

# Staff Ride

## Resources



Wildland Fire Leadership Development Program

## Mack Lake Fire – Facilitator’s Field Guide

**Note to Facilitators:** This is a suggested format. Do not feel limited by the identified stands or discussion items. It is provided as a word document so that users may adapt and revise it to fit their specific audience and time demands.

### Staff Ride Difficulty Rating

#### Physical

**Light** – All walking segments are on flat to gently rolling terrain, at approximately 1,000 feet in elevation. There is no appreciable elevation gain or loss. The hiking is along the cleared highway right-of-way for Highway M-33, the powerline going east from M-33 and then along the tractor plow line which has been cleared of brush for access. Total hiking is approximately 3 miles to access Stands 1-5 when a vehicle shuttle has been arranged. If reduced hiking is desired Stands 1-3 and 5 can be easily accessed from the nearby roads.

#### Logistics

**Easy** – All Stands are along or close to maintained state and county roads. The parking area for Stand 1 is approximately 6 miles south of the town of Mio (My-oh) along State Highway M-33. The town of Mio has ample overnight accommodations. Access to the site is dependent on spring break-up. In normal years it is safe to assume most snow cover will be gone by April 1. Parking for Stands 1-4 is along Highway M-33. Carpooling is highly recommended to reduce congestion getting on and off the highway at this location. Stands 5 and 6 are along county roads with light traffic, however carpooling is also recommended to reduce congestion at these sites.

#### Hazards

**Traffic and Parking** – Participants must park on the Highway M-33 right-of way to access Stands 1-4. This is a heavily traveled arterial highway and is the only section with passing lanes for many miles in each direction. Drive defensively when pulling on and off the Highway and have your lights on for visibility. There is ample room to pull all of the way off the pavement and shoulder. Park along the treeline to get as far away from the road as possible and carpool to reduce the number of vehicles at the site. Recommend to only park 3-5 full size pickups or other vehicles at this site. Stand 5 is along a lightly used county road. Pull onto the shoulder or park in the fuelbreak at Stand 5.

**Off Road Vehicles** – Participants must cross or will be directly alongside a heavily used ORV trail while accessing Stands 1 and 3. Do not loiter in the trail and look both ways when crossing

it going to Stand 3. ORV's use the powerline illegally and are legally allowed to use county roads. Listen and always look to avoid an accident while walking or driving.

**Weather** – All types of weather can be expected during the spring and fall from cold and snow, thunderstorms with lightning, to hot and dry conditions. Be prepared for almost any type of weather. Summer is usually mild, sometimes with hot and humid conditions.

**Snags and Brush** – The entire fire area is primarily regenerated jack pine and oak. Some snags do exist along Stands 1-4. Of more concern is the dense jack pine brush along those same stands. **Eye protection and hardhats are highly recommended while hiking between Stands 3 and 4.**

**Interested Public** – If you are driving agency firefighting vehicles it is possible the public will stop to ask questions along M-33 or the county roads. Be prepared to answer questions and more importantly recommend they move on, so they don't cause congestion along the highway.

**Deer Rifle Season** – Do not plan a staff ride during the period of November 15 and November 30 each year. The area is a popular hunting destination which could create a safety problem.

**For additional information contact the USFS Mio Ranger District at 989-826-3252.**

## STAND 1: Crane Lake Prescribed Fire

### Maps

Appendix B3A and B4, hand drawn maps from the Fatality Investigation, Mack Lake Fire.

N 44.56934°

W 084.12872°

### Visual Aids

General Technical Report NC-83 “The Mack Lake Fire” pgs. 14-17, Figures 14-20.

Appendix C2, pgs.1-2, Photos of 125 and 1000-gallon engines, Fatality Investigation, Mack Lake Fire.

