximum performance parameters
- reductions in maximum carrying capacity

POTENTIAL BENEFITS (*Describe how this project will reduce cost, save time, improve safety, increase efficiency, or provide resource management.*

The principal benefit of an OHV wildand fire equipment standard is safety for the operator, passengers and other personnel engaged in wildand fire operations. Additional benefits are clarifying terminology, cost savings, and standardized performance expectations for the variety of make and models of OHVs which are utilized in wildland fire operations.

Appendix Four

Supporting Documents

Figure 1 – Fire Weather Observations recorded by Fire Effects Monitor

FIRE WEATHER OBSERVATIONS

INTERAGENCY FIRE USE MODULE HANDBOOK

FIRE NAME: Cold Brook RX   DATE: 4/13/15   OBSERVERS: DJS

TIME	LOCATION	ELEVATION	ASPECT	SLOPE	DRY BULB	WET BULB	RELATIVE HUMIDITY	DEW POINT	WIND SPEED (GUSTS)	WIND DIRECTION	% CLOUD COVER	% SHADING	FINE DEAD FUEL MOISTURE	PROB. OF IGNITION	COMMENTS (PRECIP, FIRE BEHAVIOR, SMOKE, ETC) All shading throughout day was due to Tree canopy.
0835	DP 15 C.B.T.H	4240'	S	10	46	35	33	18	2(3)	NW	0	50	5+4 9	30	Test burn @0850 Test burn successful @ 1000
1000	Ridge South of D.P.4	4350'	S	5	52.5	40	33	24	2(4)	ENE	0	50	5+2 7	40	Ig. begins on Ridge S of DP4 @ 1010 w. ig. team starts South @ 1023
1100	N. of DP5 @ W.P.1	4240'	S	10	54	40	28	22	2(5)	S	0	50	5+2 7	40	Fire pulling off line well.
1200	Halfway B/W DP5+6 @W.P.2	4290'	SW	10	58	42	25	22	1(3)	W	0	30	5+1 6	50	4-5 acre spot fire E. ignition - 12 B/W DP13+14
1325	W.P 3 (J3)	4220'	S	5	60	43	23	22	9(13)	SW	0	50	4+1 5	60	Declared w.f. @ 1325
1415	W.P.4 SW corner of J4	4190'	S	5	60	43	23	22	5(8)	WSW	0	20	4+1 5	60	
1500	W. of DP7 @ W.P.5	4150'	S	5	64	45	21	23	4(6)	SW	0	0	4+1 5	60	RX unit tied in @ 1535
1615	DP8	4070'	S	5	64	45	21	23	3(6)	W	0	0	4+2 6	50	
1800	N. of DP8 ≈100m	4100'	SSW	3	63	44	20	21	3(5)	W	0	50	4+4 8	40	
1900	N. of DP8 ≈100m	4100'	SSW	3	60	43	23	22	calm		0	80	4+5 9	30	

MAX TEMP: 64°   MIN TEMP: 46°   MAX RH: 33%   MIN RH: 21%

TIME OF MAX TEMP: 1500 & 1615   TIME OF MIN TEMP: 0835   TIME OF MAX RH: 0835 & 1000   TIME OF MIN RH: 1800

Figure 2 – Fire Behavior Observations recorded by Fire Effects Monitor

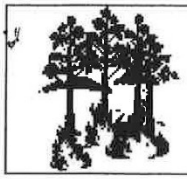
FIRE BEHAVIOR OBSERVATIONS

INTERAGENCY FIRE USE MODULE HANDBOOK

FIRE NAME: Cold Brook | DATE: 4/13/15 | OBSERVERS: DJS

TIME	LOCATION	ELEVATION	ASPECT	SLOPE	FIRE TYPE (B/F/H)	FLAME LENGTH	FLAME ZONE DEPTH	ROS	PRIMARY CARRIER	FUEL MODEL	COMMENTS
0905	DP15	4300	N	30	F	6"-1'	6"	1	G	2	
1045	B/w DP4&5	4350			H	1-2'	2-3'	15	G	2	
1142	S. of DP5	4350	E	10	H	2-3'	4'	8	N	2	Needlecast fuel carrier
(I1) 1215-1225	Interior 50-100 yds c Halfway b/w DP5&6	4290	SW	15	—	—	—	—	N	9	single-tree & group tree torching
1530	DP8	4070	SW	15	H	4-6'	8'	50	G	2	Head fire rapidly moving, interior from control line

