



Moose Fire Helicopter Crash Learning Review

Complex Narrative

July 2022

On Thursday, July 21, 2022, CH-47D helicopter pilots Thomas “Tommy” Hayes and Jared Bird were lost while conducting water bucket operations in support of the Moose Fire on the Salmon-Challis National Forest.

“Tommy and Jared represented the absolute best our country has to offer. Both were decorated veterans, hard workers, and outstanding pilots.

—ROTAK Helicopter Services

It is believed by many witnesses that Tommy and Jared did everything within their power to control their aircraft as it lost altitude and descended into the water. We honor Tommy and Jared through learning.

Jared Nathaniel Bird

Jared Bird (07/1986–07/2022) of Anchorage, AK passed away on July 21, 2022, fighting the Moose Fire in Salmon, Idaho for the U.S. Department of Agriculture, Forest Service while co-piloting ROTAK's CH-47D Helicopter.

Jared was an amazing helicopter pilot. He started his career in Alaska as a flight instructor before moving on to become a tour and utility pilot. Jared worked for Alyeska Helicopters and Alpha Aviation prior to ROTAK Helicopter Services.

Before becoming a pilot, Jared had an 8-year career in the United States Army, where he served first as an infantry paratrooper in Iraq. Later, he became a mountaineering recovery supervisor for the Joint POW/MIA Accounting Command (JPAC) based in Hawaii and deployed throughout Southeast Asia.



It's impossible to boil Jared's love of life down to a list of attributes and hobbies. His positive attitude and good humor were infectious to everyone he met. When Jared was not flying helicopters, he was always trying to get the most out of every day by skiing, hiking, playing frisbee golf, and living life outdoors as much as possible. He loved spending time with his wife, Jordan, and friends, riding his motorcycle, building things in the garage, trying new hobbies, and learning new things. Jared was always looking out for others; he would hold the door open for everyone, help a stranger change a tire, and make sure everybody had a burger before grabbing one off the grill for himself.

Jared's life leaves a gaping hole in the community he left behind. His attitude, big smile, and genuine love for aviation will continue to give us all something to strive for. He is survived by his wife Jordan Bird and his dogs Ernie and Watson; his sisters Nastassia Bird and Sarah Michalek, and Sarah's daughters Charlotte and Emmy; his father Arthur Bird and his wife Gina Bird; his mother Stacie Truitt-Rasmusen and her husband Kim Rasmusen; and the many, many friends, family members, acquaintances, and people he met at a bar one time whose lives were all impacted by their brief interaction with such an incredible man. We will never forget his red beard, heart of gold, and love of the band Tool.



Thomas Patrick Hayes

Tom “Tommy” Hayes (08/1980–7/2022) of Orofino, ID passed away on July 21, 2022, fighting the Moose Fire in Salmon, Idaho for the U.S. Department of Agriculture, Forest Service while co-piloting ROTAK’s CH-47D Helicopter.

Tom’s lifelong dream was to become a helicopter pilot. His career was steeped in aviation maintenance and he held FAA Airframe and Powerplant licenses, commercial helicopter and airplane licenses, and was a certified instructor pilot.

Tom joined the United States Army at the age of 18. In the military, Tom worked throughout the U.S., South Korea, Afghanistan, Iraq, and the “Horn of Africa.” After 5 deployments and 20 years in the Army, Tom finished his career as

a Chief Warrant Officer 4. Tom went on to pilot Chinooks for Helimax Aviation and Billings Flying Service before joining ROTAK Helicopter Services. Tom loved flying Chinooks—he often said “go big or go home” referring to the large twin rotor helicopter. In the last year of his life, he met the love of his life, Kristin Erickson, with whom he traveled, skied, rode bikes, camped, and fished. They had everything in common, and he loved her three children, Linnea, Sonja, and Mira, as his own. Tom also had three children, Patrick, Sam, and Sophia. He often spoke about how much he loved his kids.

Tom is survived by his father Tim Hayes, of Orofino; his mother Becky Hovey and her husband Steven Hovey; sister Nicole and her husband Dylan Bonner and their daughter Ariyah; Uncle Billie Craner of St. Maries; Aunt Deborah Craner; Aunt and Uncle Jeanne and Allen Webb; Aunt and Uncle Terry and Harvey Leach; Aunt and Uncle Cheri and Scott Steinmetz; Grandmother Eleanor Hayes; Great Aunt Betty and Tom Eckroth; and so many more.

The National Transportation Safety Board and Forest Service Aviation Investigation Processes – Working Together

The Moose Fire helicopter crash is under active investigation by the National Transportation Safety Board (NTSB). Also looking at the mishap are two Forest Service teams, a Forest Service Aviation Mishap Investigation team (FS AMIT), and a Learning Review team. The FS AMIT is working with the NTSB as a party to the investigation, while the Learning Review team is acting independently of the aviation safety effort. Even though the NTSB has the ultimate authority over all other entities for the aviation investigative effort, they do allow collateral investigations by other agencies outside of their process as long as those efforts are not disruptive or prejudicial to their investigation.

Why Three Reports?

For many, having two investigations and three reports for one accident may seem unneeded. However, each report is generated using a different process and lens, resulting in distinct, but equally important perspectives.

The comprehensive investigation process used by the NTSB includes the collection and cataloging of evidence, analysis of factual data, and development of three reports— a preliminary, a factual, and a final report including a statement of probable cause. The NTSB stores data collected during this process in an investigation docket that is usually made available to the public once the investigation is complete.

Working with the NTSB via the Party System, the FS AMIT utilizes the information gathered from the mutual investigation to develop the Forest Service Aviation Mishap Investigation Report. This report looks at the mishap from multiple technical perspectives and provides findings related to the agency that are used to generate aviation safety recommendations. Recommendations may become action items targeted at improving the overall safety and efficiency of aviation operations.

The Mishap Investigation Report also serves as an official record for the Forest Service Aviation Safety Branch as well as an important communication tool between the Forest Service and the NTSB. This report is a product of safety assurance under the broad umbrella of the Forest Service’s Aviation Safety Management System (ASMS). Outside of the aviation safety effort, the Learning Review team completes a third report that looks at the aviation mishap within the scope of the entire wildland fire system.

NTSB Investigation Overview

The National Transportation Safety Board (NTSB) was established by Congress in 1967 as an independent federal agency mandated to investigate all civil and public aircraft mishaps that are classified as accidents. However, the NTSB may also investigate some aviation incidents of interest. Safety recommendations are the most important product of an NTSB investigation. These safety recommendations are based on findings of the investigation but may also address deficiencies that do not pertain directly to what is determined to be the probable cause of the mishap.

Forest Service Aviation Mishap Investigation Team Overview

The NTSB provides party status to federal, state, and local government agencies whose employees, functions, activities, or products were involved in a mishap. Party status is only

offered to the those with suitable technical expertise—in this case, it is the Forest Service Aviation Mishap Investigation team (FS AMIT). The FS AMIT members are agency aviation professionals who, through experience, education, training, and knowledge in investigations and other aviation matters, meet the NTSB's requirements for party status.

The FS AMIT works with the NTSB and other party status entities to understand the complex processes that led to a mishap and to provide context to Forest Service aviation operations. The party members provide different areas of expertise that contribute to a broader technical and forensic level understanding. The collective work of aviation safety experts from all parties is synergistic—all members benefit from each other's knowledge, experience, and perspective.

Without the involvement of the FS AMIT, Forest Service aviation operations could be misunderstood by other party status members leading to unattainable NTSB recommendations for the agency. Additionally, information revealed during an investigation might be critical, and when shared in a timely manner within the Forest Service or with other operators, cooperators, or partners could prevent similar mishaps from occurring.

Learning Review Process Overview

To look at an accident through another lens, the Forest Service employs the Learning Review process, an alternative process to the Serious Accident Investigation. This distinct lens relies on storytelling to offer additional context, and engaging with the affected communities of practice to build an understanding of potential systemic conditions of influence. The Learning Review builds on the foundations of the Facilitated Learning Analysis (FLA)—making sense of an unintended outcome and developing lessons learned—to explore how the agency may need to change in response to an event.

To learn as an organization, the agency provides an honest account of an event—to tell the story of an event from the perspective of those involved. To do so, the agency produces a complex narrative, like the one you are about to read. The agency also holds itself responsible to look at ways it can respond to this event that create meaningful understanding and change. So, in addition to producing a complex narrative, the learning review team develops multiple learning products intentionally designed for specific audiences who may have different ways of learning. These products are developed through focus group sessions held with agency subject matter experts (SMEs) from within the affected community(ies) of practice, academic specialists, and non-agency SMEs. Recommendations and learning products are then vetted through a Learning Review Board. All aviation-related products are also vetted through the Aviation Directorate and appropriate Aviation branches.

In the past, the complex narrative has been released with the associated learning products, which has often taken a year or more to produce. For those who have gone through a tragic event, this time frame has proven to be too long. Based on this feedback, the agency has modified the Learning Review process to release a complex narrative of an event as soon as it is completed so that families and the community of practice can begin the healing process.

This is the complex narrative of the Moose Fire. In future months you can expect additional learning products to be released. The scope, scale, and style of those products will be driven by the focus group conversations and the information that comes out of them.

This complex narrative attempts to provide an honest account of the events leading up to, and following, the CH-47D helicopter crash. The story of this event, as follows, is told from the perspectives of the people involved and has been checked by them to ensure the learning review team stays true to their lived experiences. This is their story. (Names and equipment designators have been changed for privacy. See [appendix A](#) for a full list.)

Forest Fire History

The Salmon-Challis National Forest (Salmon-Challis NF) is a combined forest in east-central Idaho that encompasses over 4 million acres of complex ecosystems that range from deep river canyons to alpine peaks. The area has a long history of fire activity that has been complicated by over a half-century of fire suppression, the introduction of non-native vegetation, and the human alteration of vegetation types. High tree densities, stress mortality, and a buildup of fine- and medium-sized fuels has contributed to a general increase in available fuels throughout the forest. During fire season, annual average daily temperatures range from the mid-70s to triple digits. Relative humidities drop as low as 5 percent, especially in the bottoms of steep and deep river canyon corridors where strong winds are common. The Salmon-Challis NF has had a fire management past marked by explosive fire growth, dangerous environments, several fire shelter deployments, and numerous tragedy events (figure 1).