### Background

- Looking to the northwest, across M-33 (this was a two-lane highway in 1980) from this point, you can see the location of the 186-acre Crane Lake timber sale. You will notice a small hill with hardwood (oak and aspen) trees surrounded by dense, immature jack pine. For orientation purposes, using Map B4, this aspen stand is in the area where the M33 shield and the words “standing timber” are printed on the map. The Crane Lake Prescribed burn divided the clearcut area into five burning blocks and the May 5, 1980, burn was a 28-acre unit of that larger project. The primary objective of the timber sale was to create breeding habitat for the federally Endangered Kirtland’s warbler, with a secondary objective of fuels reduction. The treatment was to clearcut the jack pine pulpwood and then prescribed burn, to prepare the site for machine planting of jack pine. The Kirtland’s warbler is a habitat specialist, preferring to nest in large areas of dense young jack pine approximately 5-15 years old, or between 5-15 feet tall. The clearcutting, burning, and planting were designed to create a 186-acre block of habitat for the bird.
- The timber was cut, and a burn plan was prepared in 1978. Unfavorable weather conditions in 1979 prevented the implementation of the prescribed burning. The prescription for the burn was mid-afternoon conditions:

Temperature	≥45°
Wind Direction	West
Wind speed	5-10
Days since measurable rain	2-5
Relative humidity	25-50%
SI fuel sticks	9-15

- The burn was rescheduled for April 1980. Favorable weather on May 5, 1980, prompted the District to attempt the burn. A special weather forecast (spot forecast) was requested from the National Weather Service (NWS) and was received just after 0900 that morning. The forecast predicted relatively warm, windy, and dry conditions with a weak cold front passing through the area between 1500 and 1700 hours. The table below shows on-site readings and predicted conditions.

<b>Weather Component</b>	<b>0945 On-Site Meas.</b>	<b>AFFIRMS* Mid-afternoon</b>	<b>NWS Forecast</b>
<b>Temperature</b>	74°	71°	64° (1000) 72-76° (1200-1400)
<b>Wind Direction</b>	West	Northwest	SW-W 1000 SW-W 1200-1400 W-NW 1500-1700 (Shift)
<b>Wind Speed</b>	5-10 mph	16mph	6-10 mph 1000 10-16 G20 1200-1400 10-15 G20 1500-1700
<b>Day Since Measurable Rain</b>	4		
<b>Relative Humidity</b>	37%	40%	35% 1000 23% 1200-1400
<b>Burning Index</b>	Not Calculated	33 Model C 69 Model Q	

\*AFFIRMS is the pre-cursor to WIMS and stands for Automated Forest Fire Information Resource Management System

- Fuel type was scattered piles of jack pine slash with grass, shrubs, blueberries, and some seedling and sapling jack pine. The loading and continuity was highly variable due to the clearcutting and subsequent scattering of slash throughout the unit. The slash was originally piled at one location due to a whole tree harvesting method. At the request of the District, the timber sale contractor redistributed the slash back throughout the unit per the original intent of the project to broadcast burn the slash.
- The predominant jack pine forest experiences a “spring dip” in live needle moisture during April and May in this area of Michigan (Figure 13, page 13 GTR-NC83). This reduction in live needle moisture coincides with spring fire season and historical records show most crown fires occur during this period. Summer crown fires do occur but are less common and consume less acres normally.

