Blacks Creek Smokejumper Accident

Accident Investigation Report
Bureau of Land Management Great Basin Smokejumpers
April 15, 2015

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Investigative Team:

Andy Delmas — 5/21/15

Andy Delmas
Acting Safety Manager
BLM NIFC
Boise, Idaho
Investigation Team Leader

Paul Hohn — 5/13/15

Paul Hohn
Assistant State FMO
Wyoming BLM
Cheyenne, Wyoming
Team Member

Ken Frederick — 5/21/15

Ken Frederick
Public Affairs
BLM NIFC
Boise, Idaho
Team Member

Executive Summary

At 1158 on April 15, 2015 an accident occurred during a BLM smokejumper parachute training mission south of Boise, Idaho. The accident occurred when the smokejumper involved landed in strong winds while his main canopy was misaligned with the wind line. The misalignment caused the smokejumper to experience a hard landing, characterized by a substantial lateral and backwards movement at his point of contact with the ground. The smokejumper sustained a broken right humerus, dislocated right shoulder, with structural damage to the right shoulder, and a fractured rib upon landing. The injury occurred at Blacks Creek practice jumpspot. The injured jumper was given initial treatment on scene by Great Basin Smokejumper EMTs and transported to St. Alphonsus Hospital in Boise, Idaho, by St. Lukes #1 Life Flight for further treatment.

Narrative

Participants

On April 15th, three loads of jumpers were scheduled to do their first refresher jumps of the year. This was the second jump refresher session for the Great Basin Smokejumpers for 2015. Ultimately, two loads of jumpers parachuted that day. This report will identify involved participants by their position.

Jumpspot Coordinator

Monitor

Evaluator #1

Evaluator #2 (transitioned to Lead EMT after the accident)

Rookie Spotter

Evaluator Spotter

Jumpers 1-8 (assumed to be second load)

FL Jumpers 1-8 (“FL” standing for First Load)

Timeline for April 15, 2015

0800 - Roll call at base

0815 - Refresher class #2 receives classroom instruction on flight dynamics and techniques

1000 - Ground crew leaves base for jumpspot

1015 - 1st load of jumpers suit up

1030 - Ground crew arrives at jumpspot; prepares jumpspot for operations

1030 - 1st load departs Boise for the jumpspot

1109 - Jump 49 (J49) completes 1st load jump and returns to Boise to pick up 2nd load

1131 - 2nd load departs Boise for the jumpspot

1135 - 2nd load arrives over jumpspot

1158 - Injury to Jumper #6 occurs

1204 - J49 requested Life Flight from Boise Dispatch, for an injured smokejumper (SMJ)

1205 - Life Flight ordered by Boise Dispatch

1209 - J49 reports SMJ right humerus and shoulder injury

1211 - St. Lukes #1 responding as well as a ground ambulance (later cancelled)

1222 - St. Lukes #1 lands at Blacks Creek jumpspot

1242 - St. Lukes #1 departs Blacks Creek with patient for Saint Alphonsus Hospital

1243 - Great Basin Smokejumper base sends liaison to Saint Alphonsus Hospital

1248 - J49 lands Boise Airport

Refresher Training

Each year Great Basin Smokejumpers conduct fire refresher and jump refresher trainings for returning jumpers. These training sessions are broken into groups or classes in order to accommodate the staggered fashion in which returning SMJs report back to work. Fire refresher training for Jump Refresher Classes 1 and 2 started on April 6th, 2015 and, among other topics, included a medical training day with the purpose of familiarizing jumpers with contents of the smokejumper trauma kit and standard protocols for jumper injury response. Fire refresher training concluded on April 10th, 2015.

The second jump refresher started on April 13th, 2015 and concluded on the 21th (9 days later). Jump refresher includes classroom training (parachute-oriented skills), tower training, and live proficiency jumps in various terrain conditions. Each refresher lasts 5-10 days, depending on the size of class and weather. The jump refresher began with a day and a half of classroom instruction. This includes issuing and inspecting equipment, reviewing aircraft procedures, aircraft exit techniques, parachute malfunction procedures, and parachute flight techniques. The classroom instruction also reviews emergency aircraft procedures.

The second half of Day Two is held at a training facility referred to as "the units," located next to the Lucky Peak nursery, 10 miles NE of Boise. The units include:

1. Tower Unit – A 40-foot tower from which jumpers practice aircraft exits and parachute malfunction procedures.
2. Parachute Landing Falls (PLF) Unit– A 3-foot platform from which smokejumpers jump into a gravel-filled pit and perform properly executed parachute landing falls.
3. Letdown Unit– A 15-foot platform on which smokejumpers practice rappelling procedures to use in case of a tree landing.