In contrast to the last several water years (October 1-September 30), the Salmon-Challis NF was at 100 percent of its average annual precipitation in water year 2021-2022. Despite persistent drought, precipitation that occurred during the spring and early summer months gave the forest a welcomed departure from early starts that often led to lengthy and intense fire seasons in recent years. While conditions were moderated by the early season precipitation, summertime heat set in over the area, curing fuels at lower elevations and in river corridors. By mid-July, the Salmon River corridor, a well-known and heavily utilized recreation river, had entered fire season conditions.

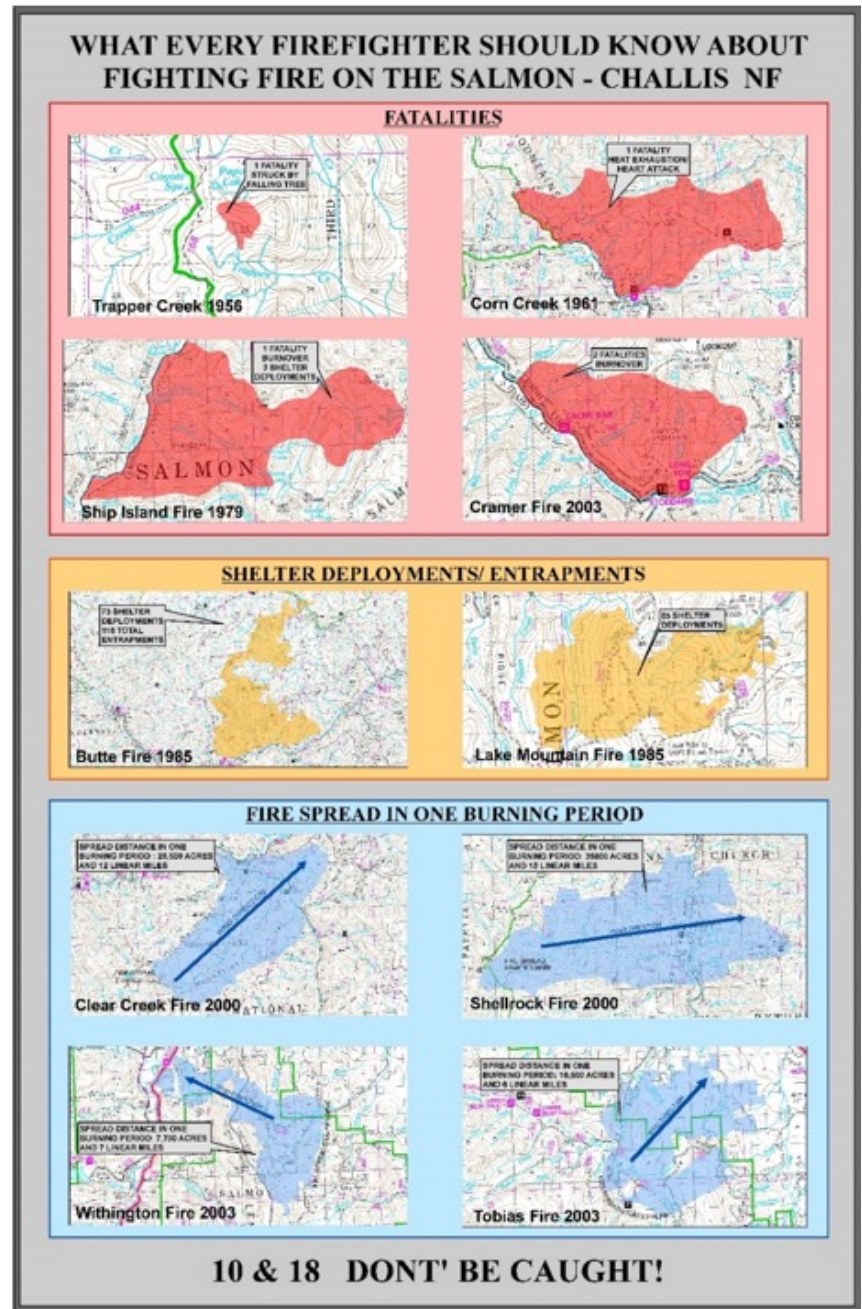


Figure 1.—Local fire danger poster provided to incoming fire resources to the Salmon-Challis National Forest.

The Moose Fire

The Moose Fire started on July 17, 2022 next to the Main Salmon River approximately 6 miles west of North Fork, ID and 17 miles northwest of Salmon, ID. The fire spread rapidly upslope on both sides of the Salmon River and exceeded the capacity of initial attack efforts, growing approximately 1,500 acres in the first burn period. It was quickly determined that the incident would be highly complex and require a Type 1 incident management team (Type 1 IMT). As the incident management team (IMT) mobilized, the Moose Fire continued to spread rapidly both to the north and south of the river. However, the local extended attack organization was able to make great progress establishing an anchor point and containment lines and burning out to the north and east of the fire's origin.



Figure 2.—Orientation map showing the location of the Moose Fire.

The Moose Fire was spreading primarily in cured grasses and needle cast. Fire behavior was described as ‘high,’ but not ‘extreme.’ Relative humidities in the canyon bottom were in the single digits and temperatures were in the 90s. On July 18, the Moose Fire, driven by winds up to 40 miles per hour, had an exceptional day of growth, increasing in size by approximately 10,750 acres. After the weather event on July 18, fire progression slowed to a more predictable pattern described as flanking downriver (to the west), establishing in drainage bottoms, then aligning with topography and running upslope/updrainage before moderating as the fire encountered green fuels around 6,000 feet.

The Type 1 IMT in-briefed with the forest on July 19 and established command of the fire at 0600 on July 20. This was the team’s second assignment of the year, and they were able to mobilize with near complete staffing. Transition-Of-Command actions were typical and included breakout groups for operations, aviation, and safety. Topics of discussion within these groups included finite details such as

establishing communication pathways in the event of an Incident Within an Incident (IWI). The team worked to establish radio communications at the incident command post (ICP) so they could keep in touch with resources on the fire. This was especially important for the medical unit so they could track the locations of EMS resources assigned to the fire since there was no cell phone reception. The IMT also conducted a mock IWI to ensure team members knew the established plan.

As on most emerging incidents, establishing division and branch breaks along with groups to fit the incident proved tricky. There were overlapping divisions and similar assignments at first, but resources worked together to smooth the operational wrinkles out.

For divisions A and F, the IMT’s primary objective was to minimize fire spread to the north and northeast. To meet these objectives, resources on the ground connected roads with indirect handlines and conducted burnouts. Several days of intense work allowed resources

to check the fire's spread north of the Salmon River, between Indian Creek and a dominant ridge above the Deadwater area of the Salmon River (see figure 3). The River Group, staffed with engines and crews, had been monitoring fire progression to the west while primarily concentrating on structure protection in the river corridor. Division T, located south of the Salmon River on the west side of the fire, had been unstaffed up to that point.

July 21, 2022 – Operational Picture

It was a slow morning on the Moose Fire. An inversion blanketed the fire area, creating a layer of smoke and calm. Over at the Salmon helibase, the operational tempo was slow; the smoke layer created by the inversion reduced visibility, limiting the use of aviation assets on the fire.

As the aircraft waited for the inversion to lift and visibility conditions to improve, one ship's (9CG) crew decided to use that time to conduct crew training. The night prior, 9CG, a Type 3 helicopter, had been pre-identified as the medevac ship for the fire (see inset box at right). Recognizing that a portion of the crew had not worked together before (they had brought several new 'fill ins'), the crew's EMT walked the crew through different scenarios; had them practice how to package and load patients; identified things like the ship's medevac configuration, medical bag, and the location of the litter; and demonstrated how and when to help. The crew also preloaded the medevac manifest and staged the equipment for quick deployment if needed. 1CG, a Type 3 helicopter and a company sister ship to 9CG, was also assigned to the Moose Fire and was parked next to them at helibase.

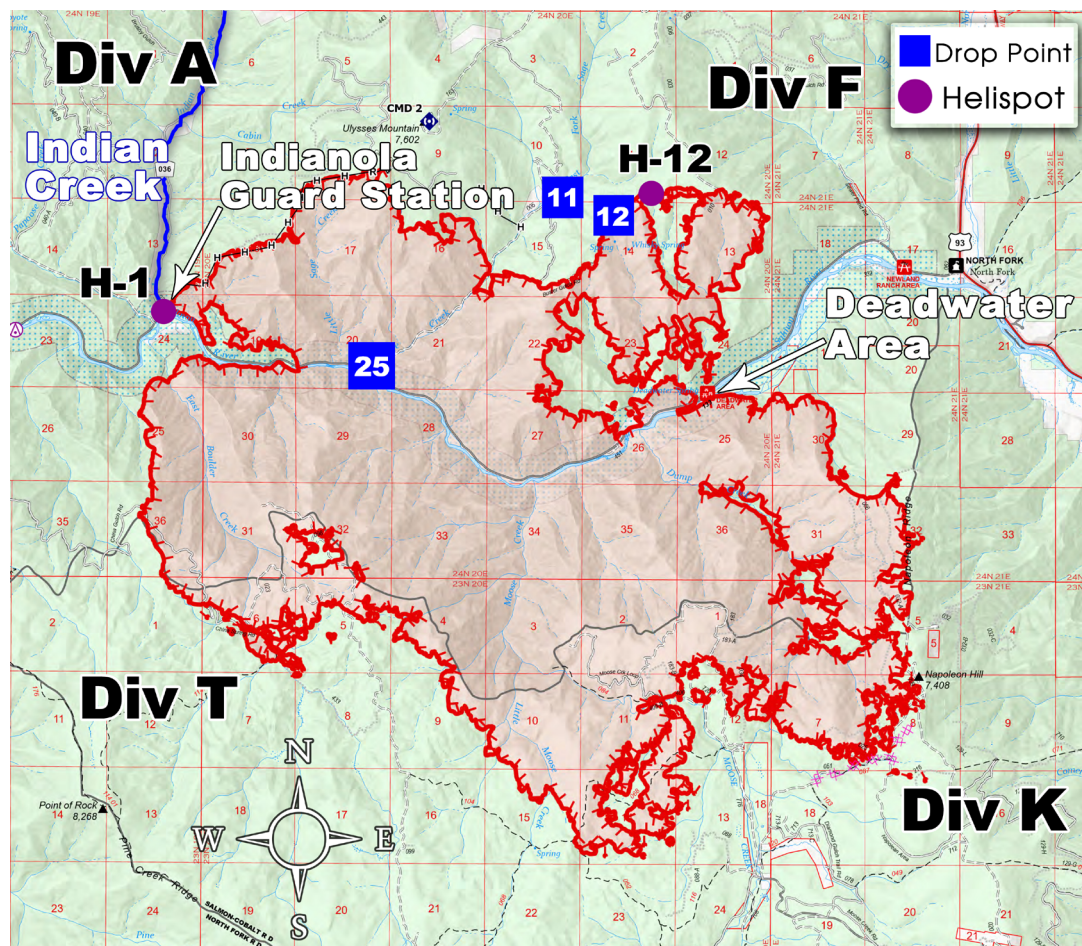


Figure 3.—Map of the Moose Fire for July 21, 2022.