## Resources for the 28 acre burn included:

1 John Deere 450 tractor plow

1 brand new 1000-gallon 6x6 engine,

1 125-gallon 4x4 engine

11 personnel total

- Several firefighters were unavailable that day, including the primary tractor plow operator, due to a training session being held that day. The intent of the burn crew was to ignite the burn by 0900 and complete it before less favorable weather conditions set in during the afternoon. However, wildfires the day before delayed the placement of two 300-gallon water bladders and this set the crew behind schedule. Weather was taken on-site at 0945 and the District Ranger gave the go ahead to proceed with the burn and then assisted with the firing operation. The prescribed burn was ignited at 1026. The crew considered the early stages of the burn to be the test fire.
- The fire was ignited in the southeast corner of the unit with firing to progress north along the east control line (tractor plow line, in some cases double plow line), parallel to M-33 to establish “good black”. The plan was to light the west control line to run head fire through the unit once the east control line was secure and black. The fire spotted 3 times during the initial stages of the perimeter ignition along the east control line. These spots occurred between the east control line and M-33. They were contained easily.
- A fourth spot occurred within a small patch of mature jack pine left for visual aesthetics along the highway. This spot was more resistant to control, spotting over the initial plow line, and took most of the fire’s resources to suppress. Ignition was halted during the suppression of this spot fire. The tractor plow operator eventually plowed a secondary plow line around the double spot (spot fire four).
- During this time the Fire Boss requested the 125-gallon engine to move to the northeast side of the burn unit. The engine got stuck on a stump (see Map B3A for location) and the tractor plow was needed to pull it free. The engine was forced to wet down the burning grass around it as the fire approached.
- Once the engine was free the burn boss gave the order to start the head fire moving northwest along the southwest edge of the unit. The crew then began to fire the west side of the unit, from the point of origin in the southeast corner. This initiated a head fire pushed by the west wind into the black created on the east flank. A fifth and sixth spot fire developed and were suppressed by the 1000-gallon engine and the tractor plow on the east side of the burn.
- After the fifth and sixth spots were contained the 125-gallon engine stalled while trying to cross the burn unit. Firing continued while the truck was stalled (see Map B3A for location). The tractor plow was called away from the northeast side of the unit to pull the vehicle to safety as fire was reaching the rear bumper of the vehicle. The engine had used all of its water in suppressing spot fires and protecting itself when it was hung up on the stump.
- At approximately 1142 the burn boss requested more Sheriff’s patrol to help with heavy smoke along M-33. The fire then spotted, for the seventh time, over the northern control line in mature timber that had been left for visual aesthetics. The spot fire began to move

rapidly to the east. At 1206 the 1000-gallon engine radioed the burn boss and told him that the spot fire was headed for the highway.

### Group Discussion:

#### **Put yourself in the shoes of the Burn Boss. Keep in mind human factors and the Swiss Cheese model.**

- Using Swiss Cheese Model, what holes are lining up to cause an unintended outcome?
- What human factors might affect your decision making in this situation?
- What options do you have to address the challenges you are having implementing the prescribed burn?
- What Leader's Intent would you give to your resources in this situation?
- Could you declare this prescribed burn a wildfire at this time? Why or why not?
- If this burn and situation was occurring today, what would be different?

#### **Now put yourself in the shoes of the District Ranger (Agency Administrator). Keep in mind the human factors and Swiss Cheese model.**

- How does your (Agency Administrator) participation in the prescribed burn affect the rest of the prescribed burn organization?
- Do you stay in your role as a crewmember given the situation, or should you transition into your Agency Administrator role?
- Are there holes in the Swiss Cheese that developed earlier than May 5, 1980, if so please describe?

## STAND 2: First Spot Fire East of Highway M-33

### Maps

N 44.57704°

W 084.12915

Appendix B3A and B4, hand drawn maps from the Fatality Investigation, Mack Lake Fire.

### Visual Aids

General Technical Report NC-83 “The Mack Lake Fire” pgs. 16-17, Figures 16-20.

### Background

- The spot you currently are standing at is the location of the first spot fire that crossed Highway 33. It was contained by a double tractor plow line that can still be seen today.
- Looking west across Highway M-33 (this was a two-lane highway in 1980) you see the location of the Crane Lake Prescribed Fire. At 1142 a request was made for additional Sheriff's patrol due to the heavy smoke along M-33. At approximately 1206 the seventh spot escaped initial control efforts and began to move east towards the highway. This forced the personnel on the fire to use M-33 as the next logical control feature. The burn boss requested another Sheriff's patrol at 1208 for M-33 due to continued heavy smoke. At approximately the same time the escaped fire was burning downslope towards M-33 on the west side of the highway. The tractor plow had constructed a line along the north side of the spot fire and connected it to M-33. However, the line did not hold.
- The first spot fire was also detected on the east side of the highway during this time. The 1000-gallon engine attacked the spot but was delayed as it tried to climb cut- slope due to the steepness of the grade. The burn boss then directed the tractor plow to contain the spot across the highway. The tractor plow put in two lines around the spot, successfully containing it with crewmembers patrolling the plow lines.

### Group Discussion:

**Put yourself in the shoes of the Burn Boss. Keep in mind human factors and the Swiss Cheese model.**

- If you could turn the clock back, would you make changes/improvements to the RX burn plan, design, or prescription?
- What are the highest values at risk right now?
- As a Burn Boss how would you be feeling and reacting at this point in the operation?
- What criteria will you use to decide to retain this fire as a prescribed burn or declare a

wildfire?