Day three and subsequent days consists of live parachute jumps. Jumpspot locations increase in complexity as training progresses. All aspects of the practice jumps are evaluated. The objective of jump refresher is for each returning smokejumper to demonstrate proficiency in all aspects of smokejumping and be certified for operational fire jumping.

Jumper Background

The injured jumper (Jumper 6) began his smokejumping career in 1994 as a USFS Redding Smokejumper. He jumped round parachutes for three years, accumulating 86 total jumps. In 1997 he transferred to the Great Basin Smokejumpers where he began jumping the BLM's Ram-Air parachute system. He was a BLM smokejumper from 1997 to 2002 and accumulated 137 Ram-Air jumps. He did not jump from 2003-2012, and resumed jumping in 2013, accumulating 36 jumps that year. He did not jump in 2014.

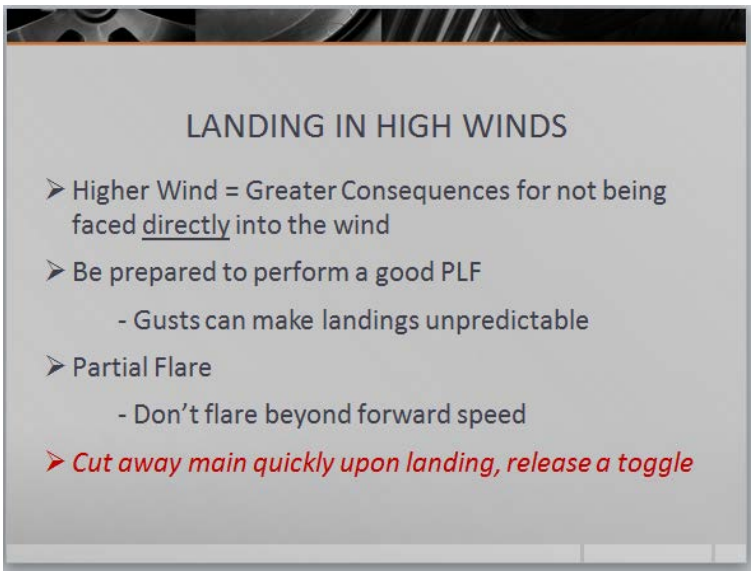
Over his smokejumping career, he recorded a total of 223 jumps (from 1994 to 2015). Of these, approximately 96 were operational fire jumps and 127 were training/proficiency jumps.

The injured jumper had not previously jumped into the Blacks Creek jumpspot. The injury occurred on his first jump of the 2015 refresher session.

Briefings

On April 15th, 2015 at 0800, the crew met for roll call followed by a briefing of the day's scheduled events. Three loads (8 jumpers per load) were planned for refresher jumps at Blacks Creek. To start the day, a classroom session was conducted on parachute flight theory and flight control, and parachute flight patterns. The flight pattern instruction included extensive content and discussion on high wind jump patterns, referred to as "non-standard patterns" (non-standard pattern is the terminology used for landing a parachute in high wind conditions and is a standard operating procedures). The pattern instruction also included high wind jump techniques and guidelines for landing in high winds.

This slide is taken from the high wind landing powerpoint presentation. Hazards and techniques related to high wind landings were specifically addressed in the morning class:



After the classroom instruction, all jumpers were briefed on the Blacks Creek jumpspot. Objectives and hazards for the jumpspot were covered in a powerpoint presentation conducted by the lead jump refresher instructor. This briefing also covered emergency procedures, communications, and the current and predicted weather conditions at the jump site. During the jump briefing, jumpers were told by the refresher instructors that the "whole world was the jumpspot", and that a good exit, pattern and safe landing were more important than landing close to the center of the spot. The main objective of this first jump was to "knock the rust off" and have a safe jump.

Spotters for the day's jump missions would consist of rookie spotters being trained and evaluated by an instructor spotter. The rookie spotters, evaluator spotter and parachute instructors for the day were informed by the refresher lead instructor that the wind cut-off threshold for the day's jumps would be *around* 700 yards of indicated streamer drift.

The ground crew at the jump spot was identified and briefed. The jumpspot ground crew included a jumpspot coordinator, two evaluators, and a monitor (whose job was to take weather readings and shoot video of each landing).