Additional Context

Designated Agency Medevac Ship

On July 20, 9CG was told they would be the designated agency medevac ship for the Moose Fire the following day. The announcement was made at helibase because 9CG had been alternating between serving as the designated medevac ship or HLCO ship with another light helicopter. Because they were swapping often, the information was conveyed by word of mouth and was not included in the Air Operations Summary in the July 21 incident action plan.

The fire was heavy with aircraft, and several other helicopters, including 8RA, a CH-47D helicopter, 2LM, 2BK, 3BB, and 2HG, were parked at Salmon helibase. As the helicopters and their crews stood by for assignments, aerial supervision resources¹ and the Air Operations Branch Director (AOBD) were engaged in a productive conversation with Planning and Field Ops to solidify tactics. During the first few days of the fire, aircraft assigned to the Moose Fire had been requested often.

Most of these mission requests came with clear and concise objectives. However, aerial supervisors received several cloudy requests, such as one to “*freshen up retardant*,” which is often a red flag (see inset box at right). When asked for clarification, the request was to put bucket drops on top of a retardant drop. Aerial supervision clarified that adding water to retardant “*scientifically dilutes the retardant making it less effective*” and subsequently declined the mission. This mission was requested again later in the day and was again declined. After this request and others to “*raise relative humidity via bucket drops*,” “*buy time*,” or “*to check up the fire*” in locations where no ground resources were in place to support those actions and no future plans for fireline construction existed, aerial supervision requested a conversation with the Ops group. The aerial supervision group expressed their concern for using aviation assets to engage in requested actions that were not specific, measurable, or realistic. They reasoned that, “*We don’t ask hotshot crews to dig downhill line construction without an anchor point, so why are we asking aviation to do the same?*” Together, ops and the aerial supervision group worked out some meaningful goals to better utilize aviation assets in ground-supported areas of the fire. This included the use of the helicopter coordinator (HLCO)² assigned to the fire to assess mission requests before launching aircraft.

Nearby, the helicopter manager for 8RA transitioned with an incoming helicopter manager, a process that went smoothly. He then stepped into a helibase manager trainee (HEBM-t) role. Having not met before, HEBM-t and the qualified helibase manager (HEBM) took some time to sit down, talk with each other, and feel things out. They began to build rapport and worked on developing crew resource management (CRM).

Additional Context

Dynamic Tensions in Risk Management

During interviews, the Learning Review team frequently heard phrases like “use as a cooling action” and “freshening retardant” as aviation resources shared their experiences. These terms were examples of mission request objectives they routinely receive while working on wildland fires, including the Moose Fire. Requests they believe are not worth the risk to aviation assets.

Often these mission requests are in areas deemed too risky for ground resources, raising the question for many of, “If you are not putting firefighters on the ground, why are you putting firefighters in the air?”

While all those who were interviewed for this learning review felt the mission 8RA was carrying out when it crashed was a valid, supported mission, the dynamic tension of risk transfer to aviation assets is prevalent in the wildland fire system and a topic they feel deserves further conversation.

¹ The aerial supervision group included two air attacks, an air attack trainee, a helicopter coordinator, the helibase manager, and the air operations branch director.

² The Helicopter Coordinator (HLCO) coordinates helicopter mission(s) and incident airspace, manages incident air traffic, and is the link between ground personnel and incident aircraft. The HLCO is an airborne firefighter who coordinates, assigns, and evaluates the use of aerial resources in support of incident objectives ([NWCG Position Catalog 2021](#)).

Meanwhile, out at the fire, ground resources had received their assignments for the day and began dispersing. The two days prior had been strenuous for many as they worked hard to build line and conduct burnout operations that would stop the fire's spread north of the river. Having completed those objectives, the moderated conditions provided the ground resources a welcomed change of pace.

In Division A, a Region 4 interagency hotshot crew (R4-IHC) would be working along the Salmon River corridor near the Indianola guard station (Indianola GS) patrolling for hotspots and monitoring fire behavior on the south side of the river for spotting potential. Also in Division A, a fireline paramedic (EMPF), a fireline EMT (EMTF), and a remote extrication module support (REMS) team formulated a plan for the day, choosing staging locations along the river corridor that would best support fireline operations. The 4-person REMS team, outfitted with a utility terrain vehicle (UTV), two qualified paramedics, and two intermediate EMTs, would stage up the rough and rocky FS005 road. EMPF and EMTF would stage together in separate vehicles at DP-25 in the river corridor.

In Division F, Water Tender 47 (WT-47) was assigned to support division resources where needed. However, things were expected to be slow in Division F that day, so the division supervisor provided intent to WT-47 that if divisions A or T needed their help, they could assist there as well.

Division T was minimally staffed with a division supervisor (DIVS T), their trainee (DIVS T-t), and a Region 6 interagency hotshot crew (R6-IHC). Being his first full operational period on the Moose Fire, DIVS T planned to spend the day scouting the geographic area, tying in with neighboring division and group supervisors, and formulating a plan for future operational periods with DIVS T-t, a captain off of R4-IHC. During a recon of the division on July 20, DIVS-T noted a potential need for boats/rafts for crews working in the area of Indianola GS and to shuttle resources to the south side of the river. There were several historic structures as well as other values at risk on the south side of the river that would eventually require structure protection. While aircraft were talked about as an option to shuttle resources, they had limited capabilities in the tight corridor, making rafts a more viable option that could be shared between the Division T, Division A, and River Group. Seeing the impending need, DIVS T requested rafts to help shuttle resources across to

Additional Context

Policy-Related Hurdles

During interviews, members of the incident management team talked about the difficulties they had in acquiring the tools needed to be successful on the fire. This included boats, medical oversight, day-sleeping quarters, and land use agreements; the list was long. IMT members felt most of these issues stemmed from federal procurement processes aimed at creating a fair and equitable purchasing environment. While they acknowledged the good these policies do in general purchasing, they also felt the policies serve as a hindrance to getting the right tools in the hands of firefighters in a timely and efficient manner and expressed a desire to streamline the procurement process for large wildland fire incidents.

*"We don't bat an eye at spending thousands of dollars for a helicopter, but we sneeze at \$3,000 a day to provide adequate sleeping quarters for our firefighters."*³

—IC

³ The IMT reasoned that the \$3,000/day for a single sleeping quarters location would have been far less than the total cost of lodging per diem for the group of firefighters working night shift.

the south side of the river, but due to policy-related procurement issues none were available (see Policy-Related Hurdles inset box). Until they could be obtained, the division would be left mostly unstaffed and ground resources would be limited to the north side of the river.

Working within each of these divisions was the River Group, which was charged with structure protection along the river corridor. In days prior, as River Group Supervisor (River Group Sup) and River Group Supervisor Trainee (River Group-t) scouted the river corridor to gain awareness of structure locations and access, they also had opportunity to meet local homeowners who often offered the use of their homes, boats, or other items they felt would be useful to firefighters. These offers were always met with a polite “*We’ll keep that in mind,*” but the group supervisors appreciated the sentiment and the relationships they were building. Elsewhere in the group, a Type 2 initial attack crew (T2IA-Crew) who had been assigned to the fire since its initial start, was tasked with staging at Indianola GS in case they were needed for structure protection or to help with potential spot fires on the north side of the river. The crew boss of T2IA-Crew planned to spend the morning away from his crew, looking at homes and infrastructure and coming up with a structure protection plan. Also in the group, E-673 was tasked with patrolling the river corridor to look for any flare ups along the road as well as debris in the road.

As ground resources began working that day, HLCO flew overhead, looking for opportunities to use aircraft. After flying the perimeter of the fire, HLCO determined it was still too smoky for aviation missions and headed back to helibase.

Fire Activity Picks Up

Around mid-day, the inversion that blanketed the fire began to lift. Fire activity started to increase and in a narrow area of the river corridor, R4-IHC began to see potential for the fire to spot across to the North side of the river. The crew requested a Type 1 helicopter for bucket work to cool the fire down. Hearing the request over the radio, WT-47 decided to head in that direction to stage where they thought they could be more helpful.

At the same time, a request was made for another Type 1 helicopter to work the ridge above R4-IHC where fire had progressed over the ridge but had left the thumb of the ridge unburned. The intent would be to pretreat the green thumb and moderate intensity to reduce the potential for spotting across the river corridor.

Back at helibase, the requests started rolling in. As per the discussion had that morning about risk management objectives, HLCO launched in their ship to check the two requested missions in Division A. When HLCO made it over the fire, he could see the main column of the fire wasn’t anything to worry about. However, a portion of the fire near the river was putting up smoke that was laying over the river/road corridor. After flying the area and assessing the requested missions, HLCO felt both were valid and requested that 8RA and 6RG, a KMAX, be launched; 8RA would work the river corridor, while 6RG would work the ridge.



Figure 4.—Smoke column on morning of July 21, 2022 indicating two inversion layers and decoupled winds. [Photo credit: Air Resource Advisor]

Winds Aloft

The distance from dip location to drop site for 8RA's mission was very short, both vertically and horizontally; a 'short turn' compared to other missions in the area. The Salmon River canyon is notorious for producing 'squirrely' winds. Meaning that terrain and atmospheric influences on air parcels can create unpredictable air movement that can quickly change wind speed and direction at various points in the lower atmosphere. During 8RA's mission, two air resource advisors

(ARA) and the incident meteorologist (IMET) were in the area and were observing two inversion layers and decoupled winds (figure 4). In this instance of decoupling, low level winds were coming from the north to the south and upper-level winds were moving from the west to the east. They observed that the fire behavior at the time of the mission was not extreme and that the burning fuels were not releasing enough energy to influence or overpower the terrain-driven winds or the upper-level winds (figure 5). Additionally, the IMET noted that winds at Indianola GS that day were comparatively lower than days prior. Helicopters working on the fire were operating well below any low-level wind shear associated with the inversion layers.



