

Florida Division of Forestry



Blue Ribbon Fire

June 20, 2011

Hamilton County, Florida

Final Review

Team Members

Weldon W. Greene, Jr., Deputy Chief, Florida Division of Forestry (Team Leader)

Kasie Crowe, Division Safety Officer, Florida Division of Forestry

Shawn Duggar, Senior Forest Ranger, Florida Division of Forestry

Gary Jarvis, Fire Behavior Analyst, US Forest Service

Shane Barrow, Forest Ranger/Safety Officer, Georgia Forestry Commission

Chuck Schneider, Operations Administrator, Florida Division of Forestry

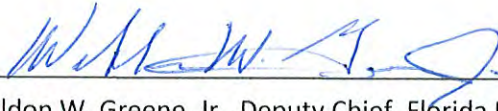
John Kern, Deputy Chief, Florida Division of Forestry

Bill Wentlandt, Assistant Superintendent, Office of State Fire Marshal

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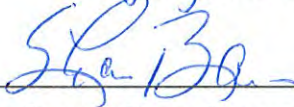
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Executive Summary

On June 20th, 2011, two Florida Division of Forestry (DOF) wildland firefighters lost their lives battling the Blue Ribbon Wildfire in Hamilton County, Florida. This wildfire began on June 16th, 2011 as a result of a lightning strike on private forest lands.

Members of the DOF's Suwannee Forestry Center (SFC) initially contained the wildfire on the afternoon of June 16th at eight acres. The wildfire was checked on June 17th and 18th by DOF firefighters. On June 19th, it was checked by a landowner representative. The fire escaped containment lines on the afternoon of June 20th. Nine DOF firefighters from the SFC and a DOF fixed wing aircraft flying in from an adjoining field unit began initial attack operations on the wildfire.

During the initial operating period of the breakout, a Type 3 open cab tractor/plow unit became stumped in a cutover (dry) pond. The Type 3 tractor/plow operator requested assistance and a second firefighter operating a Type 2 enclosed-cab tractor/plow unit immediately responded to assist. After a few minutes of attempted rescue the Type 2 tractor appears to have become blocked between numerous large stumps. As the wildfire approached, both operators abandoned their tractors; the operators were overtaken by fire and subsequently perished. Neither firefighter deployed a fire shelter. The enclosed cab tractor/plow was severely damaged by the fire and the open cab tractor sustained heat damage and extensive damage to the plow. Evidence indicates neither tractor was suitable for human sheltering at the time of the burn over.

Additionally, two other firefighters (one engine crewmember and a tractor/plow unit operator) received minor fire related injuries during their attempt to rescue the firefighters. Both injured firefighters were transported to area hospitals where they were treated and released later that evening.



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Introduction

State of Florida Fire Situation from January 1st to June 20th, 2011

Since a La Niña event began in the summer of 2010, rainfall in Florida had been well below normal. Nearly the entire state had been abnormally dry to some extent. In addition, multiple freeze events for the second winter in a row added to the available fuel load. Temperatures since the winter were well above normal, and combined with below normal rainfall resulted in dangerously low fuel moistures.

Wildfire activity during the spring of 2011 had been very high and ranked the eleventh highest active period on record for the state of Florida. As of 0800 hours on June 20th, 2011, Florida had 440 active fires burning on 118,887 acres across the state. Active federal fires in Florida included: the Oil Pad Complex on Big Cypress National Preserve, 10,510 acres, Impassable Bay fire on Osceola National Forest, 12,300 acres, and the Honey Prairie fire on the Okefenokee National Wildlife Refuge, 233,606 acres – this includes parts of Florida and southern Georgia.

During the period of January 1st through June 20th, 3,574 wildfires burned 196,452 acres on lands protected by DOF and 222 wildfires burned 56,589 acres on federal lands in Florida. Fire activity resulted in 28 counties enacting burn bans. Over 700 DOF firefighters and support personnel were engaged in fire suppression activities.

Drought conditions persisted into June making fires more difficult to control. Large fires throughout the state, including the 5,107 acre Espanola fire, the 6,500 acre Santa Fe fire, the 3,175 acre Badlands fire, the 2,397 acre Maytown Road fire, and the 68,295 acre Prairie fire required assistance from additional areas of the state. Wildland firefighters from the Florida Department of Environmental Protection (Florida Park Service), Florida Fish and Wildlife Conservation Commission, North Florida Water Management District, St. John's Water Management District, Southwest Florida Water Management District, the US Forest Service, the National Park Service and US Fish and Wildlife Service had been assisting on wildfires throughout the state. The DOF, US Forest Service, and the Florida Army National Guard provided air resources to assist with suppression activities.

The DOF (Red) Type 2 Incident Management Team was deployed to Flagler County on June 10th, 2011 to manage the Espanola fire as well as support extended attack operations for Flagler County. The Southeast Fire Compact was activated and fire resources were ordered from other states. Compact resources of engines and dozers were scarce and Florida was competing for resources with Texas, North Carolina and Georgia.

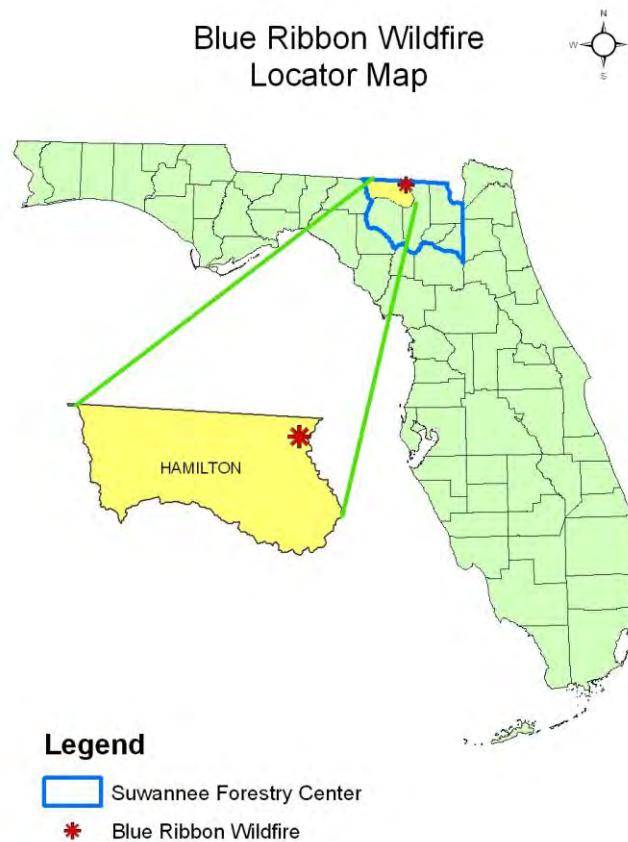
The Governor declared a state of emergency on June 13th, 2011 due to drought conditions and the increasing wildfire danger. "The **State of Florida, Office of the Governor, Executive Order Number 11-128** declares a State of Emergency due to the ongoing danger of wildfires and drought that continues to threaten the state of Florida. This order ensures state, regional, and local governments can take necessary actions to protect the lives and property of the people in threatened communities."

The DOF had restricted open burning authorizations for several weeks due to the high fire danger statewide. As a result of the high frequency of fire activity the Director of DOF cancelled all annual leave until July 1st or until the fire situation improved.

Impacts to the Suwannee Forestry Center

On June 20th, 2011, nearly the entire state was abnormally dry with Hamilton County experiencing high to extreme drought conditions. The Keetch-Byram Drought Index (KBDI) averaged 663 on a scale of 0 (saturated) to 800 (exceptionally dry). In addition, multiple freeze events for the second winter in a row added to the fuel load. Temperatures since the winter were well above normal, and combined with below normal rainfall resulted in dangerously low fuel moistures. The increased lightning activity in June led to an increased number of new fire starts. The number of lightning strikes in the general area of the SFC between June 6th and June 20th was 14,367.

In the previous months SFC fire personnel assisted other agencies and field units with various fires throughout Florida and southern Georgia. Fire crews from other field units and agencies were brought in to assist SFC with initial and extended attack. For the seven day period of June 14th – June 20th, SFC initial attack crews responded to an average of four new fires each day over their six county response area. SFC also worked an average of 23 ongoing fires a day for an average of 6,618 acres burned over the same seven day period. Dry swamps and heavy fuels made accessing and controlling fires difficult.



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Review Process

On June 21st, 2011, Mr. Jim Karels, Director of the Division of Forestry, activated an Interagency Review Team. Team members mobilized and arrived at the Columbia County Emergency Operations Center in Lake City, Florida the next day.

An in-briefing was conducted with the team to provide direction for the review process. At the conclusion of the meeting the team initiated the review with a site visit of the Blue Ribbon Fire. The team visited the Blue Ribbon Fire area on several other occasions during the review process.

Interviews with personnel associated with the Blue Ribbon Fire were conducted over the next several days. Interviews were documented and made part of the final review file. Numerous investigative elements, records, documents, and digital photographs were incorporated in this report including a fire behavior analysis, the influence of environmental factors, incident management procedures, control systems, personnel profiles of those involved, and equipment factors.

The review team also utilized DOF's experimental Asset Tracker System data records to corroborate the Fire Management Information System (FMIS) records and interview statements. More detailed information about the Asset Tracker System can be found in the Appendix.