The ground crew departed after briefing at 1000 hours. The first load of jumpers left the Boise Airport at 1030 for the first jump of the day.

On every smokejumper mission the jumpers are given a standard briefing by the spotter before getting in the door of the aircraft for exit. This briefing always covers the following:

- Confirmation the jumpers saw the spot and streamers
- Yards of drift and/or wind speed in miles per hour
- Aircraft pattern
- Known hazards
- Jumpspot elevation
- Confirmation the jumpers had activated their reserve parachute Automatic Activation Devices (AAD)

The injured jumper and his jump partner received the standard briefing. Hazards on the ground were identified as rocks, gopher holes and parked ground crew vehicles.

Jumpspot Conditions and Preparation

The Blacks Creek area is approximately ten miles south of Boise, Idaho. The Blacks Creek jumpspot was selected for the April 15 refresher jump landing spot because the site has a very large landing area with minimal hazards. It is relatively level, with low-growing sagebrush and annual grasses comprising the dominant vegetation.

The role of the jumpspot coordinator was to communicate with the spotter in the smokejumper aircraft and coordinate activities in and around the jumpspot. The jumpspot coordinator had the responsibility of determining if weather conditions on the ground remained within acceptable parameters. The monitor was responsible to videotape each jump--particularly the landings--and to monitor weather conditions using a handheld digital wind meter. The evaluators observed and critiqued each jumper's performance, and reviewed the jump with the individual smokejumpers.

On arrival at the jumpspot, the coordinator set up wind-indicating ribbons and spread a panel on the ground. These items denoted the actual center of the jumpspot.

When Load 1 arrived over the spot on April 15th, winds were blowing steadily out of the west at 12-15 mph. Temperatures were in the mid 50's under clear skies. When Load 2 arrived, winds had increased to 15-18 mph with gusts to 20 mph.

Refresher Jump Operations

1st Load

The first load of the day comprised eight jumpers. All eight jumps and landings were conducted without incident. One of these jumpers played a role in subsequent events. He is referred to as First Load (FL) Jumper 3.

2nd Load

The second load of jumpers arrived over the jumpspot at approximately 1135 hours.

The mission rookie spotter threw an "initial set" of streamers from 1,500 feet above ground level (AGL) over the jumpspot. These streamers indicated approximately 700 yards of drift from west to east and took 1:04 (one minute, four seconds) to reach the ground. (Timing steamer decent rate is a method to evaluate the presence of up or down air over the jumpspot. All streamer times observed for this mission were within acceptable parameters.) The spotter then threw a "check set" of streamers from the same altitude. This set showed a similar drift, and took 1:29 to reach the ground. The spotter elected to throw another check set of streamers out of his concern to accurately assess the wind conditions over the jumpspot. The second "check set" landed 50 yards from the jumpspot, taking 1:26 to reach the ground. The spotter felt the wind drift was consistently 700-800 yards at 1,500 feet AGL, which was within the acceptable range of *around* 700 yards of drift from the morning briefing.

NOTE - Wind conditions at the Blacks Creek jumpspot were within BLM parameters for safe parachuting. According to the BLM Spotter Handbook: "Ram airs can usually land comfortably in open terrain with ground winds up to 25-30 mph." Measured winds on the ground at the time of the jump were 15-18 mph with gusts to 20 mph. The 700 to 800 yards of streamer drift equates to approximately 21 to 24 mph. The wind cut-off on the second load of jumpers on April 15, 2015 was below the upper end of BLM Ram-Air parachute jumping wind parameters for a flat, open jumpspot such as Blacks Creek jumpspot.

The rookie spotter made the decision to go into jump operations, based on his determination that wind conditions were consistent in direction and were within the wind cut-off parameter. He also assessed the jumpspot as being large and free of hazards. Finally, the rookie spotter checked for confirmation with all the smokejumpers on the load, who indicated their agreement to go forward with the jump.

As they made their jump plan, Jumper 6 expressed some concern to his jump partner (Jumper 5) about the wind conditions. Jumper 6's concern revolved around the fact it had been approximately a year and a half since his last jump, and, due to his body weight (160 lbs.), high

wind jumps usually resulted in him having a lack of forward penetration under canopy. However, Jumper 6 stated in his interview with the investigation team that he had been trained for parachuting under high wind conditions and he would rely on his training. Jumper 6 stated that he had made more than 40 to 50 high wind jumps during his career. Jumper 6 did not communicate any concerns to either spotter prior to his jump.