Figure 3 – Smoke Observations recorded by Fire Effects Monitor



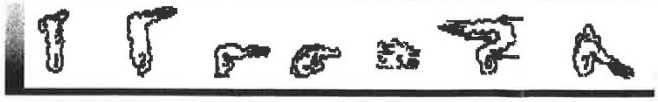
SMOKE OBSERVATION SHEET

INTERAGENCY FIRE USE MODULE HANDBOOK

FIRE NAME: Cold Brook 4/13/15

OBSERVERS: DJS

DATE	TIME	OBSERVER LOCATION AND ELEVATION	WIND SPEED & DIRECTION	ELEVATION OF SMOKE COLUMN ABOVE GROUND	SMOKE COLUMN DIRECTION	APPROX. ELEVATION OF SMOKE INVERSION LAYER ABOVE GROUND	OTHER OBSERVATIONS*
4/13	0905	DP 15	H. Variable	500'	SE	—	
	1040	Blw DP 4&5	SSW 3 (5)	1000'	NE	—	
	1200	I-1 W.P.2 Halfway b/w DP 5&6	W 1 (3)	1200'	NE	/	
	1320	J2/K2	SW 9 (13)	2500'	NE	—	
	1510	DP 8	WSW 5 (7)	2500'	ENE	/	
	1630	DP 8	W 3 (6)	300'	NE	—	



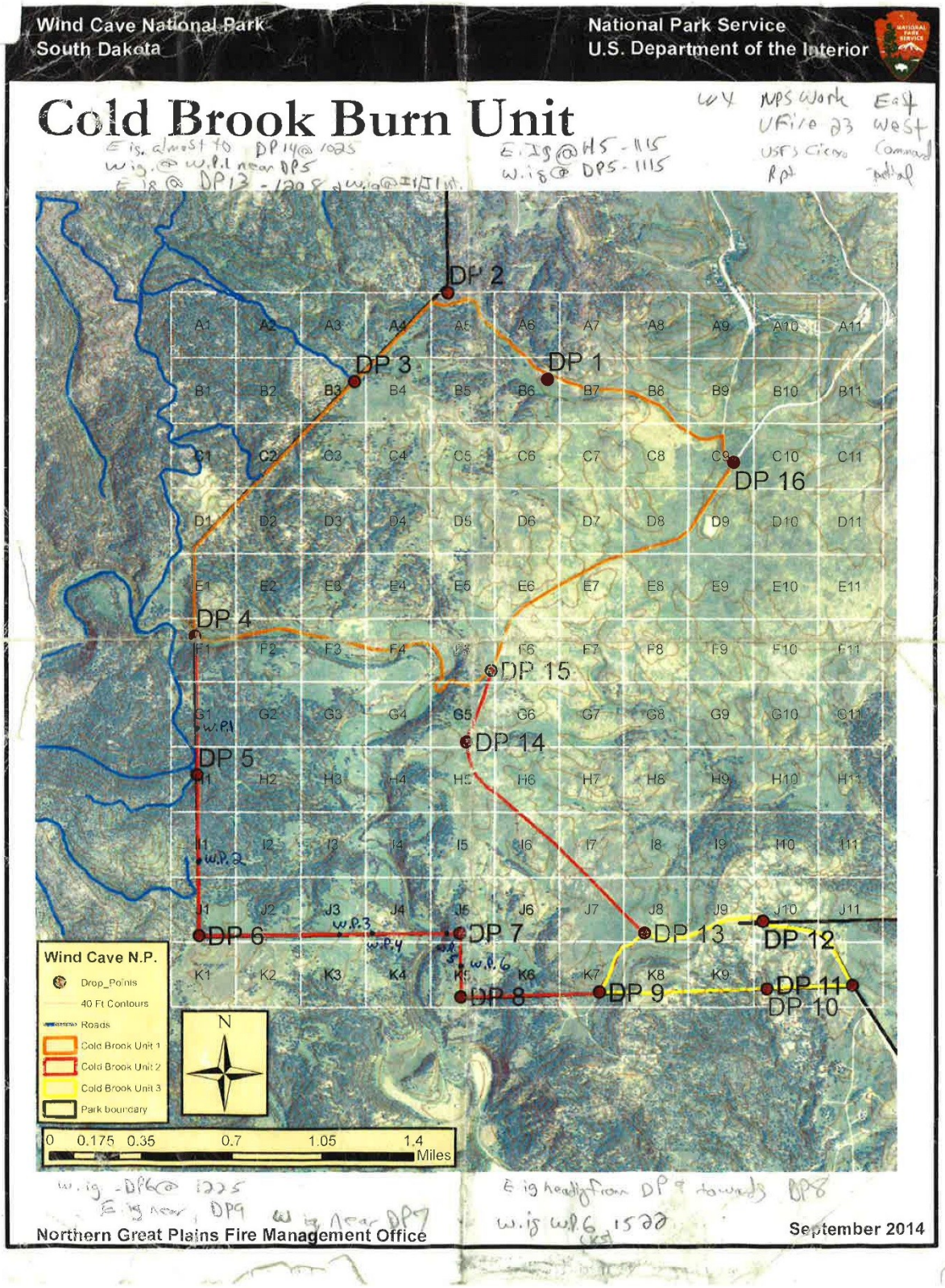
*VISIBILITY, VOLUME, COLOR, PLUME TYPE, INVERSION STATUS, VISIBILITY TO SIGHTED DISTANCE, SMOKE SENSITIVE RESOURCES