The Blue Ribbon Fire breakout taken from the air on June 20th, 2011 at 1515 hours

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Narrative

On June 16th, 2011 at 1425 hours, DOF's SFC dispatch office was contacted by a landowner representative and advised of a fire that was approximately two acres in size and located one mile north of Highway 6, off of the Woodpecker Route on Cypress Creek Road. This is in Section 19, Township 2N, Range 16E in Hamilton County, FL. Initial responding units included two Type 3 tractor/plow units (one open cab and one enclosed cab) along with two supervisors. The Type 3 open cab tractor/plow unit along with one supervisor arrived on scene at 1443 hours and named the fire the "Blue Ribbon Fire". The Type 3 enclosed cab tractor/plow unit along with the second supervisor arrived at 1500 hours. The supervisor who arrived at 1443 hours assumed the role of Incident Commander (IC) and called the fire contained at 1511 hours after having burned a total of eight acres. Crews were released from the fire soon after, leaving the enclosed cab Type 3 tractor/plow unit to reinforce lines until releasing at 1735 hours.

A Type 4 Engine arrived on scene in the afternoon of each of the following two days, June 17th and 18th, to patrol and mop-up. No smokes were reported when the Type 4 Engine released at 1444 hours on June 18th. An engine patrol did not occur on June 19th; however, the fire was checked by the landowner representative and he stated during his interview that it "looked good".

On the following afternoon, June 20th, 2011, the landowner representative was checking fires in the area when he noticed a column of smoke in what he believed was the vicinity of the Blue Ribbon Fire from four days earlier, which he had checked the previous day. When he arrived, he realized that the Blue Ribbon Fire had broken out so he made contact with the SFC dispatch office around 1450 hours. At approximately this time a DOF fixed wing aircraft was conducting an aerial patrol of the area and saw the smoke column. The pilot noted that the breakout was about a half acre when he began circling the fire around 1505 hours. Two Type 6 Engines (E-1 and E-2) and two tractor/plow units - one Type 3 open cab unit (T/P-1) and one Type 2 enclosed cab unit (T/P-2) were in the area checking other fires and all were dispatched to be en route to the Blue Ribbon Fire. Shortly after, three additional tractor/plow units, all Type 2 enclosed cab units (T/P-3, T/P-4 and T/P-5) were dispatched to be en route.

E-1 (with one crewmember) arrived on scene at 1510 hours and assumed the role of IC. He began scouting and sizing up the fire, noticing the fire moving in a NNE direction but realized that the wind was switching as he scouted ahead and saw that the fire had spotted south of the center road (see Blue Ribbon Fire Map) while traveling from the origin to the east. The IC advised dispatch that the crews would be working on radio tactical channel (TAC) 190.

The first tractor/plow unit on scene was T/P-1 who arrived along with E-2 (two crewmembers – crewmember A and crewmember B). The engine crewmembers and the landowner representative assisted T/P-1 in unloading the unit. T/P-1 unloaded and began suppression efforts on the right flank. Personnel on the scene reported that T/P-2 arrived soon afterward. T/P-2 unloaded in the original burn area and first plowed firelines to protect the transport for T/P-1. He then caught several spot fires before tying in with T/P-1 on the right flank.

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E-1 (IC) and E-2 were scouting and serving as lookouts. The IC spoke with the landowner representative on scene who advised him of a cutover (dry) pond that the tractor/plow units should avoid. The IC relayed this information on TAC190. (Crews were unaware that there was more than one cutover (dry) pond – cutover (dry) pond #1, #2 and #3 – see Blue Ribbon Fire map)

Around 1519 hours, the IC updated dispatch that the breakout was now 5-8 acres and moving fast. Dispatch asked the IC if a helicopter was needed and he confirmed that it was needed. Upon hearing this, a supervisor facilitated the order of a contract helicopter and left the SFC Office en route to the Blue Ribbon Fire. Sometime later, the fixed wing aircraft was receiving some interference on TAC190 and asked the IC to make a frequency change. The IC asked the fixed wing aircraft which frequency was best for him and it was decided to switch to TAC199. (During interviews, the Review Team was informed that TAC199 is not a channel that is commonly used in this area and although all could switch to this channel on their mobile radios, some crews could not easily find this frequency in their portable radios)

Shortly after, T/P-3, T/P-4, and T/P-5 arrived and unloaded off of Cypress Creek Road. The IC advised them to tie in with T/P-1 and T/P-2 to continue work on the right flank, and that they would be working on TAC199. As they made their way to the right flank, the supervisor arrived and met with the initial IC at the loading deck (see Blue Ribbon Fire map). They had some conversation regarding tactics and both agreed to have all five tractor/plow units work in tandem. The supervisor took over the role of Incident Commander (IC-2).

All tractor plow units began working the right flank. Around 1550 hours, T/P-2 began to overheat and went into “limp mode” and soon after experienced steering problems. Two of the tractor/plow units (T/P-3 and T/P-4) secured T/P-2 by plowing firelines around the unit before continuing operations on the right flank working towards the east. IC-2 was updated regarding the status of T/P-2 and he advised T/P-2 to come back to the loading deck.

About the same time, T/P-1 transmitted on TAC199 but was unreadable. T/P-3 advised T/P-1 that his traffic was unreadable and to try again. T/P-1 relayed again and was clearly heard as saying “I’m stumped”. Traffic was relayed that assistance was coming. (Evidence shows that T/P-5 was moving rapidly towards T/P-1) T/P-5 began making his way into cutover (dry) pond #2 to assist T/P-1 around 1556 hours. (T/P-1 attempted to work across the eastern edge of cutover (dry) pond #2 while the other units were reinforcing the right flank) The fixed wing aircraft observed T/P-1 on the east side of cutover (dry) pond #2 as the fire was reaching the west side of the same cutover (dry) pond and moving to the east. The pilot attempted to contact T/P-1 to see how he was doing but never got a response. The pilot did not see T/P-5 enter cutover (dry) pond #2. (Later, during the interview process, the pilot stated that the smoke made it difficult to locate the crews)

During this timeframe, it became difficult for crews to communicate on TAC199 due to additional interference. (Several crews referenced an open microphone during interviews) The decision was made to switch the radio frequency to TAC4. IC-2 advised E-1 to be sure all crews checked in on TAC4. E-1 began radio checks and got responses from all crews except T/P-1 and T/P-5. (During his interview, E-1

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indicated that he advised T/P-5 in person to change to TAC4 along the right flank prior to him entering cutover (dry) pond #2. There are inconsistencies between the Asset Tracker System data and firefighter statements as to when this occurred)

At this time, T/P-3 reports the fire began to make a push to the north. T/P-2 had cooled off and IC-2 advised him to continue along the right flank to check for spots. T/P-2 started working back to the west while T/P-3 and T/P-4 worked towards the east in a pine strand, beyond cutover (dry) pond #2. Around 1601 hours, T/P-4 noted that the fire was already in the pines east of cutover (dry) pond #2 and advised T/P-3 that they didn't need to be in there and to "Just let it have this". These two units plowed further east and around cutover (dry) pond #3 at about 1613 hours. T/P-2 began catching spot fires along the right flank and requested T/P-3 and T/P-4 to assist so they began making their way back along the flank to the west.

At approximately 1620 hours, IC-2 realized that he had not heard any radio traffic from T/P-1 and T/P-5 for some time. He requested that the pilot locate the units and report their location. At this point, all crews were pulled from suppression efforts to locate T/P-1 and T/P-5. IC-2 contacted another supervisor who was at a nearby fire by cell phone and advised him that they had lost contact with two operators and requested that he respond to the Blue Ribbon Fire.

At 1630 hours, SFC Dispatch contacted IC-2 on his cell phone to advise that the responding helicopter was in the area and trying to reach ground personnel on the Blue Ribbon Fire. The IC-2 advised SFC Dispatch that he would need the fixed wing aircraft to coordinate the helicopter and that they had lost contact with two operators.

A short time later, the fixed wing aircraft advised that T/P-1 and T/P-5 were in cutover (dry) pond #2. (Some ground units were still unaware of more than one cutover (dry) pond. E-1 was searching for T/P-1 and T/P-5 in cutover (dry) pond #1 and did not realize there were others) The fire had surpassed both units. E-2 and T/P-2 were the closest units to their location and the pilot helped direct them, although travel was extremely difficult with the heat and smoke. Both crewmembers of E-2 began searching on foot while T/P-2 made his way into cutover (dry) pond #2 as well. Crewmember A arrived at the location of T/P-1 and T/P-5 first. He checked both units and determined that the operators were not inside the units and relayed that information on TAC4. Shortly after, he saw two bodies east of T/P-1 and T/P-5, one further than the other. Crewmember A relayed that he had found both operators and they were non-responsive. IC-2 asked if they were burned and crewmember A replied, "Affirmative".