**Put yourself in the shoes of the District Ranger (Agency Administrator). Keep in mind the human factors and Swiss Cheese model**

**You have just been informed from the burn boss that the controlled burn has escaped and declared a wildfire.**

- If you could turn the clock back, would you make changes/improvements design of the project in the planning/NEPA stage?
- What actions will you take based on the wildfire declaration?
- Using the Swiss Cheese Model, try to predict what holes may form in this type of situation, and how can you act to mitigate or eliminate them?
- Discuss the human factors and reactions affecting you, your firefighters, and the agency regarding the decision to declare a wildfire.

## STAND 3: Crane Lake Prescribed Fire Becomes the Mack Lake Wildfire

### Maps

N 44.57997°

W 084.12797°

Appendix B4 and B6, hand drawn map from the Fatality Investigation, Mack Lake Fire

### Visual Aids

General Technical Report NC-83 “The Mack Lake Fire” pg. 15 Figure 15 and pg. 18 Figure 22

### Background

- The tractor plow lines from the attempt to control the second spot fire across M-33 and then the plow line going to the east can be seen at this location
- Between 1215 and 1230 a second spot fire was detected on the east side of M-33 just north of the original spot fire which had been contained by the tractor-plow and other personnel. This spot was in grass on the highway shoulder and was pushed by wind. The fire torched and then crowned within 100 feet of the origin in a stand of sapling sized jack pine. Surface fuel was primarily sedge, pine litter and duff at this point.
- The tractor plow, spotter, and 1000-gallon engine attacked this spot fire within 4 minutes. Some of the crews remained confident they could contain the spot fire and hold the main fire on the west side of the highway and did not feel the fire had escaped at that point. This was partly due to the 1000-gallon 6x6 being brand new and bringing significantly more suppression capability than previous years. The burn boss directed the resources to flank the spot from the north side. The tractor operator began to plow too close to the fire and was directed to not crowd the fire and have the engine follow behind for support. The District Ranger served as the tractor plow’s spotter. When the engine attempted to follow behind the tractor plow, they found the fire had already jumped the southern portion of the tractor line. They attempted to use a wetline to contain the fire and tied back in with the tractor plow line on the west flank of the spot fire.
- The burn boss began ordering additional resources at approximately this same time (1220 to 1247) requesting tractors and engines to assist with the fire. The tractor plow continued plowing line angled slightly northeast just north of the powerline. The spot fire could not be held, and the fire had grown in intensity to a sustained crown fire. However, the tractor plow and 6x6 engine continued flanking the fire in the belief their efforts would be effective and/or reinforced from behind. The District Ranger, who was serving as the tractor’s spotter, was briefly interrupted by a reporter along the powerline. At this time the District Ranger decided the fire had escaped and felt a more experienced aerial observer was needed. The District Ranger left the tractor and discussed this with the burn boss. It was decided that the District Ranger would go up in the plane and he left the fire scene. Because no vehicles were available at the fire, the District Ranger hitched a ride on M-33 to the nearby airport.
- The tractor plow continued plowing line to the east and slightly north of the powerline without the 1000-gallon engine or a spotter. After this point, no further radio communications were heard from the tractor.

## Group Discussion:

**Put yourself in the shoes of the Tractor Plow Operator. Keep in mind human factors and the Swiss Cheese model.**

- Have more holes in the Swiss Cheese developed, explain?
- Using current firefighting standards and tactics would you accept the assignment to continue the direct attack on the north flank of the fire, explain your rationale?
- How would you go about turning down the assignment if you are not willing to accept it?
- Share an experience where you have been uncomfortable or had to turn down an assignment.

**Put yourself in the shoes of the District Ranger (Agency Administrator). Keep in mind the human factors and Swiss Cheese model**

- Using the Swiss Cheese Model, what holes do you see that could line up to make this situation worse? What can you do to help prevent that?
- What actions will you take to support the personnel assigned to this incident?
- Since this is an escaped prescribed burn what unique issues will need to be dealt with during and after this incident

## STAND 4: Tractor Plow Operator is Entrapped

### Maps

N 44.58130°

W 084.11897°

Orthophoto with tractor plow actions.