SMOKE SENSITIVE AREAS: _____

_____

FORECASTED TRANSPORT WINDS: _____

HAINES INDEX: _____


Wind Cave National Park
South Dakota
National Park Service
U.S. Department of the Interior
Cold Brook Burn Unit
DP 1
DP 2
DP 3
DP 4
DP 5
DP 6
DP 7
DP 8
DP 9
DP 10
DP 11
DP 12
DP 13
DP 14
DP 15
DP 16
W.P. 1
W.P. 2
W.P. 3
W.P. 4
W.P. 5
W.P. 6
Wind Cave N.P.
Drop_Points
40 Ft Contours
Roads
Cold Brook Unit 1
Cold Brook Unit 2
Cold Brook Unit 3
Park boundary
N
0 0.175 0.35 0.7 1.05 1.4
Miles
Northern Great Plains Fire Management Office
September 2014

After Action Reviews

Conducting Effective After Actions Reviews (AARs)

- After Action Evaluations are critical learning tools for all members of the fireline.

Objectives

Consider the objectives defined in the briefing prior to the burn and in the plan itself. Are these being met?

This should be measured from the start of ignitions. The purpose of the test fire is to determine if under the current conditions objectives can be met. It is important for FIRB and RXB2 to understand that pressure to conduct a burn should not influence their decisions. As conditions change throughout the day re-evaluate if objectives can still be met or if parameters have changed too significantly.

Mindfulness should be the focus of your assessment, conditions are always changing and you must be aware of those elements that are developing differently than originally anticipated and consider how they are affecting the situation.

Situational Awareness

What unexpected events have occurred?

"There were no indications that anything might go wrong." –from Information Collection Team Interviews

How are these unexpected events affecting the burn/personnel/public?

Can/have the unexpected events be mitigated or are they continuing to compound on each other leading to a potentially greater situation that may have more complexity?
Is there good leadership?

Listen to the concerns of the individuals assigned to the burn. Consider that if a lower level firefighter feels uncomfortable expressing themselves in a group that this may manifest as grumbling regarding perceived inadequacies or issues with the burn. Encourage this individual to voice these concerns to you as the RXB2 or the FIRB and acknowledge their concerns.