At this point, T/P-2 operator met with crewmember A on foot and having seen the bodies also, advised crewmember A that there was nothing they could do and that they needed to get out of there. Conditions were extreme and crewmember A was in distress. T/P-2 operator and crewmember A got in the cab of T/P-2 and both started to leave the area. During their escape, the unit began to run hot again. T/P-2 advised IC-2 that they were coming out and that medical assistance was needed. IC-2 contacted local fire personnel and was advised that an ambulance was already en route. T/P-2 attempted to drop the plow using the quick-release mechanism and when it would not release he advised that they may have to abandon the unit. He utilized the tractor protection system to suppress

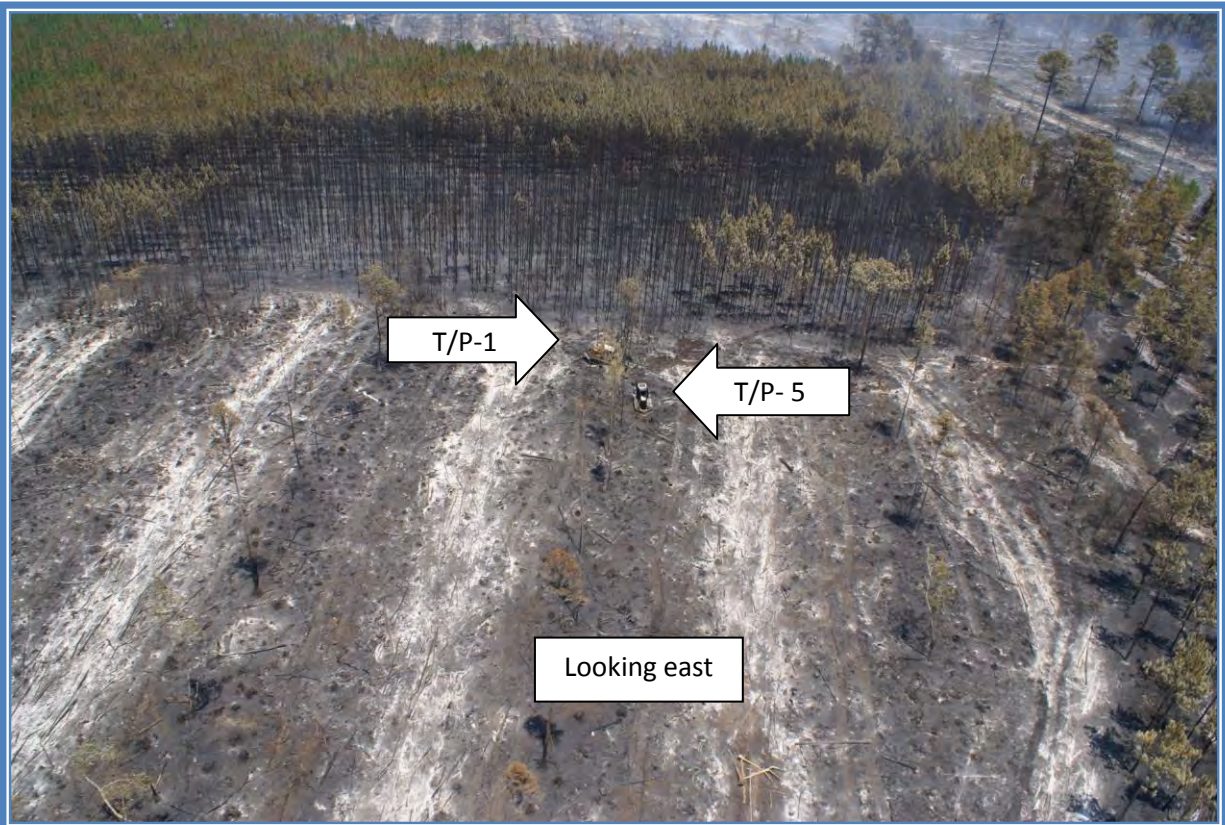
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fire that had ignited on the tracks. The unit cooled off enough to allow him to continue moving forward. T/P-2 contacted the fixed wing aircraft to help direct him back to the loading deck. The pilot advised T/P-2 to turn towards the right, but T/P-2 was having steering issues and would not turn. T/P-2 was able to continue and make it to the fireline, where both were soon assisted by medical personnel and transported to area hospitals.

After this, IC-2 began operating T/P-2 and along with T/P-3 and T/P-4 resumed suppression efforts until T/P-2 mechanical problems reoccurred. T/P-3 and T/P-4 continued to reinforce line until the second supervisor arrived along with additional resources. The second supervisor took command (IC-3) and relieved IC-2 to pull all initial crews off of the fire.

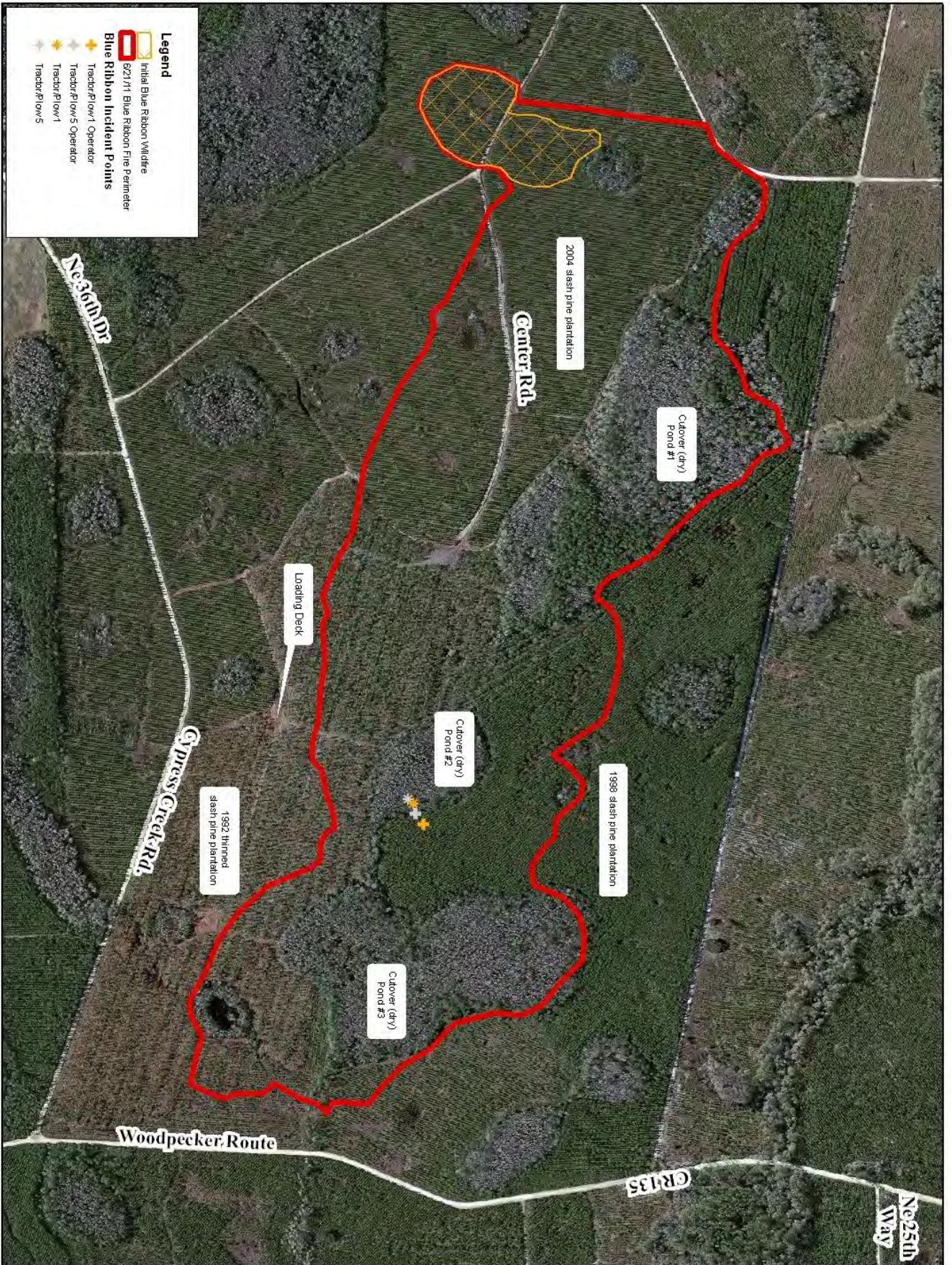
IC-3 continued to work the additional resources to suppress the fire. Realizing that there could be two fatalities, he contacted law enforcement. In addition, he requested another supervisor to respond to this fire, knowing that he (IC-3) would need to deal with the possible fatalities. Sometime later, the third supervisor and law enforcement arrived. The third supervisor took command (IC-4) of the Blue Ribbon Fire while IC-3 and law enforcement confirmed the two fatalities.

Later that evening, IC-3 made the family notifications in person while a Critical Incident Stress Management (CISM) Team debriefed the crews involved. The two personnel who were transported to area hospitals were treated for heat and smoke related injuries and released.



Aerial View of Burnover

Blue Ribbon Fire Map



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Chronology of Events

June 16, 2011:

1425: Initial report of Blue Ribbon Fire to DOF

1443: First tractor/plow unit arrives on scene

1500: Second tractor/plow unit arrives on scene

1500: Supervisor arrives on scene

1511: Supervisor advises fire contained

1735: All personnel and units have been released

June 17, 2011:

1241: Engine arrives on scene to check containment lines and perform mop-up operations

1346: Engine released

June 18, 2011:

1324: Engine on scene until 1412 – checks containment lines

1346: Engine on scene until 1444 – checks containment line

June 19, 2011:

Unk: Landowner representative checks containment lines

June 20, 2011:

1450 (Approx.): Landowner representative notifies DOF that Blue Ribbon Fire has escaped containment lines.