The jumpers exited the aircraft in pairs (or sticks). Between 1 minute 30 seconds and 2 minutes elapsed between sticks exiting the aircraft. All eight jumpers felt they had been adequately briefed about the non-standard jump pattern to be used to get to the jumpspot, and the probable effects of high winds on their patterns and approaches to the spot. All eight jumpers reported covering high wind jumps in their training and refresher materials. Though their high wind jump experience with the Ram-Air canopy varied considerably, all eight had high-wind experience and were not greatly concerned with the day's jump.

Jumpers 1 and 2 landed close to the panel. Both had comfortable landings, though both were drug on the ground for 10 to 15 feet before cutting away their main canopies.

Jumper 3 landed several hundred feet west of the jumpspot and had a soft landing. He was drug only a few feet before cutting away his main.

Jumper 4 landed hard and was drug about 20 feet before cutting away. He landed about 200 feet southwest of the jumpspot.

After seeing the 3 of the first 4 jumpers drug on the ground upon landing, the ground crew called the jumpship to inform them that conditions were marginal and that they were canceling the third load of jumpers. Second load jumpers 5 through 8 had already exited the jumpship and were in the air when this decision was made.

Jumper 5 landed about 200 feet southeast of the spot. Video evidence shows he was not aligned directly into the wind. He attempted to make a correction into the wind but overcorrected his turn. He landed going backwards and slightly misaligned to the wind line. When he contacted the ground, he briefly bounced back up in the air, hit the ground again, and was drug a short distance before cutting away his main canopy. On his second contact with the ground, Jumper 5 bruised his left hip and had the wind knocked out of him. He was later transported to the hospital by vehicle for evaluation and released.

Jumper 6 had a severe landing. Video evidence shows that he had misaligned his chute to the wind line during his final 50-100 feet before landing. His canopy was approximately 20 to30 degrees to the right of direct alignment to the wind line, reducing his canopy's ability to penetrate the wind. This misalignment compounded his backward movement and created

sideways movement, increasing his speed relative to the ground. Jumper 6 consequently hit the ground at a high rate of speed.

As Jumper 6 landed, his left boot struck the foot of FL Jumper 3, who was running to assist and assess Jumper 5 (who had **not** yet indicated that he was okay as is protocol). FL Jumper 3 tripped and fell, but was not injured.

Jumper 6 landed hard on his right side, and was subsequently drug downwind by his chute. After being drug approximately 100 feet, the wind caught his chute and propelled him nearly airborne again. At that moment, Jumper 6 cut away his main chute with his left hand, as he realized he had lost the use of his right hand. He fell to the ground and came to rest lying partially on his abdomen.

Jumper 7 landed 600 feet upwind of the jumpspot and experienced a soft landing. He cut away his main canopy almost immediately.

Jumper 8 made a soft landing some 30 feet from the panel and was drug just a short distance before cutting away his main canopy.

Final Approach of Jumpers 5 and 6

In their jump plan, Jumpers 5 and 6 agreed to fly a non-standard pattern into the jumpspot. Both jumpers felt their descents into the vicinity of the jumpspot went well. Jumper 6 characterized his approach to the spot as being essentially backwards, with “an occasional crab.” “Crabbing” is a method of turning a parachute perpendicular to the windline to allow the wind to push the jumper back towards the jumpspot. Smokejumpers use the crabbing maneuver to see the jumpspot without having to look behind them.

As Jumper 5 approached the spot, he reached his set up point, turned into the wind and went to full run (i.e. flew his canopy with no applied brakes). At full run, he realized he was still tracking backwards relative to the ground.

Jumper 6 also realized he was tracking backwards as he approached the ground. He expected he would land downwind of the jumpspot. He reported sensing an increase in wind speed as he got closer to the ground.

As Jumper 6 approached the ground, he was out of alignment with the wind line. He could see Jumper 5 had nearly landed to his (Jumper 6’s) left. Jumper 6 looked under his right arm toward

the ground to see if any hazards were present in the area where he was going to land. He did not see any hazards.

Jumper 6 did not realize until after the event that he had clipped FL Jumper 3. He reported that this contact with FL Jumper 3 was not a factor in his parachute maneuvering and landing.

Injury

When Jumper 6 landed, he struck the ground with his feet, with his momentum immediately slamming his right arm and shoulder into the ground. Because of his speed, he was unable to execute a PLF. His right arm was extended outward with his steering toggle in hand. Both steering toggles appear to be approximately at the ¼ brake setting.