Figure 5.—Picture taken on the morning of July 21, 2022. Surrounding fire behavior shows low to moderate fire intensity. [Photo credit: Air Resource Advisor]

After the two Type 1 helicopters had arrived at the fire and provided a few water drops, HLCO checked in with them to see how things were going. The KMAX was having a tough time with winds up on the ridge and suggested switching missions with the CH-47D. When HLCO asked 8RA how things were going, the pilots sounded like they were enjoying their assignment. Since 8RA had already started working their mission, HLCO decided to have them continue. He told the KMAX if they were getting blown around too much, they could head back to Salmon helibase and that 3BB, a Blackhawk helicopter, was already on order to replace them at the end of their fuel cycle and could replace them earlier if needed. The KMAX responded it was doable, but that if it got too bad, they would call it.

While the KMAX finished its fuel cycle and headed back to helibase, 8RA continued to provide water drops for ground resources. 8RA was alternating between hitting hotspots and torching trees to moderate fire intensity on the south side of the river and pretreating receptive fuels in an area on the north side of the river (across from the green thumb) that was inaccessible to ground personnel. A dilapidated structure on the south side of the river had caught fire and 8RA was occasionally dropping buckets on it as well to mitigate fire intensity coming from the structure. Between drops, 8RA tested out several areas along the river corridor to dip from. Ultimately, the pilots settled on a spot in the river near H-1 (see Dipping Strategy inset box on next page).

As HLCO continued to provide aerial supervision for that area of the fire, a request for aviation support came in from Division K. Before heading over, HLCO checked in again with 8RA knowing they would be getting close to the end of their fuel cycle. He let them know 2BK, another CH-47D assigned to the fire, would replace 8RA when they went back to helibase for fuel. 8RA's pilots responded that was good by them and that 2BK "likes to be called big baller."

"They are definitely enjoying themselves out there," HLCO thought to himself. Once 3BB arrived at the fire and started conducting bucket work along the ridge, HLCO moved to Division K to assess the requested mission.

Meanwhile, on the ground, R4-IHC had staged their crew carriers in a pullout about one-quarter mile west of Indianola GS and had two squads working hotspots along the road; one was working near Indianola GS while the other worked farther down river. R4-IHC-SQ1, a squad leader on R4-IHC, was assigned to help direct 8RA's bucket drops. After making contact with 8RA and lining them out on specifics, R4-IHC-SQ1 continued to stay in the area, communicating with the pilots and helping to direct the drops. The spot 8RA was dipping from was only a quarter mile upriver near H-1, so the turnaround time between drops was short, just 30 seconds (see Dip Location Proximity inset box).

To prevent private vehicles from being nearby when the helicopter was dropping water, R4-IHC set up roadblocks to the east and west of the drop area. Several folks from R4-IHC staffed the western roadblock and E-673 staffed the one to the east.

Back at Indianola GS, the crew boss for T2IA-Crew had tied back in with his crew after

Additional Context

Dip Location Proximity

After the incident occurred, many people asked why resources were parked so close to a dip site and a drop site. The answer is there were many reasons. The primary reason is that the fire was burning along the Salmon River corridor, a narrow river canyon that also contains a highly trafficked road that remained open despite fire operations. Because the road is so narrow, areas to safely park and stage vehicles and personnel were far and few between. Another condition was that no dip sites were identified; pilots were free to choose a location along the corridor that suited the needs of their mission.

Additional Context

Dipping Strategy

During several prior helicopter missions on the Moose Fire, pilots were given the discretion to select the best available spot to dip from along the river corridor, also known as 'free range dipping.' Pilots had been trying several different locations on the river in those first few days on the fire. A combination of factors made the area near H-1 a preferred site for most of the pilots working on the fire, including more open topography which allowed more space for pilots to maneuver; adequate river depth; the area was free from cables and wires; and the spot was commonly used in the past.

scouting. Staged, the crew watched 8RA dip out of the Salmon River near H-1 for almost one full fuel cycle. In fact, they had watched many ships dip from that same general area for the past few days; it seemed to be a favorite location for pilots.

At the pullout where R4-IHC had parked their crew carriers, Adam, a private homeowner who had come down in their UTV to watch the day's operations, pulled up. He tied in with River Group Sup to let her know that he had seen a flare up on the south side of the river. After their conversation, River Group Sup joined a nearby strategy session. While 8RA and 3BB continued their bucket work, Division Supervisor A (DIVS A), DIVS T, DIVS T-t, River Group Sup, and River Group-t stood discussing tactics and long-term plans. When the conversations ended, River Group-t broke away from the group, got into his truck and started driving down river to check on resources. Also in the pullout, Branch 1 Trainee (Branch 1-t) sat in the cab of his truck providing an afternoon update on the radio to Operations while WT-47 stood by in case they were needed.

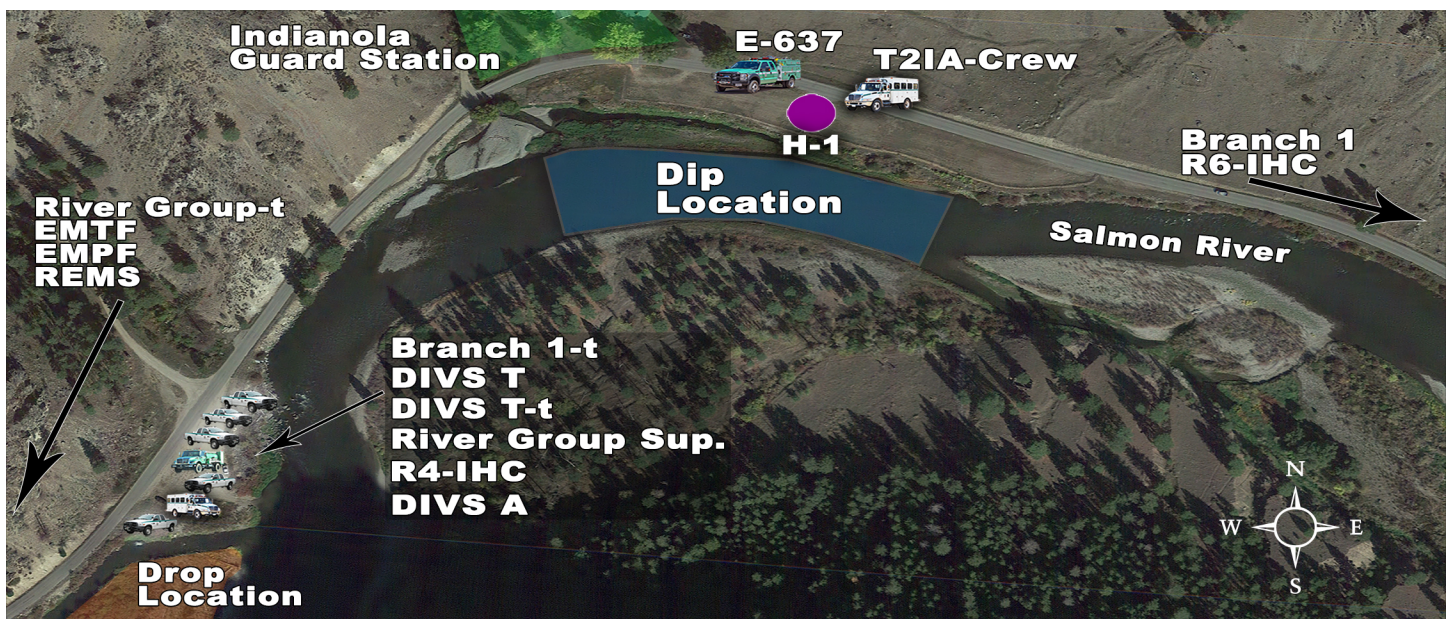


Figure 6.—Location map of resources at the time of helicopter accident.

Helicopter Down

After completing another bucket drop, 8RA returned to the area near H-1 to refill its bucket.

At the same time, R4-IHC-SQ1 was standing on a rock, acting as a lookout for the bucket drops. The fire was getting hot and as he stood there watching 8RA hovering over the river he saw the helicopter begin to lose altitude. As the helicopter was going down, he yelled to those around him—

As River Group Sup chatted with the other overhead, she watched 8RA flying back to the area it had been dipping from. Suddenly River Group Sup noticed the helicopter starting to fall. Being the only one in the group facing that direction, she said, “*Oh s**t*”—

At Indianola GS, T2IA-Crew watched as the dust settled; everything was quiet. Wispy smoke rose from the downed helicopter and parts of it continued to spin as the helicopter settled in the water. Not knowing if the helicopter was stable, especially with the attached bucket moving in the strong current of the river, the crew boss held his folks back from immediately responding, concerned they could become another accident.

The crew boss for T2IA-Crew alerted River Group Sup on TAC—

“HELICOPTER DOWN”

Everyone who witnessed the aircraft fall started moving in the direction of the helicopter.

The Response

Almost immediately there was radio traffic between ground resources and individuals leaping into action. DIVS T-t yelled over crew net to his superintendent, *“The helicopter crashed!”* but got no response. DIVS T-t urgently yelled again into the radio, *“The helicopter crashed!”* and was able to reach his crew’s superintendent (supt.). The first call made to Communications came from the R4-IHC supt., *“Communications, this is R4-IHC.”* The R4-IHC supt. would call two more times before he was able to declare an emergency, clear the Command frequency, and say *“helicopter down.”* As he drove towards H-1, he also preemptively ordered a helicopter air ambulance (Med4) and an agency medevac ship knowing they would likely be needed.

Branch 1, who was just down the road when he heard the emergency radio traffic, turned around and ran lights and sirens to H-1. Knowing the R4-IHC supt. well, Branch 1 could tell by the tone of his voice that he meant business.

River Group Sup called the REMS team on TAC and had them respond to H-1. Soon after, EMPF and EMTF received a radio call over Command from the Communications Box (Comms Box) to respond and immediately started driving to the scene. WT-47 also headed in that direction.

DIVS A rallied to H-1 from the pullout and did a rapid assessment of the situation from the shore—aircraft across the river; swift current but manageable for his ability⁴; no moving parts; aircraft appeared to be stable; and the cockpit was mostly out of the water. He knew there might be some hazardous material (HAZMAT) in the water, but felt it was a ‘go’ situation. At the shoreline, DIVS A started stripping down to his underwear, taking one extra moment to remove his wedding ring and place it in the middle console of his truck before walking down to the river and diving in.