1457: E-1 en route to Blue Ribbon Fire, Type 6 Engine

1500 (Approx.): T/P-1, Type 3 Tractor/Plow Unit and T/P-2, Type 2 Tractor/Plow Unit en route to Blue Ribbon Fire

1505 (Approx.): DOF fixed wing aircraft arrives over fire

1510: E-1 arrives on scene, assumes initial IC position and begins sizing up fire – noted fire moving NNE but wind was switching after he got ahead of the fire. He advised dispatch they would be working on TAC190

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1512: T/P-1 arrives on scene as first tractor/plow unit. He requests additional tractor/plow units and begins initial attack on right flank

1512: Three additional tractor/plow units en route to assist

1514: E-2 en route to Blue Ribbon Fire, Type 6 engine with two personnel

1519: IC advises fire is 5-8 acres and running

1525: Supervisor departs SFC Office en route to Blue Ribbon Fire after facilitating the helicopter request

1533: T/P-2 arrives on scene

Unk: Landowner representative advises the IC of cutover (dry) pond and not to go in there. The IC relays this information over TAC190 to personnel on scene.

1535 (Approx.): T/P-2 unloads and plows out spot fire to protect transport

Unk: T/P-2 starts on right flank plowing multiple spot fires

Unk: T/P-2 ties in with T/P-1 and assumes role of lead tractor.

Prior to 1550: Radio channel changes from TAC190 to TAC199 at the request of the plane due to interference of traffic from other fires

1550: T/P-3, T/P-4, T/P-5 all arrive on scene of Blue Ribbon

1550: Supervisor (IC-2) arrives on scene

1550-1555 (Approx.): T/P-2 runs hot and has lines plowed around by other tractors – temperature reading around 250....sprays out tracks—debris on fire. Turns lead tractor responsibility over to T/P-3

1553 (Approx.): T/P-1 and T/P-2 ties in with two additional tractors – T/P-3 and T/P-4

1555 (Approx.): IC-2 advises T/P-2 to come to loading deck where he met with IC-2 and E-1

Unk: Radio channel changes again (TAC4) due to interference. Communications check was made with no response from T/P-1 or T/P-5

1555 (Approx.): T/P-1 advises that he is stumped and someone acknowledged OK.

1556 (Approx.): The fixed wing aircraft observes T/P-1 on the eastern edge of cutover (dry) pond #2 and attempts to make contact with no response.

Unk: T/P-3 and T/P-5 start towards T/P-1

1558 (Approx.): T/P-3 hears T/P-5 say to T/P-1 “I’m going to push you”

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1603 (Approx.): T/P-3 sees smoke column change and fire pushes to the north

1605 (Approx.): T/P-2 cools off and IC-2 advises to go back and check lines

Unk: IC-2 advises T/P-2 to tie in with other tractors that the fire is starting to make a run

Unk: T/P-2 calls back T/P-3 and T/P-4 to assist with multiple spot fires

1620 (Approx.): IC-2 realizes that he has not heard from T/P-1 and T/P-5 and cannot make radio contact. He then asked the plane to try to locate them.

1620 (Approx.): Suppression efforts are suspended temporarily for all personnel to search for tractors which are not accounted for.

1620 (Approx.): IC-2 advises fire department of lost contact with tractors.

1630 (Approx.): SFC dispatch contacts IC-2 by phone to advise the helicopter is in the area and IC-2 requests that the fixed wing coordinate air activities. IC-2 advises dispatch they have lost contact with two tractor operators.

Unk: IC-2 advises another supervisor of the situation via phone.

1630 (Approx.): Fixed wing advises ground units that he has located the tractors in a cutover (dry) pond #2 and the fire has burned past T/P-1 and T/P-5. He begins to direct units to their location.

1634 (Approx.): T/P-2 begins to make his way towards T/P-1 and T/P-5.

1635 (Approx.): Crewmembers A and B exit E-2 on foot towards T/P-1 and T/P-5.

1640 (Approx.): Crewmember A locates T/P-1 and T/P-5 and advises no operators in them. He proceeds to the east where he locates the operators and advises they are not responsive. T/P-2 arrives soon after and the operator exits the unit and meets crewmember A.

1645 (Approx.): T/P-2 operator notes that crewmember A is in distress and assists him into the cab of T/P-2 to make their escape. The plow will not release using the quick disconnect inside the cab. The operator exits the tractor and extinguishes fire from debris on the tracks using the tractor protection system.

1649 (Approx.): T/P-2 will not steer to the right and is running hot again – approximately 260 degrees.

1653 (Approx.): T/P-2 operator and crewmember A make their way out in T/P-2 where they are assisted by EMS. Both are transported to area hospitals.

1707 (Approx.): After EMS departs; IC-2 takes over operation of T/P-2 and joins T/P-3 and T/P-4 on suppression efforts.

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1707 – 1917: Second supervisor assumes command (IC-3), pulling original personnel off the scene. IC-3 replaces original personnel with private contractors and additional DOF resources which eventually suppress the fire. A third supervisor arrives on scene. IC-3 turns fire over to the third supervisor (IC-4).

Causes of the Burnover

Direct cause:

A direct cause is the contact with energy or hazardous material which resulted in injury or other damage.

In this burnover, heat exposure from fire caused the deaths of two tractor/plow operators. The first operator's tractor/plow unit became immobilized when it got stuck on a tree stump; this required the operator to call for assistance. The second tractor arrived to assist. On scene evidence indicates an attempt to dislodge the first tractor from the stump. Both operators were overrun by the fire and found in close proximity to the first tractor.

Fire shelters were not deployed. Other than normally worn Personal Protective Equipment (PPE), crew members did not have other protection from the heat and flames.

Indirect causes:

Indirect causes are those unsafe (substandard) practices or conditions which allowed or contributed to the contact.

- 1) Understood strategy and tactics were being implemented until tractor plow operator turned into cutover area and traveled approximately 216 feet without constructing fireline.
- 2) Both operators delayed their escape due to time spent attempting to free the first tractor.
- 3) Both tractor plow units were approximately 216 feet from constructed fireline when the burnover occurred. Heavy fuel was present between the units and the fireline.
- 4) Fire shelters were available but not used by either operator.
- 5) Both units were located in front of the fire with no anchor point, escape route or safety zone.
- 6) Long term drought combined with high temperatures, low relative humidity and atmospheric instability resulted in extreme fire behavior which caused high rates of spread and spotting from the fire.

Burnover Review Elements

Fire Behavior

Fuels (Significant contributing factor)

- Fire Behavior Prediction System (FBPS) Fuel Model 7 Southern Rough (palmetto, gallberry and grass). DOF typically uses this fuel model for fire behavior prediction in this fuel type.
- Dead fuels moistures were not considered critically low.
- Live fuel moisture readings taken from the closest fuel sampling sites ranged from 104% in the grasses to 106% - 130% in the shrubs. These readings are considered critically low for these species.

Weather (Significant contributing factor)

- The wind was predominately from the west but some variation caused shifting in direction of the fire's head, this caused the flanks to flare up at times. However, the velocity of the wind did not change significantly during the wind shifts. Short to mid-range spotting was observed throughout the fire.
- Atmospheric instability along with high temperatures and low relative humidity created extreme fire behavior activity.
- The instability along with fire intensity contributed to crown torching and active crown fire.
- Long term drought caused critically low live fuel moistures. The KBDI ranged from 561 – 716 throughout the county with a mean of 663. A combined reading taken throughout northeastern Florida shows the KBDI above the 97th percentile at 704.

Predicted v. Observed Weather (Not a contributing factor)

- The predicted weather was reflective of the actual conditions on the fire during the events surrounding the burnover incident.

Topography (Not a contributing factor)

- Mostly flat terrain

Fire Behavior (Significant contributing factor)

- The combination of low live fuel moisture, high temperatures, atmospheric instability and low relative humidity caused unusually high rates of spread throughout the fire.
- Although the fire did develop a well defined plume there is no evidence that this was a plume dominated fire.

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Environmental Factors

Smoke (Influencing factor)

- Created adverse visibility conditions for ground suppression units and recon aircraft.

Weather (Influencing factor)

- Atmospheric instability combined with afternoon temperatures nearing 100 degrees, and a low relative humidity produced adverse fire behavior.

Drought (Influencing factor)

- Widespread drought conditions in northern Florida and southern Georgia contributed to significant drying of fuel moistures.

Terrain (Significant contributing factor)

- Cutover (dry) ponds with many stumps made travel in these areas hazardous.



Cutover (dry) Pond #2

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Incident Management

Incident Command (Not a contributing factor)

- The turnover on the Blue Ribbon Fire occurred during the initial attack period of the break-out. Span of control was adequate at the time of the turnover.

Strategy (Influencing factor) - *SFC used direct attack to contain the fire and employed the use of multiple suppression units working together during initial attack operations.*

- T/P-1 deviated from this understood strategy.

Tactics (Influencing factor) - *Suppression units employed "anchor, flank, and hold" tactics.*

- At least two units attempted to hook the head of this fire independently on separate occasions.