Google Earth map with stand locations and fire progression.

Appendix B6, hand drawn map from the Fatality Investigation, Mack Lake Fire.

Appendix B7, hand drawn map from the Fatality Investigation, Mack Lake Fire. Fatality site diagram.

### Visual Aids

General Technical Report NC-83 “The Mack Lake Fire” pg. 18 Figure 22.

### Background

- The tractor plow operator continued to plow fireline to the east, creating a slightly indirect line on the north flank of the fire. It was approximately 1230 and he was working alone initially. The fuel type was dense sapling and pole size jack pine. The 6x6 followed behind the plow using a wetline sprayed at the base of the fire which was about 30 feet away from the engine as they progressed.
- While the original prescribed fire personnel continued to battle the escaped fire. Numerous volunteer fire departments (VFD) were responding, law enforcement had begun evacuations of the Mack Lake subdivision, and Michigan DNR had responded to the fire. Activity of these responders was primarily focused on evacuations and protection of the subdivision. Communications and coordination with these resources was minimal at this time.
- Both the 1000-gallon engine and tractor plow were forced to stay away from the flame front and not use direct suppression tactics. Their methods were a hybrid of direct and indirect tactics using a stream of water from a distance to knock flames down and plowing a short distance away from the flame front.
- The tractor operator lifted his blade approximately ¼ mile east of M-33, made a left U-turn. He then lowered his plow and began another line heading to the east. This new line was north of the previous line and the operator did not connect the two segments of line together. This can be seen on Map B6. During this maneuver, the 1000-gallon 6x6 engine passed the tractor plow making wet line. Eye contact was made between the tractor operator and the engine as they passed but no verbal communication. The engine operator had the impression the tractor operator moved over to allow him to pass. The tractor fell behind the 6x6 due to its slower speed but continued plowing to the east. From this point on the 6x6 engine was ahead (east) of the tractor.
- The tractor plowed a circle along his line, shortly after being passed by the 6x6, probably due to a spot fire, and then continued east. This circle can be seen on Map B6. Shortly thereafter the 6x6 engine radioed that they were being forced to disengage from the fire

and were moving to the north to escape the fire. The engine was approximately 1/8 of a mile ahead (east) of the tractor at that time. The engine was able to move north away from the fire and escape.

- The fire was making a short run to the north due to a wind a shift or possibly a horizontal roll vortex downdraft. This forced the tractor operator to again lift his plow and move north and then drop the plow and begin moving in an arc to the northeast. This again left a portion of open, unplowed line behind him. Within a few minutes the operator realized he needed to make an immediate escape from the fire as it was overtaking his tractor. He lifted his plow a final time and began to move to the northeast. The operator abandoned the tractor after 110 feet and ran another 276 feet at a 26° angle before being overcome by the advancing fire. His body was found without a fire shelter. Items such as his hardhat, wallet, keys, glasses, and candy bars were found between him and the tractor within 60 feet of his body.
- At approximately 1300 the IC began calling the tractor to try to reposition it in the Mack Lake subdivision. The IC could not reach the tractor operator by radio and became alarmed. He asked another firefighter to continue to try to reach the tractor operator. When no radio contact could be made, the IC then asked a second firefighter to try to find the tractor operator on the ground. During this confusing time the Mio Department of Natural Resources tractor plow became stuck on a stump near the Mack Lake Subdivision. Radio traffic became confused by the identical radio designators for the Mio DNR tractor and the Mio USFS tractor. The second firefighter followed the tractor plow line from M-33 and, with the help of the spotter airplane, discovered the burned over tractor at approximately 1500, and the body of the tractor operator shortly thereafter. The investigation did not find evidence of a fire shelter at the site. It was confirmed the shelter was on the tractor on May 4th attached to the rear screen of the tractor. It is theorized the operator attempted to use the shelter and it was blown away.
- The original personnel on the prescribed fire continued to fight the fire until the next day knowing that their coworker had been fatally burned over by the fire.

