

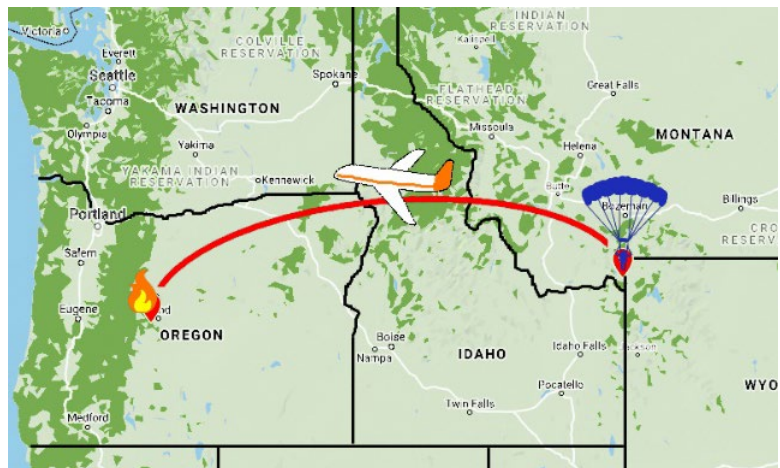


Image of the Lily Fire burning in a fire scar from 1996. Provides perspective on terrain and the fuel loading of snags and dead down.

Lily Fire Incident

NARRATIVE

It was a 2.5 hour flight from the West Yellowstone jump base to Incident 701, later named the Lily Fire, on the Deschutes National Forest. At one point the jump ship hit a pocket of turbulence where the load experienced the “biggest bump” the spotter had ever encountered in a plane. The plane circled the fire while the spotter spoke with a jumper on the ground about finding a jump spot. It was late in the day, and shadows were beginning to grow as dusk drew near. The spotter threw out streamers looking for drift and signs of possible down air but the



Map showing the distance from the West Yellowstone jump base to the Lily Fire.



How do streamers work?

Streamers are a set length of crepe paper with a specific amount of sand taped into the base of them. They are designed to fall at the same rate as a smokejumper would under canopy. Streamers are thrown out of the plane at 1500' AGL to show the vertical (up air and down air) and horizontal (wind) movement of the air.

A normal range of time it takes the streamers to get to the ground is between 55 and 80 seconds. The first set of streamers (they come in sets of 2 for redundancy) are thrown out directly over where the jumpers wish to land in the jump spot.

The wind (horizontal component) is measured in yards of drift and is determined by judging the distance between where the streamers were let out (over the jump spot) and where they land.

streamers indicated “pretty good air,” taking 67 seconds¹ to get to the ground and showing about 200 yards of drift (a low wind situation).

The spotter selected the same meadow with scattered timber that the 2 previous loads used earlier in the day. To the experienced jumpers on board it looked like a normal jump spot; “bigger than Boomerang,” a commonly used proficiency jump spot for the West Yellowstone Smokejumpers, except here the trees were taller.

There was a jumper from the previous load holding a streamer yelling to the jumpers as they neared the ground, “No wind. No wind.” In the jump spot with him was another jumper waiting to brief the incoming resources as a Crew Boss trainee. The rest of the previous jump load were already making their way to the fire one mile away just a short bit off the Pacific Crest Trail.

The first stick was already on the ground as the final jumpers exited the plane. The last jumper flew a left hand pattern watching his jump partner (JP) set up for a final approach. Taking note of the alleyway his JP selected, he set up for his own final. Once on final he recognized that he was a little downwind from where the other jumpers had set up.

When he realized he wasn't going to make the jump spot and no alternates were available, he looked around for a healthy tree and selected a tall green western hemlock to land in. He aimed for it, snagging his parachute in limbs approximately 40 feet above the ground. As he came to rest he quickly shifted into the muscle memory he developed during rookie training that spring, calming the initial nerves he felt.

¹ Normal range is between 55 and 80 seconds from 1500' Above Ground Level (AGL)

Initiating the letdown procedure, he called out to his jump partner, “JP, am I hung up well?”