Don't let problems overwhelm and absorb all focus. This may affect the execution of the mission.

Assess how individuals are handling their roles.

Consider response of individuals to situations that have developed, reactions can be easy to ignore or for one to think that person is simply overreacting. Even if an individual is overreacting with their concerns it may speak to their ability to handle or respond to a larger problem (i.e. escape). They may have the qualifications for the job on their redcard but not the experience or comfort level to handle necessary tasks.

Are we operating on automatic pilot, situation normal?

This situation can develop on home units where crews have worked together for a long time where there is little variation or change to the unit plans or fuel types. This problem can also develop if crews operate under "situation normal" where even when things present a problem it is dismissed under the premise of business as usual.

If most, or at least several, of the individuals on the burn have burned the same unit multiple times a level of complacency can creep into the operation. Consider that the same unit may perhaps have the same control lines as in the past and present the same fuel types but no situation can be 100% identical to the last time. One key element that may have changed is existing weather conditions, perhaps the area has been in extended drought which can affect the response of the fuels.

Does anyone feel that "suspicion" that something is out of place or that something important is being overlooked?

Never assume that issues that are of concern will take care of themselves.
When determining something is amiss how will it will be mitigated?

Leadership

As a leader are you seeking input from all individuals on the burn?
What response was implemented if a resource assigned to the burn became unavailable?
How is this experience comparing with past burns (i.e. comfort level, organization, ease of burn etc)?

High Reliability Organization: Mindfulness

Track small failures
Resist oversimplification
Remain sensitive to operations
Maintain capabilities for resilience
Take advantage of shifting locations of expertise

Problems that develop on a burn can continue to compound and have a cumulative effect which may affect the successful outcome of the burn.

Track lessons learned on the ICS 214 Unit Log and include in the burn documentation.

After Action Reviews

Called the rollup AAR*, it intends to bridge the standard AAR with HRO for more effective and useful information. Increase mindfulness during this peer review process.

Consider using these questions instead of the four standard IRPG questions (or adding these, depending on the time):

1. What was the most notable success during the incident that others can learn from?
2. What were some of the most difficult challenges faced and how were they overcome?
3. What changes, additions, or deletions from the plan are recommended?
4. What issues were not resolved and need further review or discussion in your recommendation?

* Dr. Karl E. Weick and Dr. Kathleen M. Sutcliffe in their book *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*.

Another way to look at the 4 basic questions:

1. What was planned?
    a. What was the leader's intent?
    b. What information were you provided?
    c. What did you feel was missing? What else would you like to have had?
2. What was the situation?
    a. What did you see?
    b. What were you aware of that you didn't see?
    c. What was simplified? Did we miss something by simplifying?
    d. Particularly address the new firefighters in the group and ask them what they saw for fire behavior on their section of line.
    e. Where were the weak points? This could be weak points on the line where the fire had possibility of escape or it could be weak points in the organization of the group. How were they mitigated?
    f. Was the big picture maintained and if so by whom and how?
3. What did you do?
    a. Why? What affect did your actions have on the outcome of the day?
    b. What didn't you do?
    c. What could have been done differently?
    d. What was your responsibility? What is it clearly stated to you in the briefing?

4. What did you learn?
    a. What might you do differently next time?
    b. What lessons did you learn for when you are in the decision making positions?
    c. What can we learn as an organization?
    d. At any point was the team stretched and if so how well did they respond and have the ability to bounce back?

All this is aimed at increasing awareness of details and the bigger picture. Reference your "Bigger Picture" checklist throughout the burn in order to maintain your situational awareness and in order to implement issues that were discusses in previous AAR's.

Appendix Five

Interagency Communication and Comment

Appendix Five: Interagency Communication and Comment

Interagency relationships are vital to the success of any single agency's prescribed fire program, both in planning and implementation. During the planning for the burn, communication with Interagency partners is necessary to develop many elements of the plan, such as the prescription parameters for both weather and fire behavior, and the contingency plan. In the implementation of the burn, thirty-eight personnel from two National Forests, seven National Park units in four states, U.S. Fish & Wildlife Service and a local fire department were involved.