### Tactical Decision Scenario

You are the ICT4 on a fire in the Huron National Forest. The fire danger rating for the day is Extreme. The fire is burning in dense, mature jack pine. The temperature is 67°, 13% RH, winds out of the SE @16mph gusting to 30 mph. You have 7 engines of various types, 1 T3 helicopter, and 1 aerial observer over your fire, and two dozers. You have been flanking the fire on the north and south side for two hours, it is now 1400. Your flanking attack has not been keeping up with the spread of the fire and it is now a sustained crown fire and approximately 600 acres in size threatening numerous structures.

You recently lost contact with your engines and dozer on the north flank after hearing they were disengaging from the fire due to a wind shift and intense fire behavior. It has been 15 minutes since you last spoke with any of the north flank resources. The aerial observer and helicopter cannot see into that area due to heavy smoke. The aircraft report spot fires at least ¼ mile ahead of the main flame front on the north flank. The aircraft also relay a message from the north flank that one engine is unaccounted for and may have been burned over. Many resources are arriving to help from local, state, and federal agencies. However, an ICT3 is still several hours away. No T1 or T2 IMT's are within 24-hour response.

- What are your priorities?
- What actions will you take to find the engine crew?
- How can you reconfigure your organization and resources based on complexity, span-of-control, and priorities from above?

### Strategic Discussion Points

As the District Ranger you have been on scene throughout much of the early stages of the fire described in the above scenario. You have just learned through incident radio traffic that the engine that was unaccounted for has been found. The engine was burned over, and two fatalities are confirmed. You do not know if the fatalities are from one of your engines or a cooperator.

- How will you approach notification of the families of the deceased, especially since you expect cell phone traffic to rapidly spread both accurate and inaccurate information almost immediately?
- What changes in your incident organization will need to be made in order for the suppression effort to continue in a safe manner, while concurrently handling the fatality incident?
- What help will you need to deal with this tragedy from a personal and organizational perspective?

## STAND 5: Mack Lake Subdivision, Perma-Log Home

### Maps

N 44.58122°

W 084.08662°

Google Earth map with stand locations and fire progression.

### Visual Aids

General Technical Report NC-83 “The Mack Lake Fire” Front Cover.

General Technical Report NC-83 “The Mack Lake Fire” pg.20 Figure 23.

Little Mack Lake Fire PowerPoint Presentation

Maple Ridge Prescribed Fire PowerPoint Presentation

### Background

- The fire continued to advance on the Mack Lake subdivision at a rate of almost 3mph with spotting ¼ of a mile in advance of the head. The fire reached the edge of the subdivision at approximately 1310 and had burned through the whole subdivision by approximately 1325. 44 structures were lost; many more survived the fire and were saved or spared for one reason or another.
- The home on the front cover of the GTR NC-83 survived the fire, primarily due to a concrete construction (trade name of Perma-Log). The two homes next to it were consumed by the fire. The rapid spread of the fire and high intensity did not allow for effective structure protection.
- Evacuations were effective and no residents’ lives were lost. One civilian was injured trying to get a closer look at the fire. After the fire passed firefighters were able to quickly return to the subdivision and prevent further structure loss from residual burning and smoldering.
- The existing fuel break was constructed to help protect the subdivision from future fires after the Mack Lake Fire and is approximately 200 feet wide. This fuel break was not in place during the 1980 fire.

### 2012 Little Mack Lake Fire

The Little Mack Lake fire was detected on April 25, 2012, at 1853 in the evening. The fire origin is approximately 1 mile southeast of the Mack Lake Subdivision. Weather has been very dry, windy, and no rain for the last 5 days. Humidity dropping into the 10-20% range each afternoon. Humidity below 25% meets red flag criteria for that parameter.

Conditions at time of ignition, at the nearby Mio RAWS, are 59 degrees, 17% humidity, winds out of the south and west at 7 MPH gusts to 12 MPH. The fire quickly transitions to a running crown fire moving to the north. Forest Service, Michigan DNR, and Local VFD’s all respond due to structures threatened and fire danger conditions.

Because of the 1980 Mack Lake Fire, the subdivision is now surrounded by a fuelbreak complex.