But his jump partner, still making his way to the tree having just landed himself, was not yet close enough to hear or respond. Now that he was treed up, the tree didn’t seem to be as good as he thought. Entangled about midway up the 100 foot tree on the edge of the branches, he was just out of arm’s reach from the bole. He seemed to be fairly level with most of the tension on his left riser. There weren’t many branches around him, and those that were nearby were short and sloped downward. Continuing the letdown procedure, he chose to drop the drogue release handle instead of placing it in his pocket, in order to avoid excess movement.

Three jumpers from the previous load heard over the radio someone was treed up as they continued hiking to the fire. The jump ship maintained orbit, waiting for the jumper to get on the ground before throwing cargo. One of his rookie trainers saw him hung up and ran over to help him through the letdown procedure.

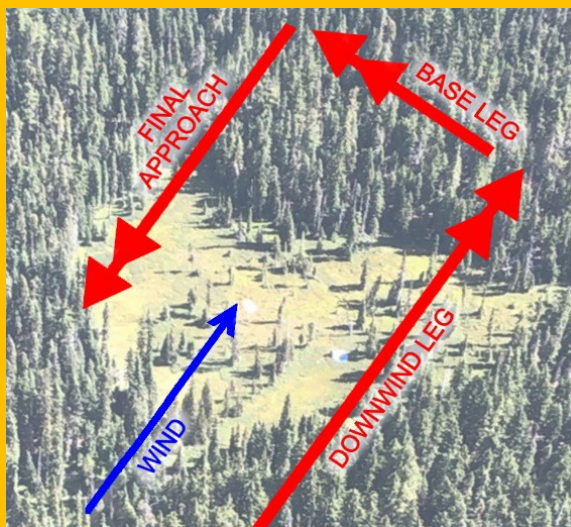
He wasn’t far along in the process when she reached his tree. “Am I treed up well?” he asked.

Looking up at the suspended jumper the rookie trainer didn’t think he was and told him so, encouraging him to continue and limiting her input to only what was needed to expedite the process. As the jumper continued through the steps small branches rained down. Throughout his training he had demonstrated great proficiency in the letdown process both on the units* and during a training jump where he treed up. He felt less stress now than he had during the training jump. His rookie trainer listened as he advanced through his five point check “perfectly correct.”

WHAT IS A LEFT HAND PATTERN?

The jumpers exit the plane upwind of the spot at 3000’ above ground level (AGL). Upon exiting the jump plane, they count “jump thousand, look thousand, reach thousand, wait thousand, pull thousand,” Once the main parachute is deployed they go through a series of canopy, airspace and control checks. They then “fly a pattern” towards the spot with the intention to place themselves in a position to land in the spot facing into the wind. This typically involves a pattern that begins with a downwind flight slightly to the right or left of the desired landing spot. Depending on the wind conditions, this downwind leg can take them past the spot where they want to land, at which time they turn in on the base leg (90 degrees to the direction of the wind) which brings them towards the middle of their approach to the jump spot. Once lined up the jumpers turn into the wind and onto their final approach to the desired jump spot.

A left-hand approach is when the jumpers begin this pattern to the right of the desired jump spot, having to turn left onto the base leg and another left onto the final approach.