Jumper 6 believed his right arm was dislocated or broken in the initial contact with the ground. He became aware that he no longer had any control of his right arm immediately after ground contact occurred.

Another jumper (FL Jumper 6) ran up to Jumper 6 and asked if he was okay. Jumper 6 answered that he was hurt, saying that he thought he had broken his arm. He was in significant pain.

Medical Response

As soon as the ground personnel (which included members of the ground crew and smokejumpers from the first load) realized Jumper 6 was injured, they called for the trauma kit. A jumper from the first load was first to arrive at Jumper 6's location and called for the kit. The jumpspot coordinator ran up to the vehicles and drove the truck containing the trauma kit down to the injury site.

Evaluator 2 was responsible to evaluate the parachute manipulation and landings performed by the second and fourth sticks. While Jumper 6 was making his landing and getting injured, Evaluator 2 was watching the descents and landings of Jumpers 7 and 8. He heard the yelling for the trauma kit and, as soon as he debriefed Jumper 8, he quickly made his way over to the accident site.

Evaluator 2 became the Lead EMT at this point. Evaluator 2 is also an experienced EMT, and he took charge of the medical response to Jumper 6's injuries. Evaluator 1 is a former EMT and assisted Lead EMT. In his interview, Lead EMT reported that a total of five EMTs were at the jumpspot. Lead EMT had an adequate number of personnel on scene to assist him.

Lead EMT found Jumper 6 in pain and lying with his arm "askew." It appeared as if Jumper 6 had an "extra elbow." As he worked, Lead EMT considered how to extricate Jumper 6 from the Blacks Creek jumpspot. The poor condition of the road into the jumpspot suggested that an

ambulance would be delayed reaching the scene, plus the bumpiness of the trip would not be helpful to Jumper 6. Further, the personnel at the accident site could not tell if Jumper 6 had additional serious injuries. Lead EMT suggested that the Jumpspot Coordinator order an air ambulance.

Jumpspot Coordinator radioed the spotter on J49 and made the request. J49 passed that request to Boise Dispatch. Dispatch placed the order for the helicopter at 1205 hours.

Lead EMT led the patient assessment and instructed others to cut away Jumper 6's harness and jump suit.

Lead EMT took Jumper 6's vital signs. He measured "little or no radial pulse" in Jumper 6's right arm. He instructed Evaluator 1 to straighten Jumper 6's right arm and to apply some traction to it. This action relieved pressure on the brachial artery and restored a pulse and capillary infill to Jumper 6's lower right arm and hand. It also relieved some of the injured jumper's pain. Traction was maintained until Jumper 6 was loaded into the helicopter.

Lead EMT instructed one of the other EMTs to place a cervical collar around Jumper 6's neck. Jumper 6 reported no neck or head pain, so this measure was precautionary.

Lead EMT also noted that Jumper 6 "looked shocky." He instructed nearby jumpers to create a wind shield using a canopy and to place jackets on Jumper 6. He also decided to start an IV in Jumper 6's left arm. Lead EMT missed his first attempt, but succeeded in getting the IV in on his second attempt. However, shortly after the IV was in, someone inadvertently snagged the IV line with his boot and pulled the needle from Jumper 6's arm. Because the helicopter was in-bound at that point, Lead EMT decided to allow the flight nurse to introduce the IV.

The smokejumpers next loaded Jumper 6 on a Traverse Rescue Stretcher (TRS) and "packaged" him for transport.

Having been notified (by Boise Dispatch) of the correct frequency with which to contact the incoming helicopter, the Jumpspot Coordinator contacted the helicopter directly and suggested a good landing spot. St Lukes #1 landed 30-40 yards to the east of the accident site at 1222 hours. The flight nurses coordinated the patient handoff with Lead EMT. In short order, they introduced an IV and administered pain relieving drugs to Jumper 6. The ground personnel assisted the flight crew with moving Jumper 6 to the helicopter. St Lukes #1 left the scene at 1242 hours.

Findings and Recommendations

Finding #1

Jumper 6 failed to align his parachute directly into the wind. The investigation team estimates, by video analysis, that his canopy was approximately 20 to 30 degrees off the wind line. This caused him to accelerate and hit the ground at a high rate of speed.

Recommendation: Utilize video footage of this incident to reinforce the importance of landing directly into the wind on high-wind jumps.

Discussion: When he spoke to the investigation team, Jumper 6 stated that during the jump he thought his parachute was aligned into the wind as he came into land, and that he felt the winds compress as he neared the ground. At the time of his interview with the investigation team, Jumper 6 had watched video footage of his landing only once; he acknowledged that he was not faced directly into the wind. [Note: When the AIT interviewed Jumper 6 on April 23, he was being treated for pain with prescription medications.]