The fuelbreaks are also designed to serve as ingress/evacuation routes. The widest section of fuelbreak is approximately 1580' wide. In other areas, multiple fuelbreaks exist to slow potential fire spread into the subdivision and provide multiple options to suppress an approaching fire. Fuelbreak width varies between 300'-600' in most areas.

Crews quickly begin flanking the fire with tractor plows and preparing to defend structures using the fuelbreaks. The tractor plows paralleled the fuelbreaks going direct on the east and west flanks of the fire. However, winds shifted to the west compromising the east flank tractor line and directly threatening the subdivision. The decision was made to withdraw from the east flank and burnout the northwest corner fuelbreak, around 2400, protecting the subdivision. Burnout operations in the grass fuel model only took a few minutes with some resident who did not evacuate watching from across the street.

The crown fire continued to move north past the subdivision, dozers and engines continued flanking the fire. The crown fire slowed down as humidity increased to 50-60% between 0300 and 0500. A light rain started by 0500. Crews contained the fire early in the morning on 4/26 at approximately 820 acres.

No structures were lost, the subdivision was easily defended by crews due to the fuelbreaks. Residents for the first time in 32 years had a very positive example of Forest Service, and interagency firefighting capability, compared to the 1980 Mack Lake Fire tragedy.

## 2014 Maple Ridge Prescribed Fire

After the Little Mack Lake Fire threatened the subdivision several fire protection issues were identified with the fuelbreak system. The westernmost fuelbreak, although effective in stopping the Little Mack Lake fire had the least depth compared to the rest of the system. The fuelbreak was 200' wide while the rest of the system had fuelbreaks at least 300' -600' wide. The second issue was the Little Mack Lake fire did not consume a 50-acre patch of dense jack pine immediately adjacent to the fuelbreak on the west side and the subdivision.

The decision was made to expand the western fuelbreak to 300' and remove the 50 acres of jack pine adjacent to the fuelbreaks. The removal of jack pine had two main objectives, hazardous fuel reduction and create additional habitat for the then endangered Kirtland's warbler. High intensity RX fire was chosen to be the method of treatment due to ecological, financial, NEPA, and timing constraints making mechanical removal a poor option. Prescribed fire was considered viable since the unit was bordered on two sides by the crown fire scar from the 2012 fire, and the other two sides were bordered by fuelbreaks and a swamp.

### **The Maple Ridge prescribed fire was designed to use many of the lessons learned from the Mack Lake Fire. This included:**

- Using control features that could hold a crown fire (Swamp, Fuel breaks, crown fire scar)
- Grass fuels within the fuel break would be burned prior to the main unit ignition on a day that timber was not available to burn. Removing all available fuel in the fuel break and ensuring the prescribed fire could not escape into the adjoining jack pine fuel.
- Main unit ignition to be conducted in the evening/night, with a spot forecast that predicted

good humidity recovery. This would create a collapsing burn window from a weather and burn period perspective. This strategy would greatly reduce probability of ignition.

- The 50-acre prescribed fire had a 996-acre maximum manageable area (MMA) so that spotting into the recent fire scar would not be considered an escape and the collapsing burn window could serve as the suppression method based on Burn Boss discretion.
- West wind prohibition to protect the subdivision

The political considerations were more complicated due to the history of the Mack Lake escaped wildfire and the tragic consequences. Public involvement was conducted, including public meetings. Many residents were supportive of the project given the recent success of the firefighting efforts and the fuelbreaks. Other residents remained concerned that the prescribed fire would escape control and/or the visual aesthetics of the burn was not desired.

The decision was made to move forward, and the project was implemented on the evening of May 11, 2014. The fuelbreaks were burned prior to 5/11. Crews began black lining shortly after 1900. Weather at 1900 was 71 degrees, RH 31%, and south wind of 1-3 MPH. It had been 2 days since rain (.07") and the preceding week there had been 1" of rain in multiple events.

Crown fire was initiated at approximately 2020. Weather at 2020 was temperature of 71, RH 38% with light S-SE winds. The crown fire quickly consumed most of the unit within 5 minutes. Several smaller sections were fired and by 2100 ignitions were complete. Weather at 2100 was 68 degrees, RH 47%, with light S-SW winds.