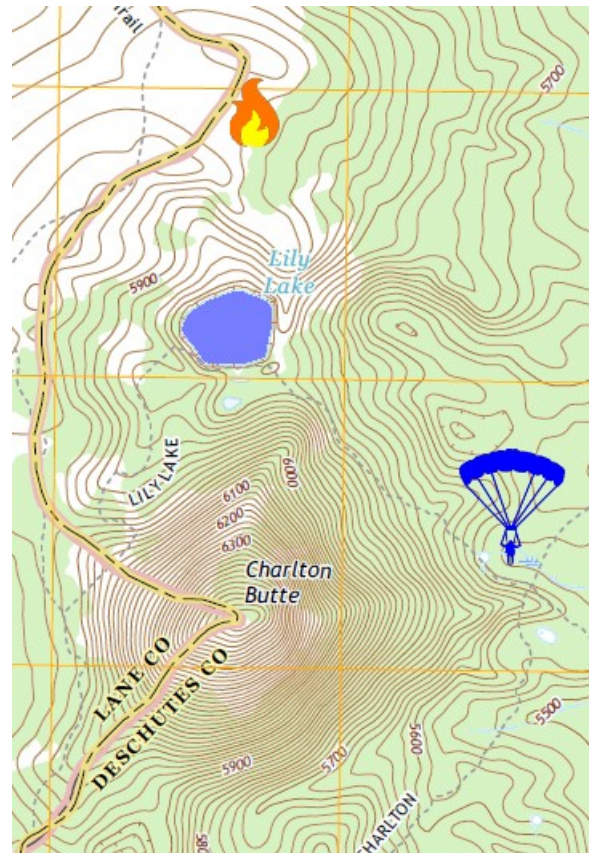
Left hand pattern used for the Lily Fire over laid on an image of the jump spot used by both Redmond and West Yellowstone Smokejumpers for initial attack of the fire.

He slowly released his right side riser and felt little movement. As he suspected, his left riser was holding his weight. Suddenly he had “a bad feeling” and said as much to the jumper on the ground. He then began to release his tight left riser. He had to jerk slightly on the riser to initiate the 3 ring release. As it released and he began to weight the letdown tape he heard a crack and began to drop. He bounced back up slightly “like a spring” before feeling a snap and falling 30 feet.

GETTING THERE

The 2020 western fire season had an awkward start. The COVID-19 pandemic took hold in the United States weeks before many units were going to begin onboarding both permanent and temporary seasonal employees and begin spring training. Well thought-out training plans had to be pushed back and/or greatly modified to accommodate an infectious disease that was just beginning to be understood. This included rookie smokejumper training. The smokejumper community opted to mitigate potential exposures by reducing inter-base training and travel with the exception being the units (exit tower/letdown platform) portion of training, leaving each individual base to cover the rest of the initial training at their home unit.

Without a high demand for initial attack the summer season started slowly for jump bases across the West. As things began to pick up in July boosting was limited to help bases maintain the “module as one” concept and pod strategies they had developed as an effort to keep vital initial attack resources healthy and operable for the fire season. On August 16, 2020, Central Oregon experienced a red flag warning across their entire dispatch area hammering them with lightning. The next morning the interagency dispatch center was busy coordinating initial attack orders for aerial resources. The local jump base was flying with their last 2 jumpers searching for yet another smoke report. Unable to locate the smoke, they continued their reconnaissance flight.



Map showing the location of the jump spot to the fire including the existing trail system used to navigate back and forth.

Incident 701 was reported by an individual hiking the Pacific Crest Trail just after 0900 on August 17, 2020. Shortly after, a staffed lookout confirmed the report as a small dark gray column with a light southwest wind on it. Mapping its location put it in a remote inventoried roadless area on the Deschutes but close to the border with the Willamette National Forest. This was also near

the Deschutes and Lane county lines. The duty officer for the district indicated that this fire was a priority and asked if the jump ship in the air, Jump-12 (J-12), had any jumpers to staff it.

J-12 had only one stick (2 jumpers) left onboard to staff the fire. They sized it up and reported it to be quarter acre with low spread potential in a flat burn scar from 1996 as they circled looking for a jump spot. Unable to find one next to the fire the crew picked out a meadow roughly one mile away that would work. Just after 1100 this last stick of local jumpers was on the ground in the meadow with cargo dropped closer to the fire.

The two jumpers were able to use the Lily Lake Trail for a good portion of the hike to the fire though it was covered with dead and down trees. By the time they arrived at the fire from the jump spot at 1245 it had grown to half an acre with moderate to high spread potential. They knew it wouldn't be the "two manner" they were looking forward to. The IC immediately ordered more resources – a type 1 helicopter and a hotshot crew, handcrew or 10 person module. Crew 501 from the Willamette filled the resource order.