Evaluation of refresher curriculum and interviews with the involved jumpers indicated that techniques for landings in high winds was adequately covered prior to the jump. In classroom training on the morning of the jump, the consequences of failure to properly align with the wind was specifically covered.

Finding #2

The speed at which Jumper 6 contacted the ground precluded his ability to execute an effective PLF. That, combined with his arm position, contributed to his injuries.

Recommendation: Utilize this incident to re-emphasize the importance of proper body position (arms in) during PLF instruction and evaluation.

Finding #3

FL Jumper 3 lost situational awareness while attempting to assist Jumper 5.

Recommendation: Emphasize to ground personnel at jumpspots the importance of maintaining situational awareness while jumpers are still in the air.

Discussion: FL Jumper 3 was running to the aid of Jumper 5 (who had just landed) when he passed below Jumper 6. Video footage of the accident reveals Jumper 6 made slight contact

with FL Jumper 3, clipping the FL Jumper 3's legs and tripping him. FL Jumper 3 stated that he "got tunnel vision" and lost situational awareness while going to the aid of Jumper 5. FL Jumper 3 could have been injured by Jumper 6 had their contact been more severe.

Finding #4

Ground personnel did not play a significant role in Jumper 6's set up and final approach for landing.

Recommendation: None

Discussion: When interviewed for this report, Jumper 6 stated his decisions and actions were not affected by personnel on the ground. Jumper 6 was concerned with where he would be landing, since he was moving backwards under canopy due to the high winds. Jumper 6 was unaware of making contact with the FL Jumper 3 until he watched the video of the jump.

Finding #5

The April 15 jumps were conducted at the upper end of the briefed wind limit for the first jump of this refresher, with 700 to 800 yards of drift, but well below the upper limit of BLM Ram-Air smokejumper operations.

Recommendation: None

Discussion: The jump refresher cadre, spotters and smokejumpers on Load 2 were cognizant of the conditions and made an informed, rational decision to move forward with the jump at that time. *According to the BLM Spotter Handbook: "Ram airs can usually land comfortable in open terrain with ground winds up to 25-30 mph". 700 to 800 yards of streamer drift calculates to 21 to 24 mph. Measured winds at the time of the jump were reported as 15-18 gusts to 20.*

Finding #6

Smokejumper instruction and curriculum regarding non-standard patterns and high wind jumps was adequate.

Recommendation: None

Finding #7

The investigation team discovered some confusion about whether the Project Aviation Safety Plan (PASP) for smokejumper proficiency and training flights was approved and signed.

Recommendation: The signatory process for Great Basin Smokejumper plans needs to be clarified. A cross walk for role equivalencies needs to be established for the national office to clearly state who is authorized to sign PASP and other Risk Assessment Tools.

Discussion: The PASP was newly implemented this year. The plan was signed and revised multiple times during the spring of 2015, with the first signature on the plan appearing on March 18, 2015. The most current version of the plan was signed and dated April 16. Authorities and notifications were not well understood by the Great Basin Smokejumper unit, the Boise Dispatch Center, and the Boise District. This issue is unique to the program because smokejumping is a national program, and policies and procedures are written for local field units.

Finding #8

Records of measured wind speeds at the jumpspot were not kept by the monitor or the jumpspot coordinator.

Recommendation: Measurements of weather readings taken at the jumpspot during proficiency jumps should be documented. This could be as simple as having the monitor stating weather readings while recording video.

Finding #9

The parachute used by Jumper 6 was inspected after the accident and was found to be properly trimmed and within the tolerances for steering line configuration.

Recommendation: None

Discussion: This evaluation indicates the parachute was configured to fly straight; no built-in turn existed. This parachute was returned to service and jumped without incident the week after this incident.

Commendations

Commendation #1

The Great Basin Smokejumper program leadership, the personnel on the scene of the accident and the investigation team commend the actions of the Lead EMT. His clear thinking and leadership role were noted as being particularly helpful in reacting to the incident.

Commendation #2

The jump program has an extensive video library and tracking system of jump performance for every smokejumper in the program. This system allows for immediate feedback and tracking of trends or patterns for individual jumpers. Jump performance issues are promptly addressed and fixed. Culturally, the smokejumper program has a very strong performance-based feedback system. Individual performance is also used to make decisions on the level of training and whether remedial training is required.