Safety Briefings/Major Concerns (Influencing factor)

- Operators had attended safety briefings on extended attack incidents in the previous week.
- Daily weather forecasts were received at morning radio check.
- Afternoon weather observations were provided at 1400 hours.
- Suppression crews were advised of the hazard of cutover (dry) ponds, but it is uncertain if all crews received the message.

Instructions Given (Influencing factor)

- Limited specific instructions were given, however overall strategy and tactics were well understood.
-

Control Mechanisms

Span of Control (Not a contributing factor)

Communications (Significant contributing factor)

- Three tactical channel changes were made during initial attack: (TAC190, TAC199, and TAC4).
 - Fixed wing pilot recommended changing to TAC199 due to interference. (Group containing TAC199 was not easily found by firefighters on their portable radios)
 - Some personnel did not perform the third channel change to TAC4.
 - No communication received regarding the severity of the situation faced by T/P-1 and T/P-5. This includes the units themselves as well as the fixed wing aircraft serving as a lookout above.
-

Personnel Profiles

Training/Qualifications/Physical Fitness (Not a contributing factor)

- All personnel on the incident had been trained and had experience in the positions they held.
- All personnel received RT-130 Fireline Refresher training within the last year.

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- All personnel required to take the annual work capacity test were current.

Length of Operational Period/Fatigue (Influencing factor)

- Crews had worked significant hours prior to the Blue Ribbon Fire breakout. Local supervisors had tractor/plow crews come on duty later in the day whenever possible.
- Engine crews came on duty early to mop-up existing fires and were available to assist with new starts in the afternoons.

Attitudes (Influencing factor) – The review team concluded that all crews in this area have a positive, can-do attitude and their ability to work well as a team greatly contributes to their success. However, it is important to note that certain “hazardous attitudes” (Incident Response Pocket Guide – IRPG) did exist that may have contributed to this burnover. They include the following:

- **Complacent – Just another routine fire** - *During interviews, many crews commented that this was just like all of the fires they had been fighting over the past several weeks and they thought they “had it”.*
- **Group Think – Afraid to speak up or disagree** - *Some crews observed specific hazards during this incident and failed to speak up, thinking that the other crew(s) must see the same thing. Comments made during interviews include: Regarding fire behavior – “He’s experienced; he sees what I see.” Another comment was made saying, “I didn’t say anything about the pond, it seemed obvious that he didn’t need to be in there.”*

Experience Levels—(Not a contributing factor)

- The review team concluded that the experience levels of the various operators were not a factor that influenced or contributed to the burnover incident.

Equipment

Availability (Not a contributing factor)

- Sufficient resource support was on scene (five-tractor/plow units, two-type 6 engines and one-fixed wing aircraft), one Type 1 helicopter en route at time of burnover.

Performance / Non-Performance (Influencing factor)

- All preventive maintenance was up to date with DOF Standards.
- T/P-1 was a reserve open cab dozer. The operator was normally assigned to an environmental cab which was being repaired at the time.
- T/P-2 reported tractor was overheating and went into limp mode several times, resulting in other tractor/plow units having to plow suppression lines around T/P-2.
- T/P-2 could not get the plow to quick-release from inside the cab. The tractor was later inspected at the DOF shop by a mechanic and worked properly.
- T/P-2 had steering problems. It was later determined that the cause was the water protection system hose being lodged under the steering controls.

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Clothing and Equipment (Significant contributing factor)

- Fire Shelters for T/P-1 and T/P-5 operators were available and found inside both tractors not deployed.
- PPE was provided and available to all crew members.



Fire Shelter in cab of T/P-1

Evaluation of the 10 Standard Fire Orders and 18 Watch-Out Situations

10 Standard Fire Orders

The 10 Standard Fire Orders were evaluated to determine both their application and any violations. The 10 Standard Fire Orders were not followed completely. Those that contributed significantly to the burnover (directly affecting the outcome of T/P-1 and T/P-5) were the lack of adequate escape routes and safety zones, the lack of communication between crews and fighting fire aggressively without providing for safety first.

1. **Keep informed on fire weather conditions and forecasts. (Not a contributing factor)**
 - All crews were aware of the weather conditions and forecasts.
2. **Know what your fire is doing at all times. (Influencing factor)**
 - Some crews felt comfortable that they had hooked the head of this fire and made comments that they “had it”.
3. **Base all actions on current and expected behavior of the fire. (Influencing factor)**
 - All crews had been fighting fire in similar conditions for several weeks. They were aware of the potential, yet an attempt to cut off the head around a cutover (dry) pond was made.
4. **Identify escape routes and safety zones, and make them known. (Significant contributing factor)**
 - T/P-1 and T/P-5 did not identify their escape routes and safety zones prior to entering cutover (dry) pond #2.
5. **Post lookouts when there is possible danger. (Not a contributing factor)**
 - Lookouts were posted on the ground as well as in the air.
6. **Be alert. Keep calm. Think clearly. Act decisively. (Influencing factor)**
 - T/P-1 and T/P-5 failed to act decisively in that they waited too long before attempting their escape.
7. **Maintain prompt communications with your forces, your supervisor, and adjoining forces. (Significant influencing factor)**
 - At times, communications were not maintained among crews. In addition to multiple frequency changes due to interference and some crews not receiving word of the frequency change (although significant effort was made to confirm), it is also imperative that firefighters engage in communication. All firefighters have five communication responsibilities that include:
 - 1) Brief others as needed
 - 2) Debrief your actions
 - 3) Communicate hazards to others
 - 4) Acknowledge messages
 - 5) Ask if you don't knowNo communication was received regarding the severity of the situation faced by T/P-1 and T/P-5. This includes the units themselves as well as the fixed wing aircraft serving as a lookout above.
8. **Give clear instructions and be sure they are understood. (Influencing factor)**
 - All crews were familiar with the plan to anchor, flank and hold; however, no formal briefings occurred where instructions were provided as to the strategy and tactics that should be used. The hazards associated with the cutover (dry) pond were communicated to the initial responding crews; however, it is unclear if that traffic was acknowledged.
9. **Maintain control of your forces at all times. (Influencing factor)**
 - The Incident Commanders discussed and agreed on the tactics to be used; however, this was not completely followed by all crews.
10. **Fight fire aggressively, having provided for safety first. (Significant contributing factor)**
 - All crews were engaged in aggressive firefighting; however, the crews did not provide for safety first as they went into the cutover (dry) pond #2 without ensuring that all components of Lookouts, Communications, Escape Routes and Safety Zones (LCES) were in place.

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18 Watch-Out Situations

The 18 Watch-Out Situations were evaluated in terms of their application and contribution to the burnover that occurred. The 18 watch-out situations were not appropriately considered. Safety Zones and Escape Routes were not identified. Crews went into the cutover (dry) pond #2 without a safe anchor point while attempting a frontal assault with unburned fuel between them and the fire. The fuels and terrain in the burnover area, along with the environmental conditions, made escape extremely difficult.

1. **Fire not scouted and sized up. (Not a contributing factor)**
 - The initial IC along with the fixed wing aircraft concentrated on scouting and sizing up the fire.
2. **In country not seen in daylight. (Not a contributing factor)**
 - All crews were experienced in fighting fire in this area.
3. **Safety zones and escape routes not identified. (Significant contributing factor)**
 - T/P-1 and T/P-5 did not identify their escape routes and safety zones prior to entering cutover (dry) pond #2.
4. **Unfamiliar with weather and local factors influencing fire behavior. (Not a contributing factor)**
 - All crews were familiar with weather and local factors influencing fire behavior.
5. **Uninformed on strategy, tactics, and hazards. (Influencing factor)**
 - No formal briefings occurred; however, it was evident that all crews we interviewed understood the strategy and tactics to be used. It is unclear whether or not all operators received the communication regarding the hazards associated with the cutover (dry) pond(s).
6. **Instructions and assignments not clear. (Influencing factor)**
 - Again, during interviews it was evident that the crews understood the plan to work in tandem; however, T/P-1 attempted to work along the eastern edge of the cutover (dry) pond #2 alone. There was not a formal briefing that provided those specific instructions to stay together and it is unclear whether or not the communication regarding the cutover (dry) pond was heard by all.
7. **No communications link with crewmembers or supervisor. (Not a contributing factor)**
 - All crews were equipped with functioning radio equipment for maintaining a link for proper incident communications. T/P-1 operator requested and received assistance.
8. **Constructing line without safe anchor point. (Significant contributing factor)**
 - As crews went into the cutover (dry) pond #2, they failed to plow a fireline, resulting in the loss of a safe anchor point.
9. **Building fire line downhill with fire below. (Not a contributing factor)**
 - Not applicable.
10. **Attempting frontal assault on fire. (Significant contributing factor)**
 - As T/P-1 worked along the eastern edge of cutover (dry) pond #2, the head of the fire was reaching the pond on the west side.
11. **Unburned fuel between you and fire. (Significant contributing factor)**
 - As a result of entering the eastern edge of cutover (dry) pond #2 with the fire reaching the western edge, there was unburned fuel between T/P-1 and the fire.
12. **Cannot see main fire, not in contact with someone who can. (Not a contributing factor)**
 - All crews were working in close proximity of the fire, therefore were aware of its location.
13. **On a hillside where rolling material can ignite fuel below. (Not a contributing factor)**
 - Not applicable.
14. **Weather becoming hotter and drier. (Not a contributing factor)**
 - Initial responding crews arrived just after 1500 and the burnover took place just over an hour later. The conditions did not significantly change in that time.
15. **Wind increases and/or changes direction. (Influencing factor)**
 - There were some moderate increases in wind speed and changes in direction.
16. **You are getting frequent spot fires across the line. (Influencing factor)**

Blue Ribbon Fire Review

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- All crews reported numerous spot fires.
17. **Terrain and fuels make escape to safety zones difficult. (Significant contributing factor)**
- The fuels and terrain in the burnover area made escape extremely difficult.
18. **Taking nap near fire line. (Did not contribute)**
- Not applicable.