In less than an hour the fire tripled in size and began spotting from snag to snag 50 – 100 yards in front of itself. At 1331 an order was put in for another load of jumpers. The dispatch center was swamped with ongoing fires and all the jump bases in the region were out of jumpers. The order was bumped up to the Northwest Geographic Area Coordination Center (GACC) and onto the National Interagency Coordination Center (NICC) and then to the Northern Rockies GACC. Meanwhile crew 501 with 8 individuals parked at the Harralson Horse Camp trail head at 1325 and started the nearly 3 mile hike to the fire.

Around 1500 the order for jumpers reached the West Yellowstone jump base in USFS Region 1 on the Custer-Gallatin National Forest. The spotter and pilot worked on filling out the required Aircraft Flight Request/Schedule or "flight strip" while others worked on getting approval from



Second load of Redmond Smokejumpers gathering their jump gear in the jump spot which later became the helispot for the air ambulance.

the Fire Staff, a regional requirement due to COVID-19 concerns. Obtaining the recently required COVID approvals and filling out the flight strip did not cause a meaningful delay. J-13 departed West Yellowstone 20 minutes after Crew 501 reached the Lily Fire at 1605.

Mid-afternoon eight Redmond smokejumpers returned from fires 651 and 653 and set about refurbishing their gear. Through cell phone communications with the jump base the Lily Fire IC learned of the jumpers at the base

and requested them through dispatch. Gathering their gear they loaded up on Jump-45 and departed the Redmond Air Center within a few minutes of the request. J-45 flew over the Lily fire and selected the same meadow jump spot from that morning. By 1900 the Lily Fire had eight more jumpers and cargo on the ground.

Once J-13 reached central Oregon air space after the flight from West Yellowstone they were redirected to another start in the response area prompting them to fuel up in Redmond rather than Bend as initially laid out in the flight strip. While on the ground J-13 was directed back to the Lily Fire. With frequencies and maps in hand J-13 took off for the Lily Fire a quarter after 1900.



Image from the next day of the tree where the smokejumper fell roughly 30 to 40 feet to the ground.

INCIDENT RESPONSE

As he fell from the tree, the jumper remembered thinking to put his feet together in preparation to do a Parachute Landing Fall (PLF); evidence of the ingrained training. When he hit the ground a log sabotaged the PLF attempt and he found himself on all fours with blood dripping through his facemask onto his arm. His rookie trainer was there in an instant gently removing his helmet to find the source of the blood and immediately shouted for help. To her he looked to be in a fair amount of pain but seemed to be downplaying it. She remembers hearing him say “Just give me a bit to lie down and I will be fine.” Just behind her was the EMT from the West Yellowstone load, deeply concerned about the injuries possible from the mechanism of injury (MOI). Given the impact, he asked the fallen jumper to lie down and began coordinating the removal of gear to expose potential injuries. Looking back up at the tree, the injured jumper was confused to see the parachute still hanging in the tree suspended in the branches and couldn’t quite work out how he fell but the parachute

remained². As the EMT performed the head to toe assessment of the patient the only findings were a laceration to his lower lip and pain, 3 out of 10, on palpation of the lower back.

When the information of an injured jumper came over the radio, J-13 quickly shifted from preparing to deliver cargo to dropping the trauma bag to the group in the jump spot. The three Redmond jumpers still hiking to the fire promptly turned around to head back, and the two individuals managing the jump spot switched to communicating with the IC on the fire about the injured jumper.



Close up of the ground where the smokejumper landed on the log.

Careful not to jostle the patient too much, the EMT and the other jumpers that were now at the tree put a cervical collar on him. Given the height of the fall no one intended for the patient to remain on the fire. While waiting for word on the plan and knowing that extractions from fires can take quite a bit of time, the EMT decided to keep the patient in a supported position of comfort as long as possible before strapping him to the Traverse Rescue Stretcher (TRS). As they treated the patient, one well-seasoned jumper noticed the letdown tape lying on the ground extending out of the patient's leg pocket. Instead of hanging from the parachute riser still stuck in the branches above, it was lying in the needles with a loop and 3 half hitches at the end.