Commendation #3

As a result of the Emmett Ridge injury in 2014, new accident prevention and response protocols were implemented which proved effective on this incident. Moving the medical training to the beginning of refresher prior to any practice jumps proved to be helpful, as noted by several participants. Increased coordination with dispatch including coordinates of jump activities and communication with the Air Ambulance over a preplanned frequency was effective.

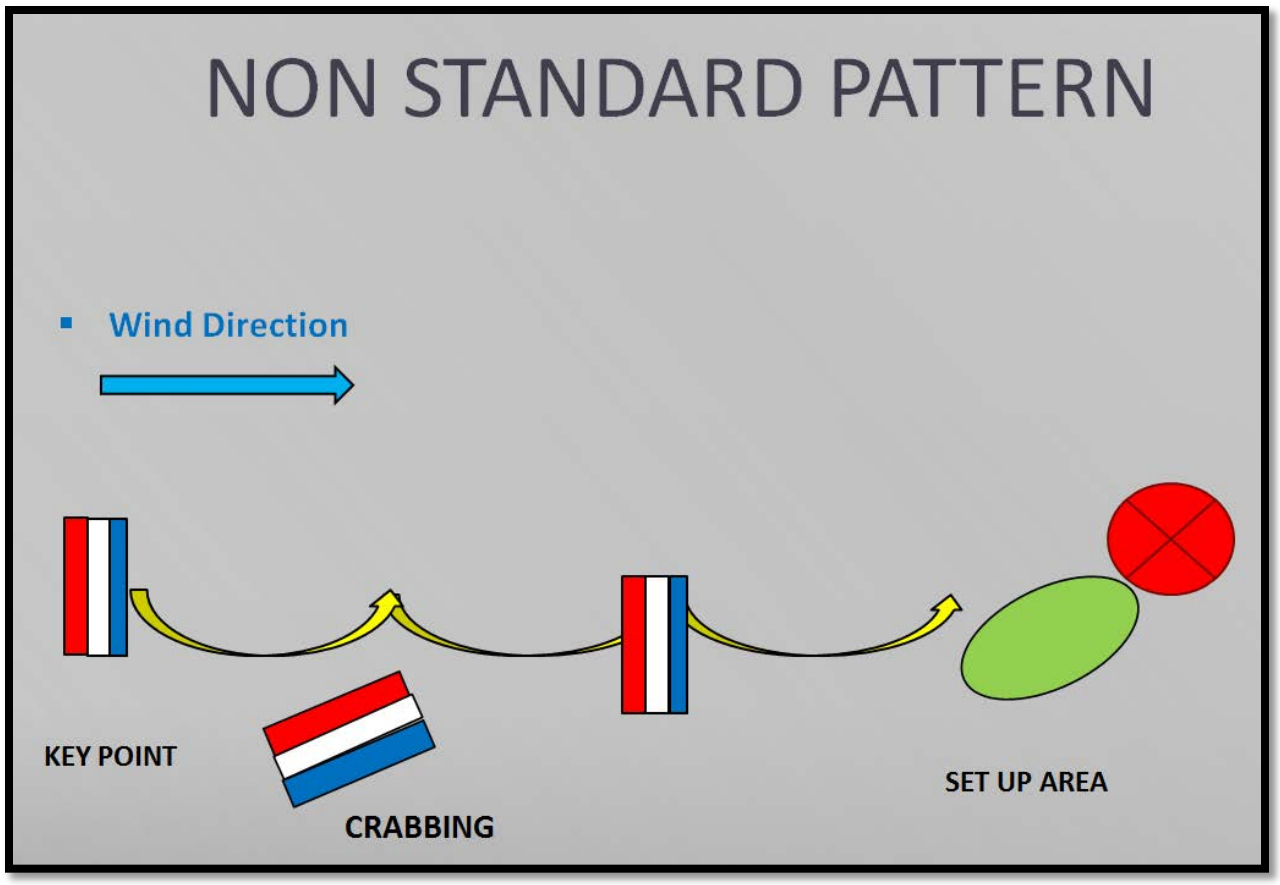


Figure 1: Non Standard Pattern Utilized for High Winds, depicting crabbing technique.