R4-IHC-SQ1 was the next on scene, taking his phone and other things out of his pocket as he ran from the pullout to H-1. Without hesitation, R4-IHC-SQ1 jumped in the water, radio in hand, and swam across. He was soon followed by DIVS T-t, who after initially running in the

Additional Context

Incident Management Team Actions

At ICP, folks heard the radio traffic and started filling the roles they had practiced the day before. The air operations branch director (AOBD) quickly looked at AFF (automated flight following)⁵ to confirm and identify the tail number of the downed aircraft. He then tied in with the IC before proceeding to the Comms box to tie in with the medical unit leader (MEDL), as per the IMT’s IWI plan. Once there, AOBD relayed to ground resources that 8RA was a two-pilot machine. He then worked with helibase to get aircraft launched to the fire to help with the medevac. As AOBD continued listening to the radio traffic, he worked with the IC, Agency Administrator, local fire staff, and local dispatch center to make notifications to the Contracting Officer Representative, the regional office, and others.

The MEDL checked in with their EMS resources making sure they were responding to the IWI, tracking progress, and providing support where needed. Just outside the Comms box, the deputy IC held the radio while the Safety Officer furiously took notes and relayed communications.

⁴ The Salmon River was flowing between 1,600 and 2,000 cubic feet per second at the time of the helicopter accident ([USGS National Water Dashboard](#)).

⁵ Automated Flight Following (AFF) is an online government application that automatically tracks the location and velocity of specially-equipped aircraft and mobile assets and provides this information in near-real-time to dispatchers, aviation managers, and other authorized users.

direction of H-1 turned back and jumped into a vehicle with DIVS T who was also headed in that direction. Leaping out of the rig, DIVS T-t headed for the water and jumped in. DIVS T assessed the situation and saw an eddy nearby and thought *“If anything or anyone was able to get out of the helicopter it would get stuck there,”* so he waited, watching. He also wanted to keep an eye on the swimmers to make sure they were all making it across the river safely.

More R4-IHC crewmembers soon reached the shoreline and started self-assessing—*What is my swimming ability? What do I need to take off to make it across the river? Can I swim straight across, or should I jump in upstream?* Several started ditching various levels of clothing and boots and jumped into the river to help with the rescue efforts. Others joined DIVS T at the eddy.

“A lot of unknowns, HAZMAT in the water, fire burning nearby, and a river to get across; it was a busy situation. The fire was burning onto debris and pretty close to the edge of the river.”

—Scott, WT-47 operator

By the time the R4-IHC supt. made it to H-1, five of his crewmembers and DIVS A were already in the water. Knowing he couldn't have stopped them even if he wanted to, the R4-IHC supt. grabbed his radio and committed to doing what he needed to support his folks. He tied in with Branch 1 who was also now on scene. They had a quick discussion about who would assume

the role of IWI incident commander. Having already communicated about the crash with ICP, they decided the R4-IHC supt. would fill the IWI IC role (IWI IC). Branch 1 would support him however he could while also maintaining a focus on firefighting and the rest of the resources in his branch.

Things were hectic with so many people responding to H-1. Wanting to find a way to be helpful but not add to the chaos, E-673 moved their engine to block the road to H-1, so access could be limited to those who needed to be there.

Over in Division K, HLCO was lining out 2HG on their mission when he heard the radio traffic—*“helicopter down.”* Immediately HLCO began contacting the active aerial resources. He called 8RA but received no response. HLCO then made positive contact with 3BB and asked, *“Did you hear about a helicopter down?”* 3BB could not confirm that radio traffic so HLCO asked 3BB to head in the direction of where 8RA had been working. With the potential for a downed aircraft, HLCO placed an order for an air attack. It wasn't long before 3BB radioed HLCO to confirm there was a helicopter down in the river. 3BB dumped the water from its bucket in anticipation of helping with the rescue response where they could. Meanwhile, HLCO and their pilot diverted from their current mission to the accident scene.

“If you are involved in a severe IWI, you need to get someone to replace you in the supervision role.”

—HLCO

Back at H-1, the swimmers made their way across the river. Compared to the hotshots, DIVS A looked like an Olympic swimmer without the weight and friction of Nomex and boots as he swam straight across the swift water. Not far behind, R4-IHC members, R4-IHC-SQ1, DIVS T-t, Stuart, and George noticed what appeared to be HAZMAT in the water coming from the helicopter and the bent and twisted metal of the wreckage as they swam across the river. Others on the bank worried about the stability of the helicopter as the attached bucket was still drifting downriver in the swift current of the Salmon River.

First to the scene, DIVS A made a second rapid assessment as he stood just downstream from the pilot's right side of the ship—the ship was in shallow water, there was no mechanical noise, no smoke, and no moving parts. Deeming the ship stable, DIVS A waded to the helicopter and was able to identify there was a pilot in the right side of the cockpit. The pilot's head was half in the water and DIVS A reached through the door and lifted his head above water. As he held the pilot's head above water, DIVS A checked for a pulse and breathing—he had both—and the pilot showed responsiveness to pinching with grunts. As DIVS A worked to extract the pilot, he kept repeating to the pilot, “*I’ve got you. I’ve got you.*” A few moments later, R4-IHC-SQ1 arrived; DIVS A directed R4-IHC-SQ1 to try and access the pilot on the left side.



Figure 7.—CH-47D from across the river. [Photo credit: Branch 1–t]

Meanwhile at H-1, the IWI IC looked on from the north shore as his folks swam across the river, including R4-IHC-SQ1 who had held a radio overhead as he swam. The radio was held high at first. As R4-IHC-SQ1 swam to the helicopter, IWI IC watched the radio get lower and lower, closer and closer to the river. At the last stroke in the swift water, IWI IC saw the radio sink into the river for one breaststroke before R4-IHC-SQ1 made it to the downed aircraft.

Additional Context

Patient Naming

There were multiple perspectives on how the pilots became named Patient 1 and Patient 2. In some perspectives, Patient 1 was named for the order of extrication, being the first pilot out of the cockpit, left seat, and the first to receive treatment. This pilot was identified as a ‘black’ patient (using the nationally recognized triage standards), CPR in progress with no pulse or breathing present.

Other perspectives believed Patient 1 was the second pilot out of the cockpit, right seat, and second to receive treatment. This pilot was triaged as a ‘red’ patient, critical but with pulse and airway present and became the priority patient. The dispatch log reflects that the red, critical patient was named Patient 1.

For the purposes of this narrative: Patient 1 will refer to the critical, red patient who was the second pilot to be removed from the helicopter. Patient 2 will refer to the black patient who was the first pilot to be removed from the helicopter.

When George and Stuart, crewmembers of R4-IHC, reached the aircraft, they worked together with R4-IHC-SQ1 to rapidly extricate the left seat pilot, Patient 2 (see inset box above), by pulling on his hips and shoulders, giving attention to stabilize his head and spine. They got him onto the riverbank, checked for a pulse and breathing, found neither, tried to give two

breaths, and began chest compressions. Bobby, another member of R4-IHC who had swam across, joined George and Stuart in providing aid to the pilot.

The first communication from the south bank of the river to the north bank came via broken radio traffic. With the radio too waterlogged to work well, the swimmers also set up a verbal relay. Responders shouted from the cockpit to a relay outside the ship who then yelled across the river.

Between broken radio traffic and through the human relay, the IWI IC was able to make out that there were two patients—one was black with CPR in progress on shore, one was critical red and they needed extrication gear.

The right seat pilot was still stuck in the cockpit with his head being held above water. DIVS T-t, who had made it to the helicopter and was helping DIVS A, could not access the pilot through the door or broken windshield, so he swam into the fuselage through the aircraft's cargo door. DIVS A held Patient 1's head up while DIVS T-t worked to untangle the mess of wires, straps, and metal that were wrapped around the pilot's legs. Using a knife one of the hotshots had in his Nomex pocket, DIVS T-t cut the wires away while DIVS A held his head. DIVS T-t then held the pilot's head while DIVS A cut away the seatbelt. However, the pilot's legs were pinned under the door and they could not pull him loose. While DIVS T-t held the pilot's head above water, DIVS A and two other members of R4-IHC who had also swum over attempted to free Patient 1 from the damaged cockpit. DIVS A felt around underwater and found a piece of frame that felt like it was pinning the pilot's legs. With all the force he could muster, DIVS A was able to break that piece off and start peeling the door back.

As the group worked to pull back thick glass and aluminum, the emergency locator transponder (ELT) alarm beeped eerily and an American flag illuminated by the sun hung in the cockpit over the pilot's seat casting a red, white, and blue glow over the group. After what felt like an eternity, with three people pulling on the window, and one supporting Patient 1's

"The efforts made to force the door open were superhuman."

—DIVS T-t

neck and chest, they were finally able to get Patient 1 out and bring him to shore where Stuart, Bobby, and George continued to provide CPR to Patient 2 as R4-IHC-SQ1 served as radio relay.

At the same time back at helibase, 1CG was on the pad spooling up for a mission when they heard a radio transmission announcing that an aircraft was down. 1CG's crewmembers and pilot paused momentarily, looking at each other, when one crewmember signaled for the pilot to shut the aircraft down. The crew of 1CG immediately started reconfiguring the ship with a 100-foot longline. Simultaneously, HEBM-t, sent the Aircraft Base Radio Operator Trainee back to 9CG, as he was the EMT (9CG EMT) for the designated medevac ship. Having prepared for such a scenario that morning, the crew of 9CG was already putting their training into practice, configuring their ship for a potential medevac mission.

What seemed like moments later, requests for aircraft support of the rescue response started coming in. The Air Support Group Supervisor (ASGS) was familiar with the area of the helicopter crash and determined that the pre-configured Type 3 medevac helicopter would have an easier time landing at H-1 than a Type 2. Knowing this, she added the Type 3 medevac

"The folks who responded on the ground were incredible. They were absolute heroes out there that don't get trained in rescue and yet they did what they did."

—AOBD

helicopter to the order. In addition to the orders placed, the Air Attack platform (Air Attack), staffed with an Air Tactical Group Supervisor (ATGS) and Trainee (ATGS-t), was launched in line with protocol for any fireline IWI when aircraft coordination is required.