Around 2010, dispatch received a phone call from Lily Fire IC about an injured jumper, category Red. The Assistant Center Manager (ACM) for operations took over the conversation and had the dispatcher create an incident-within-an-incident in Wildcad. At the time the IC had very little information about the status of the patient besides the MOI and wanted to start what could be a lengthy response. The Ops ACM gave the Lily IC the non-emergency number to the county 911 system and asked that they go direct about patient status. Dispatch would begin the air ambulance request and inform the 911 center to expect a call.

It had been a long busy day in dispatch which resulted in two Unit Aviation Officers (UAO) still being in the building when the call came in. Together with both assistant center managers for

² During the interview, the injured jumper asked the review team if they had an idea of what happened. When shown what might have happened he was surprised. After all, by both his perspective and that of his rookie trainer on the ground helping him through the letdown, his procedure was correct.

operations and aviation they initiated a primary plan and several back-up plans to get the injured jumper off the hill. They quickly began the essential steps to the response. Ops ACM contacted 911 to request an air ambulance, one UAO reached out to the Deschutes County emergency manager about a ground-based search and rescue team and National Guard hoist ships, the other UAO notified the regional Helicopter Operations Specialist (HOS) and started the paperwork needed by the joint operations center for the National Guard, and the aviation ACM was documenting everything that was being done. The Forest Service short-haul ship prepositioned on the forest was extended until dispatch had a solid plan in place and in motion. None of the federal short-haul helicopters have night-flying capability.

Circling above the jump spot the spotter communicated with the incident-within-an-incident (IWI) IC, checking and double checking about delivering the rest of cargo the jumpers would need as “pumpkin time” for the jump ship was fast approaching. With the injury response in the trees at the far end of the jump spot the IWI IC felt it was safe to drop the cargo in the opposite end of the meadow. The Redmond jumpers that had been hiking to the fire began arriving. The first one back unpackaged one of the West Yellowstone chainsaw boxes that were just dropped and started putting the saw together. Two more Redmond jumpers arrived as the IWI IC and CRWB-t were clearing the soon-to-be helispot of parachutes and jump gear.

On the fire the Lily IC, an Advanced EMT, and another jumper began to develop contingency plans. Their biggest concern was the air ambulance declining the mission and a hoist ship not being available which could result in the patient having to endure a long strenuous pack-out potentially exacerbating the injuries. They decided if extraction by air was not possible they would keep the patient on scene overnight as long as he remained stable.

Within 30 minutes of being requested, a local air ambulance was off the ground in Bend headed toward Lily Lake to pick up the injured jumper. The team in dispatch continued pursuing contingency plans and checking each other on “things that have gone wrong in the past.” They confirmed HEAR (hospital emergency ambulance radio) frequencies so the firefighters on the ground could talk to the air ambulance, and continued to keep leadership informed of their progress. They even pursued the availability of air ambulances, hoist ships and air rescues from as far away as Kalispell, MT. All of them were determined to apply the lessons learned highlighted in previous Facilitated Learning Analysis documents.

The firefighters in the jump spot prepared for the arrival of the medivac helicopter. Jump equipment had been secured and tucked away in the trees. They had spent 30 to 40 minutes felling green trees and snags to improve the landing zone. The patient was packaged and waiting. Using their



Image of the air ambulance on scene loading the injured patient that evening.

head lamps, they stood at the edges of the helispot indicating the landing area. The IWI IC stood in the middle of the meadow with a fusee to guide the helicopter in until it was about 100 feet off the ground. He then snuffed it out and moved out of the way. With no apparent hesitation the air ambulance pilot lit up the helispot, swept in and landed like “parking a car at the grocery store.” By 2131 the medivac ship had the patient loaded and was headed toward the hospital in Bend, OR where a hospital liaison from the local forest was already waiting.