Due to the importance of Interagency involvement, interviews were conducted with cooperators, including: National Weather Service staff from the Forecast Office in Rapid City; Great Plains Interagency Dispatch Center staff; South Dakota Department of Agriculture, Wildland Fire Division personnel in both the central office in Rapid City and at Custer State Park; and USFS personnel from the Black Hills National Forest and Nebraska National Forest.

Interagency support for the prescribed fire program at Wind Cave National Park is strong, and the lead interviewer stated she heard "a tremendous amount of support" in the interviews she conducted. It is of note that the Great Plains Interagency Dispatch Center was one of the first in the nation to fully support not only Federal agencies, but the state of South Dakota as well, beginning in 2003. Since the Center serves as the central ordering point all agencies, communication is streamlined, and resource availability is better known to all the partners.

It was apparent to all Team members that NPS staff has put a great deal of effort into the Interagency working relationships over the years and are considered professional partners.

All the local land management agencies use prescribed fire and value it as a tool to attain resource objectives. Most of the other agencies don't have objectives to attain mortality in ponderosa pine (it was noted that "timber is still king in the Hills") but they do understand why the park has those objectives and that it necessitates burning under a "hotter" prescription. As noted, several agencies provided personnel to implement the Cold Brook Prescribed Burn and Custer State Park (South Dakota Department of Agriculture/Wildland Fire Division) was conducting a burn the same day, in similar fuel types and conditions approximately 15 miles to the north.

National Weather Service staff at the Forecast Office in Rapid City verified that the spot weather forecast issued prior to burn implementation was favorable, and that when ignition began on April 13, only a Fire Weather Watch had been issued for the following day, April 14. The Fire Weather Watch was later upgraded to a Red Flag Warning, but having that information on a timely basis from the Forecast Office allowed the firefighters to make some operational decisions after the escape, including working crews through the night, to assure firelines were secured before the forecasted high winds occurred.

Though Interagency relationships are strong and support is good overall, the Team did observe one significant area that could be improved upon, in National Environmental Policy Act (NEPA) actions and planning for future prescribed burns, specifically between Wind Cave National Park and the Black Hills National Forest. During the dialogue portion of the FLA, concerns about potential escape on to National Forest and/or private lands on the west and south sides of the Unit were voiced and local firefighters were concerned enough about it that they did additional prep on those lines immediately prior to

ignition. These were the mowed lines running along the park boundary, to the inside of the bison fence. When firefighters were asked why they were trying to hold the fire to within the park boundary, in unfavorable terrain and fuels, rather than stepping back to Forest Service roads where accessing the burn with water-handling equipment would be simpler, the answer was often “NEPA”.

All Federal agencies are required to adhere to the National Environmental Policy Act, commonly referred to as NEPA, which analyzes environmental impacts of proposed management actions. In this case, the Fire Management Plan for Wind Cave National Park has undergone an Environmental Analysis (EA) and prescribed burn projects are covered under this “programmatic EA”. In the U.S. Forest Service, NEPA is usually done on a project basis, not programmatically, so each year, proposed projects are assigned to specialists who dedicate time to complete the NEPA analysis on each project. In order to implement the burn across agency boundary lines would, therefore, entail planning with the Forest well in advance (at least 1 year budget cycle) of a proposed burn, to assure the project was prioritized, funded and programmed into the Forest Workplan and the NEPA analysis was completed before Unit preparation and implementation was begun. While this does add significant time to the planning process, making the effort to assure that firefighters have the option of going outside the NPS boundary into both more favorable terrain and fuels would be worth it in terms of firefighter safety. Line Officers from both NPS and USFS are encouraged to develop an interagency agreement under the “Service First” authority so that NPS can fund the USFS specialists needed to complete the NEPA requirements on the Forest Service lands.