The tempo at helibase picked up as pilots, managers, and crewmembers all moved deliberately around their respective platforms as they prepared for their missions. As the crews worked silently to configure their ships, they could hear the scene unfolding over the radio...

“One pilot out, no pulse, CPR in progress. The other pilot is still trapped, and his head is being held above water.” (See Color-Coding in Triage inset box on right.)

Nearby, the Salmon rappel base manifested a medical response load of personnel and gear at the request of the ASGS, who knew that, depending on the level and flow of the river, accessing the south side of the river in that location could potentially only be done from above. The rappellers configured, completed buddy checks, and awaited further instructions.

There was a ton of information coming in and HEBM and HEBM-t worked to make sense of all the requests and assign the appropriate aircraft. Working off past experience, HEBM reiterated to HEBM-t they didn’t want things to get bogged down in questioning orders; if the IWI IC ordered it, they would send it. In total, they sent three agency helicopters.

Additional Context

Color-Coding in Triage

As EMS personnel assigned to the fire responded to the IWI, they tried to gain intel by listening to the radio transmissions. Several EMS folks spoke of hearing “one pilot, green” which slowed their speed as they were driving on a rough and windy road past fire engines and other vehicles. Soon after they heard “two pilots,” which increased the urgency again. Others heard the initial assessment transmission as “one red, one green.”

In discussions after, EMS personnel thought maybe folks were saying “one red patient in the green” meaning on land in an unburned area. They felt this led to confusion over how many patients there were and their status.

“When they wanted a ship with a longline we launched it. When they wanted a Type 2 we launched it. Anything they asked for we launched it.”

—HEBM-t

1CG was the first off the ground, then 9CG, then 2LM. En route to the incident, 9CG EMT and Helicopter Crewmember Trainee (HECM-t), a crewmember experienced in handling traumatic scenes, gathered information from radio traffic to form an image of the scene which they used to prepare a plan for when they landed.

Meanwhile at H-1, River Group Sup had arrived. Noticing vehicles parked in H-1, she told T2IA-Crew to move their rigs. Next, she honed in on figuring out whether someone was serving as IC. Seeing that the IWI IC role was already filled, she quickly filled an ops role to coordinate needs. Asking IWI IC what he needed, he responded, *“We need boats to get extrication and medical supplies across.”* Thinking back to an earlier conversation with Adam, a local homeowner who had offered up the use of his boats, she sprinted across the road to where Adam happened to be parked and yelled, *“We need your boats!”* That was all it took, and Adam was racing off to his house where his boats were already loaded for potential evacuation.

Hearing the request for boats, DIVS T, River Group-t, T2IA-Crew crewmembers, and a couple of folks from R6-IHC who had self-dispatched to H-1 when they heard the emergency

radio traffic, started looking for boats. They had heard Indianola GS might have some, so they started looking in windows at the work center. They found boats, but the doors were locked with deadbolts. The group was feeling frustrated when, from around the corner, one of the R6-IHC crewmembers came with a sledgehammer in hand; the door didn't stand a chance. Once inside, the group saw the two boats as well as one of the trailer tires were flat, but they didn't care. The group pulled the boats from the shed and started shouting *"Does anyone have a 2-inch ball hitch?"* R6-IHC had a three-way ball hitch and was able to hook up to the trailer. As they did so, members of T2IA-Crew pumped up the Forest Service boats and strapped them to the trailer.

Meanwhile, using the verbal relay and the waterlogged radio, those on the southern shore continued giving updates and requesting needs. *"Backboard! AED! Extrication gear!"* Hearing the need for extrication gear, IWI IC directed River Group Sup to pull a tuna net out of his

*"You know when you're hunting and you see your bull? You get all nervous, you get buck fever and you think you're going to miss the shot? For a split second I had that buck fever, afraid I was going to miss the shot, going 'How the f*** do I get extrication gear to my guys?!' Looking across the river, for a few moments, I just didn't feel like I could get stuff to them quick enough. Then I had an idea."*

—IWI IC

truck and load whatever they could find for extrication and medical gear into it. As River Group Sup, Branch 1, WT-47 operators, and members of R4-IHC began loading equipment into the net at H-1, IWI IC requested a 100-foot longline ship to haul the tuna net across. The load included Pulaskis, a chainsaw, fire extinguishers, and a *"s***-pot"* of medical gear.

By then HLCO had reached the airspace over H-1. HLCO tried to make contact with ground resources over the Air-to-Ground (A/G) frequency but was unable to. At that point, HLCO was flying high, while 3BB was flying low, so he requested they switch positions.

While HLCO attempted to contact ground resources, he had 3BB monitor the radios and serve as a radio relay. Having heard the request for a longline to haul extrication gear, HLCO and pilot discussed whether that was something they could do. Knowing that time was of the essence they decided to land and offer to belly hook the tuna net over to the south shore. HLCO tried calling ground resources again but was unable to reach them. To grab their attention, the pilot shot a high approach with their helicopter and came in at a hover. Noticing the hovering helicopter, River Group Sup got on A/G and asked HLCO if he wanted to land. She then cleared resources out of H-1 to make way for the HLCO ship.

As rescue efforts continued, Adam hauled ass back to his house. As he drove back to H-1 after grabbing the rafts, Adam ran into his neighbor Joe who had also witnessed the accident and was headed home to grab his own rafts. Joe left his ATV on the side of the road, jumped in with Adam, and they made their way to the accident site. Before they could get to H-1, the pair ran into the roadblock that had been set up to keep traffic along the river corridor away from the unfolding IWI. The law enforcement officer (LEO), unaware of Adam and Joe's role, wouldn't let them by.

Additional Context

In the heat of the moment

Following the incident, the Law Enforcement Officer (LEO) serving as road guard sought out the private landowner and apologized. While the landowner recognized that the LEO was just doing his job and the apology wasn't necessary, the officer reaching out made all the difference and made the landowner feel much better about the whole situation.

Protesting to the road guard, Adam yelled *“I’m trying to f***ing help!”* As they tried to reason with the LEO, an R4-IHC crewmember pulled up, who had had an idea to ask private rafters held up at the roadblock for volunteers to use their boats. Coincidentally, the ‘volunteers’ he ran into first were Adam and Joe and the R4-IHC crewmember was able to get the LEO to let

“The private owners were coming in hot bringing in the rafts. Everyone knew that was the next step for getting the pilots across the river.”

—DIVS T

them through the roadblock. Just as Adam and Joe pulled into H-1, EMPF and EMTF showed up as well. They jumped out of their rig and grabbed their medical bags. They could see compressions going on across the river. Finding the nearest person, they asked, *“How do we get across?”* The answer was, *“You don’t.”*

At Indianola GS, the hijacked Forest Service boats had been loaded on the trailer. The truck pulling them sped towards the river while the rest of the group ran behind. They only made it about 200 yards before they hit the congestion of vehicles pulling into H-1. The driver paused at the intersection, to check for traffic, while the passenger urged him to just drive. The driver commanded, *“Hey! Check for traffic,”* to which the passenger wanted to reply, *“I don’t give a s*** about traffic!”*, but recognized that the scene at H-1 was chaotic and they needed to slow down and ‘pump the brakes.’

With no boats yet in the water, EMPF requested an AED (automated external defibrillator) be hauled over in the tuna net. Not wanting to wait for the incoming long-line helicopter or the boats, an R4-IHC hotshot grabbed an AED that had been borrowed from the Indianola GS and headed towards the water. Branch 1 intercepted the potential swimmer, asking *“Are you a strong swimmer?”* The R4-IHC member replied *“Yes,”* and Branch 1 let him go, though in the back of his mind he kept thinking about the potential risks. The swimmer jumped in, holding the AED overhead with one hand all the way to the south shore. Other hotshots also attempted to bring critical needs across, each having a momentary conversation with Branch 1 before jumping in. While some were successful,

“There was a lot of traffic that came into that intersection right at that moment.”

—DIVS T



Figure 8.—Cataracts are rapidly shuttled from trailers to the water.

others recognized their own limits and dropped the tools as they swam to avoid becoming patients themselves and adding to the complexity of the incident.

As Adam and Joe started unstrapping the cataracts⁶, several firefighters from T2IA-Crew, WT-47, and R4-IHC came up. *“They just lifted the rafts over their*

⁶ A boat with two parallel hulls or floats, especially a light sailboat with a mast mounted on a transverse frame joining the hulls (thefreedictionary.com/cataract).

heads and carried them down to the river.” As they jogged the boats down to the water, one person asked, “Does anyone know how to row?”

With many years of rafting experience, Scott, an FFT1 off WT-47, self-identified that he fit the need and instinctively jumped in the raft he was helping to carry as soon as it hit the water and grabbed the oars; Joe manned the other cataraft. Scott shuttled EMPF and EMTF to the south bank on the first cataraft, while Joe rowed

“As we were coming up with a game plan, some boats showed up. Folks were shouldering them and hustling them to the river. They were just jogging across the parking lot with those boats and putting them in the water.”

—EMPF

a load of gear and firefighters across on the second.

At the same time as the boats arrived, HLCO and pilot landed at H-1 as the IWI IC tried to wave them off to keep the helispot clear for the incoming medevac ship. HLCO jumped out of the helicopter and found the IWI IC who asked if they could take a backboard. HLCO replied, “No, but we can haul the tuna net.” (See inset box above.)

Additional Context

Helicopter Typing and Capabilities

The Type 3 helicopter the HLCO was flying in was not configured for the transport of a patient on a backboard at the time of the incident. However, under a different configuration, the helicopter would have been able to carry out such a transport. Often, it is not the type size of a ship that is the limiting factor, it is the current configuration of the helicopter.

HLCO quickly finished rigging the tuna net, borrowed a hard hat and a radio from ground resources, and assigned someone to talk to the pilot as he hooked the swivel to the belly of the

Additional Context

Advanced Helicopter Experience

The HLCO (helicopter coordinator) is an airborne firefighter who coordinates, assigns, and evaluates the use of aerial resources in support of incident objectives. The position does not currently require the individual to be a qualified helicopter crewmember (HECM) or helicopter manager (HMGB), only that the individual be task force or strike team leader qualified. This particular HLCO had an extensive background in helicopter operations and was a qualified HMGB, which contributed to the flexibility and comfort level with the on-the-fly decision to hover hook the load. A capability that could have been absent in other qualified HLCOs.