The level of care the injured jumper received on scene and the coordination between the Lily Fire IWI IC and the Lily Fire IC, dispatch and the UAOs helped facilitate a quick extraction to definitive care. After four days in the hospital and surgery to repair broken vertebrae perilously close to his spinal cord, the injured jumper walked out of the hospital with rods and screws in his lower back. He expressed the doctors believe a full recovery is likely, but will take quite some time.

NOTES FROM THE SUBJECT MATTER EXPERTS

Based on the evidence on scene, it was determined by smokejumper equipment subject matter experts that what most likely caused the smokejumper to fall out of the tree was a misrouting of the letdown tape while securing it to the parachute riser.

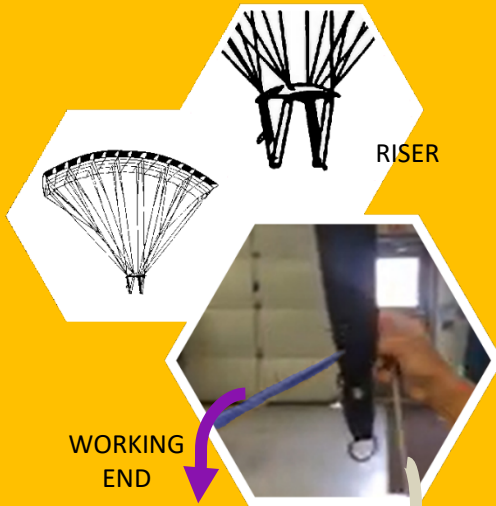
As described by the USFS Ram-Air Parachute Training Guide, the smokejumper performing a letdown will tie the letdown tape to the riser by threading the tape between the V formed on the tight riser (inside to outside), wrap the tape around the back of the riser, around the front of the riser, and thread back through the V from outside to inside, then tie off using three half hitches. However, if the smokejumper does not route the tape over the top of the main letdown line as the tape goes around the front of the riser, the knot looks correct, but does not adequately secure the smokejumper to the riser ([See below photo series for comparison](#)). When the smokejumper disconnects his/her harness from the riser, there is a potential for the letdown tape to slip from the riser, causing the smokejumper to fall.

Though the Ram-Air smokejumper letdown procedure has been in use for over 30 years (in the BLM and more recently in the FS), the first documented case of this error occurring happened earlier this year. It had hitherto not been understood that misrouting the tape in this way could result in a dangerous situation. When the potentially dangerous misroute was discovered by a smokejumper performing a proficiency letdown during refresher training, it was reported through the smokejumper Malfunction Abnormality Reporting System (MARS) database and distributed to all smokejumper bases, where it was discussed with all smokejumper personnel. A video illustrating the hazard was also produced by the base where the misrouting occurred and distributed to all other bases.

In light of this accident, it was quickly decided by the Forest Service Smokejumper Base Manager Council that the letdown procedure would remain in its current form, but that all smokejumpers will now verbalize routing the tape over the top of the main letdown line as part of the 5 point check that smokejumpers verbalize before releasing their harness from the risers. Though this

step in the procedure is standard practice for performing a letdown, the verbalization of it is intended as a redundancy that will ensure proper routing of the letdown tape. If another smokejumper is present on scene, as is common, the sequential verbalization can aid by allowing that smokejumper to affirm that the one performing the letdown has done the procedure correctly. A more in-depth procedural and equipment review will take place in the coming months by the National Technology and Development Program (NTDP) in a continued effort to make smokejumper operations and procedures as safe as possible.

Photo Series and Illustration of the Letdown Tie-Off



The smokejumper performing a letdown will tie the letdown tape to the riser by threading the tape between the V formed on the tight riser (inside to outside)...

...wrap the tape around the back of the riser...



OVER

UNDER

*** Straps were color enhanced for better visualization***



...around the front of the riser, and thread back through the V from outside

Photo Series and Illustration of the Letdown Tie-Off Continued

...then tie off using three half hitches.



However, if the smokejumper does not route the tape over the top of the main letdown line as the tape goes around the front of the riser, the knot looks correct, but does not adequately secure the smokejumper to the riser.