T/P-1



T/P-5

Findings (Based on LCES)

Lookouts:

- The fixed wing aircraft was used for a lookout and patrolling during the incident although smoke hindered visibility.
- The pilot did observe T/P-1 in cutover (dry) pond #2 and thought there was adequate time before the fire reached that area. Therefore, the urgency was not communicated to other resources.
- The IC was in E-1 scouting and serving as a lookout. E-2 also served as a lookout on the incident.
- Asset Tracker System was also employed to monitor resource locations by IC-2.

Communications:

- Due to radio traffic from other incidents and interference on this incident, three TAC channels were utilized; this caused some confusion during the incident. (T/P-1 radio was found to be on TAC199)
- Radio frequency TAC199 was not commonly used in this area and was difficult to find in portable handheld radios.
- A significant effort was made to inform the crews of each channel change; crews were asked to acknowledge.
- No communication was received regarding the severity of the situation faced by T/P-1 and T/P-5; from neither the units themselves nor the fixed wing aircraft serving as a lookout above.

Escape Routes:

- No escape routes were identified when T/P-1 entered cutover (dry) pond #2.
- Difficult terrain and limited visibility due to smoke hindered the ability to escape.

Safety Zones:

- No safety zones were identified when T/P-1 entered cutover (dry) pond #2.

Other Findings:

- T/P-1 deviated from the strategy and tactics when he turned into cutover (dry) pond #2 without constructing fireline. T/P-1 failed to communicate this action.
- Attempts from T/P-5 to dislodge T/P-1 were unsuccessful and cost valuable time that could have been used to escape.
- Fire shelters were not used during the burnover and were left in the tractors.
- T/P-1 was not operating his primary unit but had used the reserve tractor in the past few days to become familiar with its operations.
- When IC-2 realized that contact had been lost with T/P-1 and T/P-5, all crews were pulled from suppression efforts.
- The Asset Tracker System was a benefit to IC-2 during the incident; however, the System was not installed on T/P-1 and the location of T/P-5 was not displayed on IC-2's computer.
- SFC recognizes the benefit of multi tractor/plow operations during complex incidents.
- Multi tractor response provided an added measure of safety when T/P-2 overheated and went into "limp mode".
- T/P-2 continued to be used although there were overheating and steering issues.
- Multiple spot fires were observed by resources on the fire.

June 20, 2011

- SFC does not currently have an assigned DOF helicopter. The contract helicopter that was ordered arrived after the burnover occurred.
- SFC personnel had worked significant hours prior to the Blue Ribbon Fire breakout.
- It was found that T/P-2 steering issues were caused by the tractor protection system hose being lodged under the steering linkage.
- Video taken by the fixed wing aircraft was useful during the review process.

Recommendations

- DOF should evaluate strategy and tactics used as fire danger increases.
- Firefighters should receive refresher training on principles of LCES and situational awareness.
- Evaluate how fire shelters should be carried and stored on equipment.
- Evaluate operations procedures when equipment malfunctions during fire suppression activities.
- Develop trigger points for when to abandon equipment.
- Review radio frequencies and ensure proper channel and procedures are known and understood.
- Evaluate improved Asset Tracker System and consider having installed on all equipment, including training of personnel.
- Evaluate work/rest ratio to ensure proper rest of fire personnel.
- Evaluate the installation of video cameras on fixed wing aircraft to be used during IA. Information gathered could be used during After Action Reviews and future training.
- DOF should ensure that the steering issues related to the tractor protection system hose has been resolved for all units statewide.
- DOF should review radio communications procedures and identify if a tactical “imminent safety threat” process is needed.
- Pursue avenues for increased availability of aviation resources.



Appendices

Appendix A



FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
COMMISSIONER ADAM H. PUTNAM

June 21, 2011

MEMORANDUM

TO: Sonny Greene, Deputy Chief, Field Operations Bureau

THROUGH: Jim Karels, Director

FROM: John Fish, Chief Forest Protection Bureau

SUBJECT: Incident Review Team – Significant Incident – Incident # 2011-06-1130

Pursuant to Division Policy and Procedure Chapter 115, I am requesting the formation of an Incident Review Team to review and investigate the Blue Ribbon Wildfire incident that occurred on June 20, 2011, in Hamilton County, Suwannee Forestry Center.

The Team's mission will be to gather all factual information regarding the significant incident and to discover and define the environmental, management and human factors that produced the outcomes observed. The Team's final report will include the Team's findings and recommendations for preventing similar occurrences in the future. The final written Incident Review Team report will be submitted to the DOF Director and Fire Chief by COB on Friday, July 8, 2011.

Cc: David Core
Jeff Vowell
Ralph Crawford

Appendix B

June 20, 2011

Fire Behavior

The Blue Ribbon Fire started on June 16th, 2011 and was contained at 8 acres. For the next three days the fire was checked daily to ensure it was still inside the containment lines. On June 20th the fire spotted out of the control lines and burned 203 acres before being contained again. The second containment effort required multiple resources that consisted of tractor plow units, engines and aerial resources. During the second containment effort two tractor plow units were burned over resulting in the death of the two operators.

During the second containment effort the fire exhibited extreme fire behavior that produced an average rate of spread (ROS) of 49 chains per hour (ch/hr) in the first 46 minutes of the fire. The fire spread nearly two-thirds of a mile during this time.

The fire moved through three fuel types before the burnover occurred. The first fuel type was a seven year-old slash pine plantation with grass, gallberry and palmetto understory. The fire spread an average of 58 ch/hr and produced flame lengths (FL) of 30 feet. Active crown fire occurred throughout the stand (short runs) that required understory fuels to ignite the crowns. The fire did burn very intensely and consumed the crowns where it crowned out. The surface fuels were burned completely.

The second fuel type was a 19 year-old slash pine plantation that had been thinned two years earlier. The understory consisted of grass, gallberry and palmetto understory. The fire spread an average of 33 ch/hr in this fuel type and produced flame lengths of 20-25 feet. Very little crowning occurred due to prior thinning and crown base height being 30 feet on average. The fire did burn intensely and consumed the understory fuels completely.

The third fuel type was a cutover (dry) pond site that had two month-old logging slash. The slash was completely cured due to drought conditions that had persisted over the past two months. The fire spread an average of 15-20 ch/hr and produced flame lengths (FL) of 10-15 feet. The fuels burned very intense and completely.

Blue Ribbon Fire Review

June 20, 2011

Weather

Closest Spot Weather Forecast for June 20th, 2011. Impassable Bay Fire was 21 miles to the east of the Blue Ribbon Fire.

SPOT FORECAST FOR IMPASSABLE BAY...USDA-FOREST SERVICE
NATIONAL WEATHER SERVICE JACKSONVILLE FL
521 AM EDT MON JUN 20 2011

...FIRE WEATHER WATCH IN EFFECT TUESDAY AFTERNOON...

SKY/WEATHER.....MOSTLY SUNNY (35-45 PERCENT). PATCHY FOG EARLY IN THE MORNING.
MAX TEMPERATURE.....AROUND 99.
MIN HUMIDITY.....43 PERCENT. WIND (20 FT).....WEST WINDS 6 TO 8 MPH..... LAL..1.
MIXING HEIGHT.....1100-1900 FT AGL INCREASING TO 6600-7100 FT AGL.
MIXING WINDS.....WEST 8 TO 12 MPH.
DISPERSION INDEX.....60.
CHANCE OF PCPN.....10 PERCENT.
WEATHER COV.....PATCHY

TIME (EDT)	6 AM	8 AM	10 AM	NOON	2 PM	4 PM
SKY (%).....	41	39	39	40	40	40
WEATHER TYPE....	FOG	NONE	NONE	NONE	NONE	NONE
TEMP.....	70	74	87	95	99	98
RH.....	100	99	67	51	43	43
20 FT WIND.....	W 6	W 6	W 6	W 6	W 7	W 7
20 FT WIND GUST.	10	10	10	10	15	15
MIX HGT (FT)....	1100	1900	1900	4400	7100	7100
TRANSPORT WIND..	W 10	W 12	W 12	W 10	W 8	W 8
CHC OF PCPN (%).	10	0	0	0	10	10
LAL.....	1	1	1	1	1	1

Actual Weather Monday, June 20th, 2011

On site weather taken at Kelly Road Fire approximately 7 miles to the east of Blue Ribbon Fire

Time	Temp	RH	*Wind Speed	Wind Direction
1420	97	39	3	South
1513	101	36	2	Southwest
1607	99	37	2	West Southwest
1700	98	35	0	Calm
1815	97	38	0	Calm

*eye level

RAWS Station

Eddie Tower - 28 miles to the east

Time	Temp	RH	*Wind Speed Average	**Wind Gust	Wind Direction
1504	99	34	7	14	275 degrees (West)
1604	99	34	4	6	275 degrees (West)
1704	97	36	4	5	304 degrees (West, Northwest)

* Average 10 meter wind speed

** Maximum 10 meter wind gust from last reading

Live Oak – 20 miles to the southwest

Time	Temp	RH	*Wind Speed Average	**Wind Gust	Wind Direction
1500	94	46	5	14	333 degrees (Northwest)
1600	95	45	5	12	312 degrees (West, Northwest)
1700	96	44	4	8	304 degrees (West, Northwest)

* Average 10 meter wind speed

** Maximum 10 meter wind gust from last reading

June 20, 2011

Fuels

The fuels were a southern rough element with slash pine overstory. The understory consisted of palmetto, gallberry, and mixed varieties of grasses. FBPS Fuel Model 7 – Southern Rough.