No control problems occurred during implementation. Resources began the burn at 1900 and finished at 2200. Flame lengths within the column likely exceeded 100', ROS was estimated at 189-315 chains per hour. This equates to 2.3 to 3.9 MPH.

Post fire results indicated complete mortality of the jack pine stand and elimination of crown fire threat to the adjacent subdivision. Stocking surveys after 5 years confirmed the jack pine did not regenerate well within the stand and did not meet the objective of quality Kirtland's warbler nesting habitat. The burn area can be considered foraging habitat for the birds and is now serving as a permanent fuels reduction and wildlife opening since the timber did not regenerate.

## Observations and Lessons Learned

- Crown fire in jack pine is possible with only 2 warm, windy, and low humidity drying days
- Evening/nighttime ignition dramatically reduced probability of ignition (PIG) and resultant spotting. Compared to the long-range spotting of the 1980 Crane Lake RX fire which was ignited mid-morning and was making crown runs by approximately 1200.
- Fuelbreaks, roads, and other natural or manmade features are dramatically more effective, compared to firelines (hand/tractor) for holding RX fires or wildfire suppression. Design your project with more than adequate fire control features.
- Bring your prescribe fire project boundary to fire control features rather than attempting to

build firelines through fuel complexes. Consider your adjoining fuel type as an equal or more important factor in your project design.

- Use previous wildfires or fuels/RX treatments to anchor future treatments to maximize fire control effectiveness

### Tactical Decision Scenario

It is Memorial Day weekend; a windstorm has pushed a tree onto the powerline near the origin of the 1980 Mack Lake fire. A crown fire has developed with temperatures in the low 80's and humidity in the low 30's with west winds from 10-20 mph. A Haines index of 6 is predicted for that afternoon.

Your task force consisting of 1 T6 engine, 1 T4 engine, 1 T3 tractor plow have arrived to help assist with structure protection in the subdivision. You recognize this fire is quite like the 1980 fire. The ICT3 has briefed you that your objective is to provide defensive structure protection for the NW portion of the subdivision. Three other task forces will handle the remainder of the subdivision. Since you are familiar with previous large fires within the Mack Lake basin, you estimate you have 20-30 minutes before the fire reaches the existing fuelbreak designed for just such an event.

You have roaded escape routes to the north, south, east, and west. The task force to your south is actively burning out a field for a safety zone. Evacuations are underway and appear to be complete for your portion of the subdivision. You have a T1 and T3 helicopter w/bucket on scene.

- Determine what course of action you will direct your task force to take?
- Is the existing fuelbreak sufficient to protect the subdivision?
- Do you feel it is safe to stand and defend the structures with a direct hit from the oncoming crown fire, and explain why?
- Put yourself in the shoes of an FMO or District Ranger. What actions will you take as this fire evolves?

## Strategic Discussion Points

As described in the scenario above a major wildfire is threatening the Mack Lake subdivision. It appears that the suppression effort is well coordinated with adequate resources. The IC is defensively protecting life and property allowing the main fire to spread into undeveloped areas while protecting the subdivision. The subdivision is surrounded by an extensive fuel break system. There does appear to be some communication and coordination issues among incoming resources including law enforcement, and volunteer fire departments.

- Are you comfortable with the strategy the IC is using to manage the fire?
- How can you as an FMO or Line Officer help the IC manage this incident?
- What contacts and coordination will you undertake with cooperating agencies and local government to help manage the fire?
- Once the fire is no longer threatening the Mack Lake subdivision what direction and priorities will you give the IC to then suppress the fire? Will you do this by presenting a formal WFDSS to the IC?

## Staff Ride Integration Phase

**Suggested questions for the integration phase. It is recommended that just one question is used for the group unless time allows for a longer integration phase.**

- What were the human factors that most stood out to you based on the study of these four fires?
- How does project planning, decision making, and preparedness affect the outcome of a project or suppression effort based on study of these fires?
- Based on your study of these events, how do you identify and eliminate holes in the Swiss Cheese?
- What is the single most important thing that you have concluded from today's study?
- How will you use what you have learned?