When the smokejumper disconnects his/her harness from the riser, there is a potential for the letdown tape to slip from the riser, causing the smokejumper to fall.

LESSONS LEARNED

The IA

Flight Strips

- Filling out an Aircraft Flight Request/Schedule form or “flight strip” for an IA outside of a Geographic Area is required³ in both the National and Northern Rockies Coordination Center’s Mob Guides and added only about 10 minutes to the WYS response to the Lily Fire. However, we heard from both IA resources and dispatch centers that it seems to be a redundancy that, even if it only takes a little time to complete, does not benefit the IA resource or dispatch centers in a meaningful way. There is a desire to review its use for out of GA IAs. The group suggested that during this winter’s National Mobilization Guide review that the utility of the flight strip be discussed and for the flight strip to be eliminated if it is found to be of limited use.

Smokeyumper IA Range Beyond GACC

- Even though the jump base within the GACC (Redmond Smokejumpers) was jumped out, an order for IA resource was filled with jumpers outside of the GACC. Once off the ground the WYS jump plane was over the Lily fire with a load of 8 jumpers in just over 3 hours.

The Injury

The Letdown Process

- For the remainder of this season the letdown procedure will remain in its current form, but all smokejumpers will now verbalize routing the tape over the top of the main letdown line as part of the 5 point check that smokejumpers verbalize before releasing their harness from the risers.
- A more in-depth procedural and equipment review will take place this coming winter by the National Technology and Development Program (NTDP), in a continued effort to make smokejumper operations and procedures as safe as possible.

The Response

On-Scene Immediately Following the Injury

- Everyone picked up a role that was needed. This was facilitated by a common operational picture and training in the smokejumper community. “Fluidity came through trust with each other.” This included:
 - Fire IC trusted “RED” assessment from IWI IC at the jumpspot even without full 8-line and communicated that to Dispatch.
 - Spotter and jumpspot communication to place rest of cargo in jumpspot away from injured jumper.

³ [National Mob Guide](#) (Page 62)

[Northern Rockies Mob Guide](#) (Page 92)

- One of the jumpers at the scene of the injury noted that there was a short delay in getting an 8-line going, and that he did not have a copy of an 8-line in an easily accessible place in his pack. He has now moved a copy to a more accessible place in his gear.
- Those working to improve helispot took the time to pause and discuss, “We need to be really, really careful of what we’re doing. The trees are tall; be aware of where people are, we don’t want a 2nd injury.”

Coordination of Medivac

- Dispatch trusted Lily Fire IC with “RED” assessment of patient without rest of 8-line and began to get medivac plans going.
- Lessons Learned from other FLAs were forefront in dispatch’s mind as they developed plans and contingencies for medivac.
 - “We weren’t waiting for something to fail.” Assistant Center Manager’s (ACM) and Unit Aviation Officer’s (UAO) immediately began developing contingency plans for medivac
 - Air Ambulance
 - National Guard hoist capable helicopter
 - Hoist capable ship based out of Kalispell, MT
 - County search and rescue team (ground based)
- Strong existing relationships with county partners enabled contingency plans to come together quickly.
- Dispatch ensured positive communication between medivac ship and ground contact.

From the Medivac Pilot

- Night operations into a forested clearing, “is about as challenging a thing as we do.”
- Had positive communications with ground personnel early. Without it we are not able to do night ops.
- Ground personnel were using headlamps to illuminate Landing Zone. Was able to see where they wanted me and then asked them to shut off lights as we got close so we could use Night Vision.
- We were able to put patient from existing packaging right into our ship.

ACKNOWLEDGEMENTS

The FLA team would to thank each of the participants for sharing their experience not only with the team but also with the larger wildland fire community. It was expressed several times throughout this FLA how those involved learned from previous FLAs and utilized that learning to respond to this incident. Their desire to contribute helps create a learning culture in our profession.

The support of the Deschutes National Forest, Central Oregon Fire Management Service and their leadership to provide a space where employees can learn from these experiences is appreciated by those involved and the FLA team.

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