Fine dead fuel moisture was 7%. Fuel moisture determined by using closest observed weather.

*10 hr fuels moisture was 8%

*100 hr fuels moisture was 15%

*1000 Hr Fuels Moisture was 16%

* Taken from weather station 081302 - Eddy Tower

Live Fuel Moisture ranged 122% – 131% gallberry, 106% – 130% palm palmetto, and 104% in bluestem. These measurements were averages taken from the closest sources. No onsite measurements were taken.

First fuel type: The fire started in a seven year-old slash pine plantation. The understory consisted of grasses (bluestem) and shrub (palmetto and gallberry). FBPS Fuel Model 7 Southern Rough.



Representative Fuel Type



Taken at Fire

Second fuel type: After approximately 0.4 miles the fire moved into a 19 year-old Slash Pine plantation that had been thinned 2 years earlier. The understory consisted of grasses (bluestem) and shrub (palmetto and gallberry). FBPS Fuel Model 7 Southern Rough.



Representative Fuel Type



Taken at Fire

June 20, 2011

Third Fuel Type: After approximately 0.6 miles from origin the fire moved into a cutover (dry) pond site. The site had been cut 2 months earlier and consisted of moderate loading of hardwood slash.



Representative Fuel Type



June 20, 2011

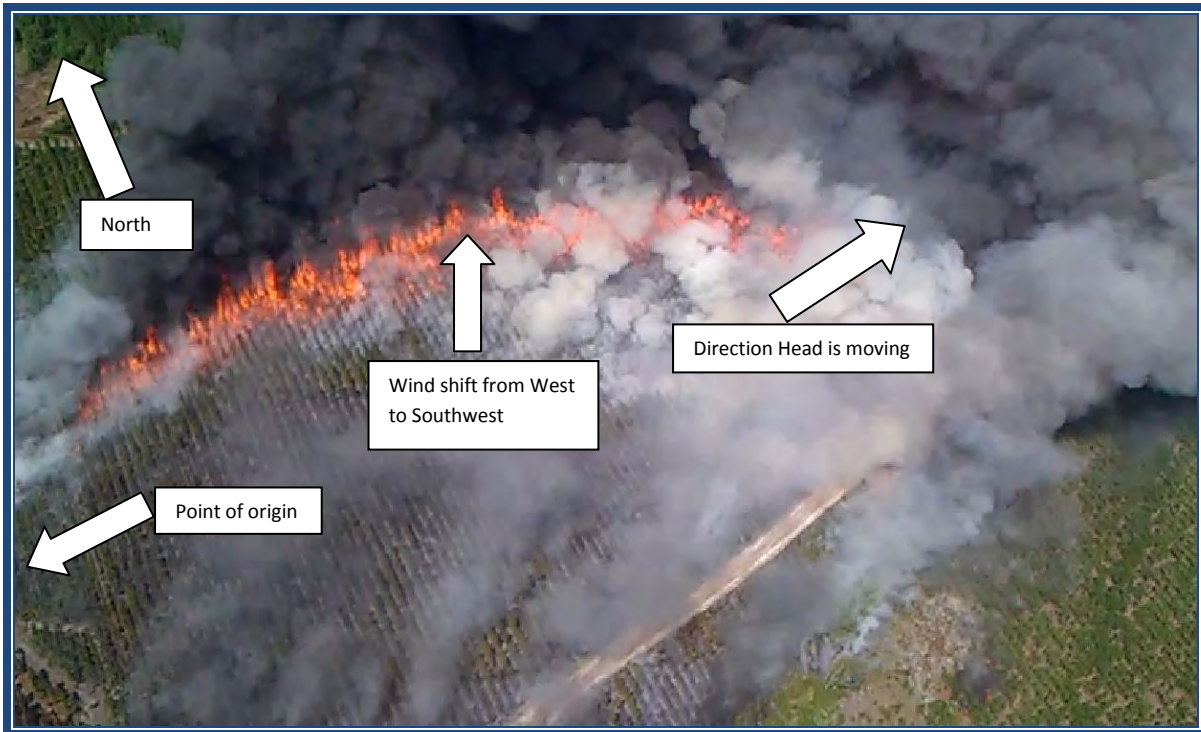
Taken at Fire



Aerial View of Cutover (dry) Pond #2 After the Fire

June 20, 2011

Fire Behavior



Fire Behavior in the First Fuel Type, 7-year old Slash Pine Plantation



Picture Taken by Incoming Tractor/Plow Unit

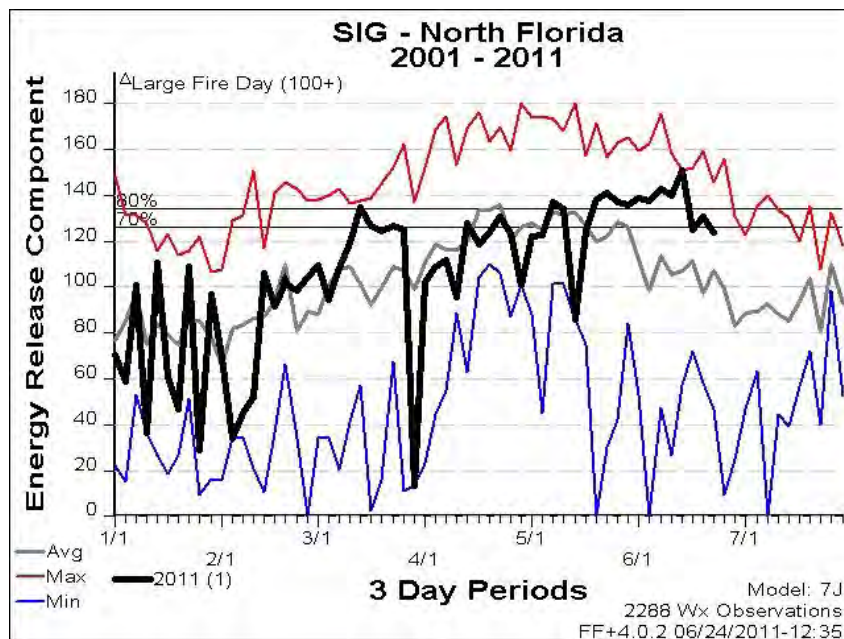
June 20, 2011

Fire Behavior in Second Fuel Type, 19 year-old Slash Pine Thinned 2 Years Earlier



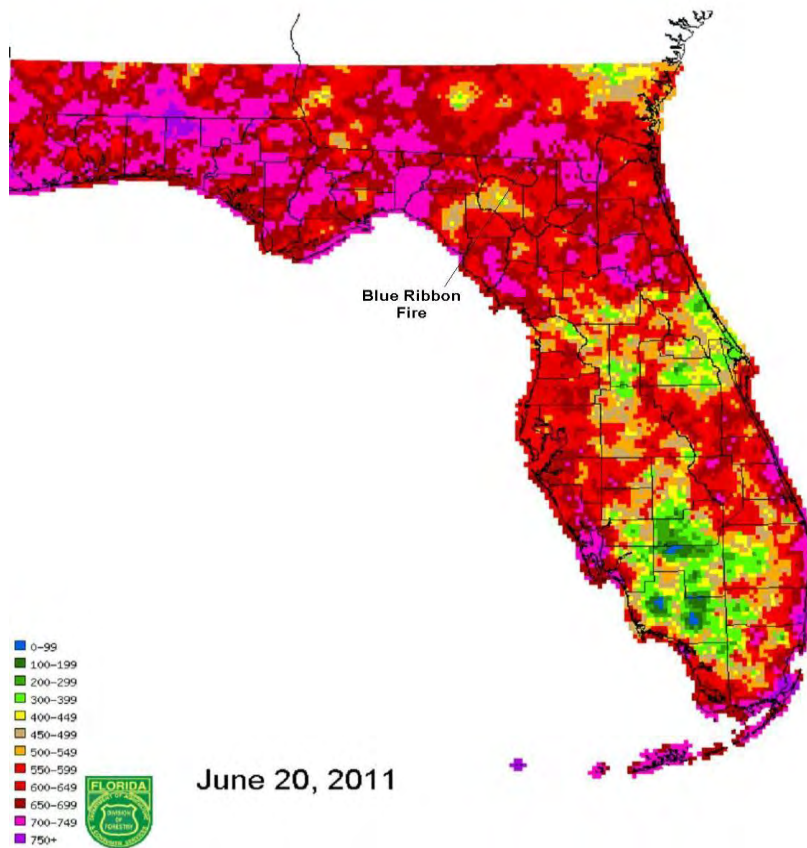
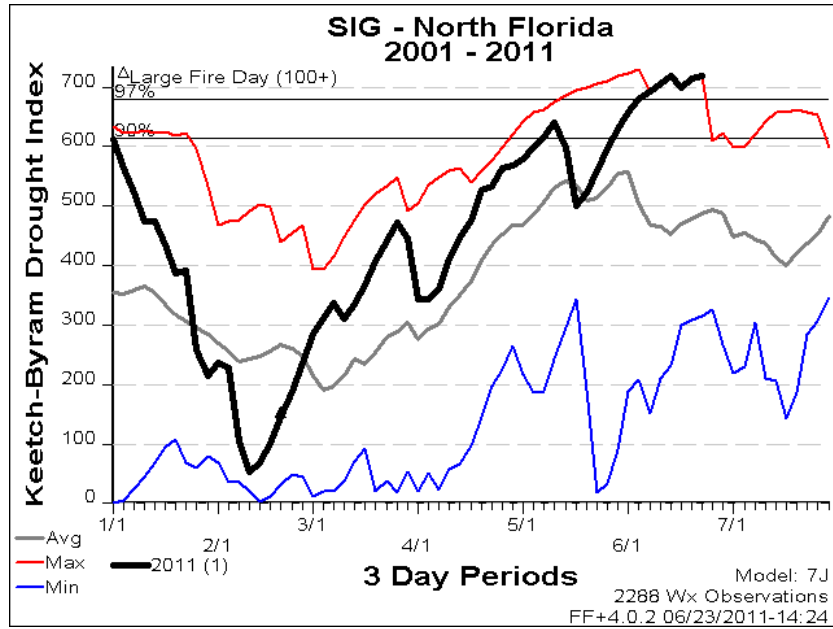
Photo Taken as Fire was Approaching Cutover (dry) Pond #2