Figure 9.—HLCO helicopter hovers over the south bank of the river near rescuers and CH-47D wreckage.

hovering helicopter (see Advanced Helicopter Experience inset box on page 17). The pilot flew the tuna net across the river and set the load on the ground nearby just as the cataraft with the EMPF and EMTF arrived (see figure 9). For several of the swimmers on the south bank who were solely focused on providing care to the patients, the tuna net, just a stone's throw away, appeared out of nowhere.

Also arriving at H-1 during this time, the R6-IHC truck found access to the river was blocked by the HLCO ship. Unable to reach the shore with the truck, River Group-t and members of T2IA-Crew and R4-IHC unloaded the boats, ran them to the shore, placed them in the river, and then walked them upriver of the aircraft. With no frame, the one boat was useless, but the 12-foot raft would work well. River Group-t, an experienced river rafter in his personal life, and a local firefighter (FFT1), jumped in and started rowing across. Once they reached the south shore, River Group-t and FFT1 stood by to help. When someone requested spider straps, River Group-t volunteered to go to the north shore to grab them. As he did so, he made eye contact with an R4-IHC crewmember who was on the north shore with the spider straps about to jump in the water to swim them across. They made eye contact and River Group-t gave him an "I'm coming" look, but the crewmember jumped into the water anyway. When he did, the swimmer started drifting right toward the helicopter. River Group-t didn't want them to be 'those guys' who created another IWI, so he rowed over, pulled the guy out of the water with the requested supplies, and then rowed back to the south shore.

In the air, the ATGS and ATGS-t were headed towards the fire in the Air Attack platform. Because HLCO was on the ground and 3BB was flying in a steep canyon, Air Attack was unable to reach them to be cleared to enter the temporary flight restriction (TFR) area. Knowing there was a helicopter down, ATGS and ATGS-t made the decision to enter the TFR at 10,000 feet, well above the operating space of the helicopters. By the time ATGS and ATGS-t made contact with 3BB, they were well within the TFR and in sight of Indianola GS.

Not long after, the three other ships (9CG, 1CG, and 2LM) that had been launched to support the rescue efforts arrived in the airspace over the crash site. Due to the terrain, the incoming aviation resources struggled to make contact with aerial supervision until they were halfway there. Once in range, 9CG had a hard time breaking through all the radio traffic and decided to orbit nearby the incident until they were able to contact Air Attack.

Now on the south shore, EMPF and EMTF conducted a brief triage of the actions being taken. DIVS A tied in with them and expressed his perspective that Patient 1 was the priority. Seeing that the hotshots were providing excellent CPR to Patient 2, EMPF told them they were doing good and to continue CPR. The pair then went to assess the condition of Patient 1. EMPF and EMTF found Patient 1 had significant trauma injuries and determined a need to support their airway, provide spinal immobilization, and get them packaged for transport across the river.

"The EMT was super dialed and provided a calming presence."

—R4-IHC crewmember

As the group worked to package Patient 1, River Group-t and Scott prepped the rafts for transport. They rigged the rafts with straps so they could get the backboards on then moved the catarafts upstream, accounting for current, to align with the caterpillar line that had been set up on the north shore to carry the patients up the riverbank.

On the north shore, HLCO noticed the fire encroaching on the medical response. To cool down the nearby fire, HLCO cleared 3BB to drop water on it. After two bucket drops, HLCO directed 3BB to find a spot north of the area to orbit, allowing incoming medical helicopters unrestricted access to the helispot. HLCO then loaded back into their helicopter and, with permission from Air Attack who was now over the accident site, lifted to step back into an aerial supervision role. Once in the air, HLCO and Air Attack divvied out supervision: Air Attack would take Air-to-Ground radio

“While we were helping the pilots, we had a forest fire burning right next to us in the woods and not very far away.”

—Scott, WT-47 operator

traffic, and HLCO would coordinate the helicopters.

“I turned around [while we were providing care] and the fire was right there, but then a helicopter was cooling it down, so I felt comfortable again.”

—R4-IHC crewmember

With the three incoming aircraft hovering nearby, HLCO and Air Attack made a concerted effort to figure out which of the aircraft was configured for what mission. Adding to the confusion was the similar tail numbers for 9CG and 1CG which were both Bell 407s with identical paint jobs. As 9CG continued to orbit nearby, they could hear radio traffic from the ground, *“Patient 1 ready for transport.”* This allowed 9CG EMT to prepare a plan for action prior to landing. After a little back and forth, the group was able to identify two ships with

capabilities to fly the patients. However, only one, 9CG the medevac ship, had enough fuel to make it to Missoula. HLCO cleared 9CG to land at H-1.

Not long after, the REMS team arrived at H-1. Based on the radio traffic they had heard while driving, they grabbed their spreaders and medical gear expecting them to be needed for the extrication efforts. They asked the first person they came upon whether the pilots were out. They said “Yes,” so the REMS team set their extrication gear down and grabbed their jump bag instead.

On the south shore, Patient 1 had been packaged and was quickly loaded onto the cataraft. Scott was rowing and shuttled across the river. By this point, many hands had already assembled on the north shore to chain the patient up the riverbank and into a ground ambulance, including one of the bootless swimmers who held spinal stabilization for Patient 1. Once in the ambulance, the paramedics worked to provide a definitive airway and figure out the best plan for patient transport.

As soon as Patient 1 and the EMPF had unloaded from the cataraft, two paramedics off the REMS team jumped in and headed for the south shore in the cataraft, now piloted by Adam, the boats owner. There the REMS team found the hotshots still doing CPR on Patient 2. They hooked up their 3-lead AED to track heart rhythms and then engaged



Figure 10.—Rescue efforts continue on the south shore of the Salmon River. [Photo credit: Branch 1-t]

Additional Context

Calling Traumatic Arrest

EMS providers can terminate resuscitative efforts in a traumatic cardiac arrest in accordance with agency protocols. The determination to do so is based on several factors including the safety of the emergency scene, the needs of the family, and the location of the scene. These special circumstances may necessitate the need for patient transport without the return of spontaneous circulation.

Transport of the patients at this IWI was a point of discussion during interviews. Scene preservation, standard protocols, and long-term mental and emotional health of the firefighters providing care were all discussed during this conversation.

While the IWI IC and paramedics recognized that survival from a traumatic cardiac arrest is rare, they also recognized the effects those efforts had on the rescuers providing care.

Due to the safety concerns at the IWI, the remoteness of the scene, availability of medical tools, lack of communication with Physician Medical Control, and the needs of the firefighter “family,” the decision was made to continue resuscitative efforts and transport to Salmon Hospital.

“We saw that doing CPR was therapeutic for them. It would have qualified as a traumatic arrest, and we could have ceased efforts. We knew we needed to let them keep doing this (providing CPR) and we needed to transfer them across the river and to definitive care.”

—EMPF

in a conversation with the EMTF on whether to call traumatic arrest. They decided based on patient condition and the medical tools available, they would continue CPR, package for transport, and transfer Patient 2 to definitive care (see Calling Traumatic Arrest inset box).

“The scene was chaotic which I wasn’t expecting.”
—9CG EMT

Once 9CG landed at H-1, 9CG EMT exited the helicopter, pausing to assess the scene. It was chaotic, but 9CG EMT homed in on the group treating Patient 1 in the ambulance and broke into the conversation saying, “Our helicopter

is ready to go.” 9CG EMT quickly realized that the patient was not ready for transport and was already being treated at a higher level of care (EMPF) than he could offer. Instead, he offered transport of the patient, EMPF, and himself (see Patient Care is Priority inset box).

As paramedics in the ground ambulance continued to work on Patient 1, 9CG EMT, EMPF, and Air Attack had a quick conversation about shortest flight times and whether to take the patient to Salmon, Idaho Falls, or Missoula. As they did so, they heard

Additional Context

A Perceived Medical Delay—Patient Care is Priority

In the midst of an IWI, minutes can feel like eons, and decisions that lead to “delayed” transport are often met with frustration and confusion. After Patient 1 was loaded into the back of the ground ambulance and 9CG had landed, paramedics and EMTs worked to stabilize him for transport. Perspectives from those outside the ambulance described this time passing as excruciating. As EMS personnel continued to work on Patient 1, a person nearby asked why they weren’t putting the patient in the helicopter right away.

EMS personnel on site explained they were trying to establish a stable airway for the patient, that “*airway is king.*” (Continued on next page.)

Additional Context

A Perceived Medical Delay—Patient Care is Priority (cont)

Even if the air ambulance had been on site instead of 9CG, they still would have taken the time to establish an airway before loading the patient.

EMS personnel are trained to take the time to establish airways because a lack of oxygen prehospital can result in a higher risk of mortality and/or brain injury. Therefore, effective airway management prehospital is critical to patient care and typically takes priority over immediate transport. ([National Library of Medicine, 2016](#)).

“Wildland firefighters train to move the patient quickly and time passed is time lost.”

—IWI IC

Med4, the helicopter air ambulance, call in over the radio saying they were inbound. The conversation switched to whether or not to put Patient 1 on 9CG or to wait for Med4. They all agreed that, in addition to the patient not yet being in a transportable condition, waiting the extra 3 minutes on the ground for Med4 to arrive would get Patient 1 to a higher level of care faster than the alternative (see inset box Medevac Ship vs. Air Ambulance). The decision to wait was also supported by the medical unit leaders (MEDLs), advising that transport by helicopter air ambulance was the priority.

To make way for Med4, 9CG lifted off H-1, leaving its EMT and HECM-t to help the resources on the ground. Another EMT assigned to an ambulance on the fire recognized the incoming helicopter air ambulance and knew they wouldn't land

with the amount of rotor wash the helicopters were putting off. They ran over to tell the IWI IC, who then tasked WT-47 with wetting down H-1.

As Med4 asked to enter the Temporary Flight Restriction (TFR) for the fire area, the amount of traffic in the airspace was concerning for the Med4 pilot. Air Attack was in a high orbit, HLCO was over the scene, 3BB and 2LM were orbiting nearby, 9CG was on the ground at H-1, and 1CG had landed on a sandbar nearby. Once the Med4 pilot was able to make contact and coordinate with HLCO and Air Attack, their concerns about air traffic were alleviated and Med4 was able to enter the airspace. Seeing Med4 inbound, HECM-t cleared H-1, allowing the aircraft to land at the helispot.

“The time from Med4 launch to skids down on H-1 was 18 minutes. To have a life flight ship in 18 minutes...that's pretty quick.”