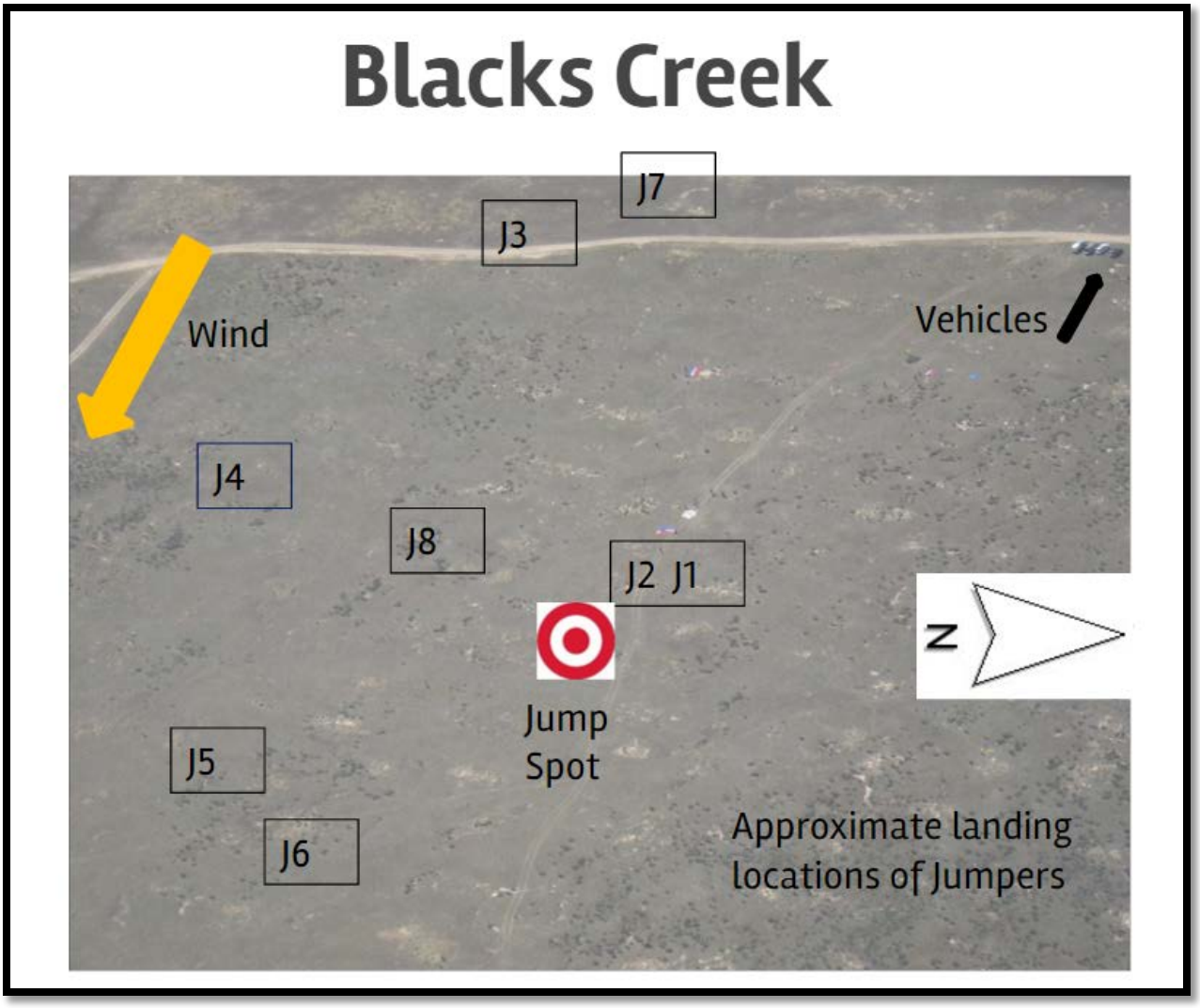


Figure 2: File photo of Blacks Creek Jumpspot with smokejumper landings locations identified.

Photo 1: Jumper 6, 11 seconds before landing facing into the wind. This image is a screenshot taken from video shot from the exact center of the jumpspot. Jumper 6's canopy is aligned with the wind at this point.

Photo 2: Jumper 6, six seconds before landing, canopy out of alignment with the wind. This image shows that Jumper 6 has turned his canopy slightly to his right.

Photo 3: Jumper 6 position prior to landing. This image shows that Jumper 6's canopy is not directly in alignment to the wind.

Photo 4: Jumper 6 when feet impact ground, hands in raised position, right arm extended. Photo shows FL Jumper 3 (right) just before he fell after being contacted by Jumper 6.

Photo 5: Main canopy is released by Jumper #6. Note cutaway accomplished with his left hand, because of damage to his right arm.