ERC Charts



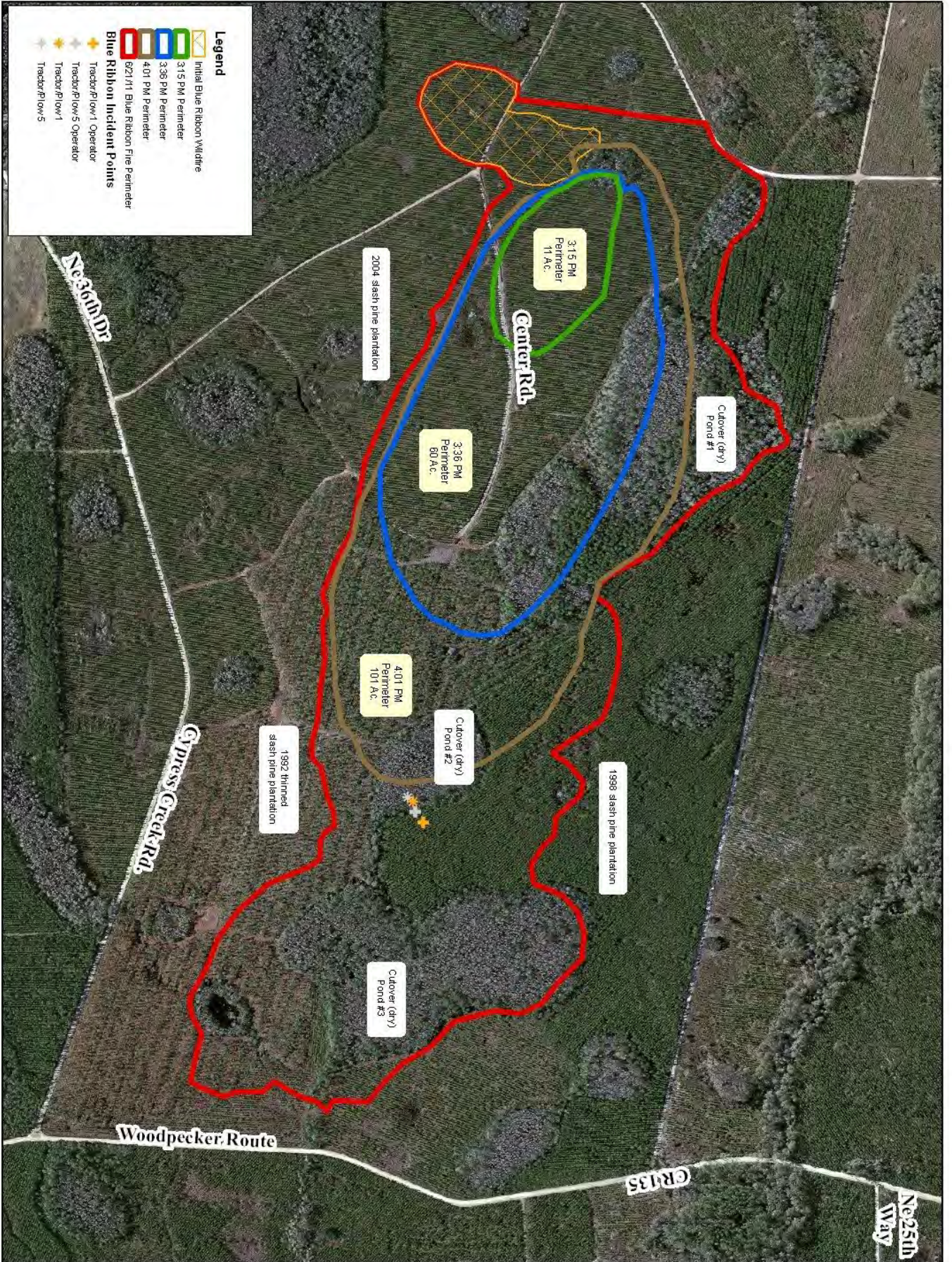
June 20, 2011

KBDI Charts



Appendix C

Fire Progression Map



Legend

- Initial Blue Ribbon Wildfire
- 3:15 PM Perimeter
- 3:36 PM Perimeter
- 4:01 PM Perimeter
- 6/21/11 Blue Ribbon Fire Perimeter

Blue Ribbon Incident Points

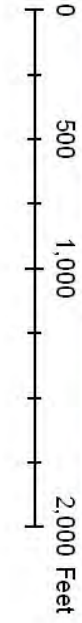
- Tractor/Plow 1 Operator
- Tractor/Plow 5 Operator
- Tractor/Plow 1
- Tractor/Plow 5

DISCLAIMER
This map is the product of the Florida Division of Forestry. No warranties are provided for data herein, its use, or its interpretation.

Blue Ribbon Fire
6/20/11 Hamilton County
Estimated Fire Progression Map



Initial Wildfire 8 acres
Final Wildfire 203 Acres



Appendix D

June 20, 2011

Explanation of Asset Tracker System

The Florida Division of Forestry contracted for the development and installation of an Asset Tracking System in 2009. The Asset Tracking System is a platform where the GPS location of suppression equipment is transmitted via radio from the suppression equipment to a supervisor's radio in their vehicle, then to a laptop computer. This data is then displayed on the computer as part of a map and the times, locations, speed and direction of travel are saved as a data file. During this incident the data of the suppression equipment was not gathered until IC-2 arrived at approximately 1550 hours, whose vehicle is equipped with a receiver and laptop computer.

Gaps in the data stream can occur when the GPS in the suppression equipment loses contact with satellites or radio issues stop the transfer of data from the suppression unit to the supervisor's radio. The accuracy of the location information is dependent on the strength of the GPS signal which can be affected by clouds, smoke, canopy, or other obstructions. The accuracy of the information is generally 10 - 30 feet. This level of accuracy can lead to clusters of points with some distance between them even for equipment that is stationary.

Asset Tracking begins with the operator starting the vehicle which applies vehicle power in both cases to either the transmitting or receiving tracking equipment. On the transmitting side the GPS receiver begins to acquire satellites. Transmitting begins after 50 seconds and continues on a 10 second interval thereafter until the vehicle's ignition is turned off. Satellite lock can be immediate or minutes depending on the interval between last time used and receiver obstructions. Regardless of satellite lock data transmission begins after the application of power.

On the receiving side, power from the vehicle's ignition is applied to the Receiver, and the Analog to Digital converter "RTD". Both become active immediately. Receive range is limited to line of site. Field testing has shown typically a two-mile radius. From the laptop the receive session begins with the user launching Active Asset Server, selecting the RTD port and launching ArcGIS Explorer. A receive session can be started or stopped by the opening or closing of the port the RTD is connected to and all data is stored within each laptop for After Action review. Unlocked Satellite data in the form of 0.0 coordinates are received, stored in the database, but filtered from viewing.

Appendix E

June 20, 2011

Acknowledgements

A special thank you to those who assisted the Review Team with technical expertise throughout the review process:

Allen Davis, Law Enforcement Investigator II, Office of Agriculture Law Enforcement

Billy Leitch, Investigator, Georgia Forestry Commission

John Spisiak, Telecommunications Specialist III, Florida Division of Forestry

Lee Barnwell, Senior Forester, Florida Division of Forestry

The Review Team would like to thank all firefighters and personnel who assisted during this review process. Your open and cooperative attitude helped ensure a complete and thorough review of this incident in our effort for all wildland fire agencies to learn from this event.