—ATGS

Additional Context

A Perceived Medical Delay—Medevac Ship vs. Air Ambulance

Another perceived delay in the IWI stemmed from the decision to wait for the helicopter air ambulance instead of immediately transporting Patient 1 in the on-scene medevac ship. If Patient 1 were to be transported to the hospital via 9CG, they would not have access to advanced life support (ALS) equipment until arrival at the hospital. However, air ambulances are tailored for these types of situations; they have a flight nurse, a critical care unit, and necessary advanced life support (ALS) equipment readily available. This meant Patient 1 would get to a higher level of care as soon as they were loaded into the Med4 ship. While the additional minutes felt like an eternity to those involved in the response, medical experts on the ground providing care recognized that delaying transport by a few minutes would provide access to ALS equipment to Patient 1 faster.

When Med4 landed, HECM-t tied in with the medical flight crew and led them to the EMS personnel in the ambulance. The medical flight crew worked with providers to transfer Patient 1 from the ground ambulance's monitors to Med4's monitors and to package the patient for transport (see inset box below). They then transferred Patient 1 to Med4 and a higher level of care.

Meanwhile, on the south shore, the care providers had loaded Patient 2 onto the cataraft Joe was piloting, one still holding c-spine and two others continuing compressions. The rigid frame and configuration of the cataraft made it possible to continue compressions where a normal, non-framed raft would not have provided that support. Once across the river, the hotshots who had stoically provided CPR to Patient 2 for over an hour, carried him all the way to the ambulance, busting past the caterpillar line that was waiting to assist; they had cared for Patient 2 for this long and were determined to see it through to a higher level of care. Once on the north shore, paramedics established a definitive airway for Patient 2 then transported the pilot to Steel Memorial Hospital in Salmon, ID via ground ambulance; CPR was continued all the way to the hospital.

Additional Context

A Perceived Medical Delay—Swapping Monitors and Patient Packaging

Most EMS units have monitors on board. However, not all monitors are interchangeable, and often must be switched out when transferring patient care. This was the case for Patient 1 as EMS providers transferred care from the on-scene paramedics to the medical flight crew. While the time from Med4 landing to lifting was only eleven minutes, it felt like forever to those outside the ambulance. However, the perceived delay was necessary for EMS personnel to provide the best care to Patient 1.



Figure 11.—WT-47 wetting down H-1 in preparation for the inbound Med4 ship.

After the patients had been transferred to higher care, Adam and Joe continued to ferry people and supplies from the south bank to the north. Once everyone was back on the north bank, Adam and Joe, with the help of those around them, loaded up their rafts and went home. Overhead, aircraft that had responded to the IWI started trickling back to helibase, with only Air Attack remaining over the fire. IWI responders continued to oversee the IWI area and each other. Resources from Division A and River Group gathered together for small AARs. Then Branch 1 and Branch 1-t tied in with the affected resources to check in on how everyone was doing,

“It was sobering to hear from R4-IHC that they were transporting the one patient by ground ambulance.”

—ATGS

offer options for peer support, and to discuss best options for each crew's wellbeing. As these resources debriefed, scene safety at the accident site was still a priority, and DIVS T worked with R6-IHC crewmembers and WT-47 to get a Mark III pump, sprinkler kits, and some folks across the river with the remaining Forest Service raft to wet the area down to prevent fire from reaching the crash site.

Post response – Employee Care

Following the helicopter accident, personnel on the fire reacted differently. Recognizing the heroic feats of those involved in the rescue efforts, the IMT wanted to provide them an opportunity to self-evaluate their status. They arranged for sleeping quarters at the high school in town (no hotels were available) and tentative release for those involved. Ultimately, the IMT left the decision up to each module, individual, and pilot whether to remain at the fire, return home, or to take a couple of days off in place. Multiple perspectives were heard:

For R4-IHC, they were told the IMT had plans to get them a hotel in town that night and to release them the next day. Knowing that the best course of action for his crew would be to continue working and engaging in meaningful projects on the fire, the superintendent went into ICP to have a discussion with the ICs about remaining on the fire. Staying on the incident allowed the crew several victories and bonding opportunities with private landowners who appreciated the work and actions taken by them. This allowed them to process the incident as a group.

DIVS A chose to remain on the incident, in a non-operational capacity, to provide peer support to those directly involved with the incident. He also received support himself from hotshot crew superintendents who had peer support training, close peers, and mentors who were also assigned to the incident.

IMT members were given the option to continue working in their roles and this allowed them to remain focused on the task at hand. Command and General Staff made a concerted effort to connect with each team member, one-on-one, and then follow up with another one-on-one check-in a few days later. The personal connection and follow up was appreciated.

Being at the end of their assignment, and having a few folks new to fire, E-673 felt going home was the best option for them. They also received some strong feelings from the overhead they were working for that going home was also the best decision. After receiving that advice, the crew talked it over together, and felt going home was the best option.

Some pilots chose to stay on the fire, others asked for a few days off. With enough aircraft on the fire, the IMT was able to facilitate these requested days off without hindering operations and without borrowing from other incidents or the local forest.

After having a phone conversation with the IMT, Branch 1 returned to River Group Sup and River Group-t and said they were free to go home. Both felt that demobing would be the worst thing for them. They wanted to keep working and to be with their people. That night, River Group Sup and River Group-t connected with crews they had worked for in years past that were also assigned to the Moose Fire and resumed working the next day.

For T2IA-Crew, heading home after the accident felt like the best option. They stayed in Salmon that night and decided to wait for the Critical Incident Peer Support (CIPS) team to show up before heading home. The process was a little weird until a liaison was put in place because no point of contact had been identified for the IMT that the crew could ask questions of. Once home, T2IA-Crew's home unit took great care of their employees, ensuring they had the support they needed.

EMPF and EMTF knew each other, so they took time to have their own private discussion afterwards about what happened. In the 4 to 5 days before the CIPS team arrived, they also

had impromptu conversations with the firefighters who helped provide care. They were able to ask questions of each other and gain understanding, which proved to be helpful to the group as they processed the incident.

Additional Context

Critical Incident Peer Support—What is it and how is it ordered?

The Critical Incident Peer Support (CIPS) group provides education, support, and assistance to those impacted from critical incidents such as the Moose Fire. The peers and clinicians are trained to provide support and education around critical incident stress and bridge those impacted to higher levels of care for aftercare.

The ordering process typically happens through agency administrators or incident management team leadership to the Regional or National Critical Incident Stress Management (CISM) Coordinators. The CISM coordinator then orders and organizes a CIPS team, made up of qualified peers and a trained clinician(s), that meets the need for those affected. Typically, a CIPS team will be operational within 24- to 72-hours of the critical incident and provides education and support to those impacted through debriefings and crisis management briefings.

CIPS may be ordered for other critical incidents such as natural disasters, non-line of duty deaths, or other traumatic events or exposures on the job. If you or your work unit feel you are in need of peer support after a traumatic event or exposure, please reach out to your forest leadership, who will contact the appropriate CISM coordinator.

CIPS can be used more than once after an event or exposure. Often times there is a need for follow up, “once the dust settles,” or once the field or busy season comes to an end and people have more time to process what they experienced. If long-term care is needed outside of what is provided by CIPS, the CIPS team will suggest options to the individual and bridge to higher care by trying to find appropriate resources in their area.

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Appendix A: Name and Designator Reference Sheet

Name or Designator	Position or Role
1CG	Type 3 helicopter; sister ship to 9CG.
2BK	Type 1 helicopter, H-47D scheduled to replace 8RA at the end of 8RA's fuel cycle
2HG	Type 2 helicopter, assigned to Division K at the time of the accident
2LM	Type 2 helicopter, staged at Salmon helibase, requested as part of response to the crash
3BB	Type 1 helicopter, Blackhawk that swapped with 6RG, the KMAX
6RG	Type 1 KMAX helicopter working the ridge near 8RA
8RA	Type 1 helicopter, CH-47D; ship that crashed
9CG	Type 3 helicopter designated as the agency medevac ship on July 21, 2022.
9CG EMT	An EMT on the 9CG helicopter crew
Adam	Private homeowner; catarafts used in response to accident
Air Attack	The air attack platform on the fire; made up of ATGS and ATGS-t
AOBD	Air operations branch director for the Type 1 IMT assigned to the Moose Fire
ARA	Air resource advisor
ASGS	Air support group supervisor working out of Salmon helibase
ATGS	Air tactical group supervisor assigned to the Moose
ATGS-t	Air tactical group supervisor trainee assigned to the Moose Fire
Bobby	R4-IHC crewmember
Branch 1	Operations branch director of Branch 1
Branch 1-t	Operations branch director trainee of Branch 1
DIVS A	Division supervisor of Division A
DIVS T	Division group supervisor of Division T
DIVS T-t	Division group supervisor trainee of Division T; captain on R4-IHC
E-673	Engine assigned to River Group
EMPF	Fireline paramedic assigned to Division A
EMTF	Fireline EMT assigned to Division A
FFT1	Local firefighter assigned to the Moose Fire; helped row Forest Service raft with River Group-t

Name or Designator	Position or Role
George	R4-IHC crewmember
HEBM	Helibase manager
HEBM-t	Helibase manager trainee
HECM-t	Helicopter crew member trainee off of the 9CG helicopter crew
HLCO	Helicopter coordinator
IC	Incident commander of the Type 1 IMT assigned to the Moose Fire
IMET	Incident meteorologist
IWI IC	Incident commander of the incident within an incident; superintendent of R4-IHC
Joe	Private homeowner; neighbor of Adam's
Med4	Helicopter air ambulance
MEDL	Medical unit leader for the Type 1 IMT assigned to the Moose Fire
Patient 1	The second pilot pulled from the aircraft
Patient 2	The first pilot pulled from the aircraft
R4-IHC	Region 4 interagency hotshot crew assigned to Division A.
R4-IHC-SQ1	Squad leader on R4-IHC, directed 8RA bucket drops
R6-IHC	Region 6 interagency hotshot crew assigned to Division T
REMS	Remote Extrication Module Support team assigned to Division A
River Group Sup	Group supervisor of River Group
River Group-t	Group supervisor trainee of River Group
Scott	Type 1 firefighter off of Water Tender 47
Stuart	R4-IHC crewmember
T2IA-Crew	Type 2 initial attack crew assigned to River Group
Type 1 IMT	Type 1 Incident Management Team overseeing the Moose Fire
WT-47	Water Tender 47 assigned to Division F