
Alice Lake Canoe Incident Facilitated Learning Analysis



**Kawishiwi Ranger District
Superior National Forest**

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I. Introduction

“The Facilitated Learning Analysis process helps us to maximize learning opportunities presented by unintended outcomes or near miss events. The intent is to improve performance by generating individual, unit, and organizational learning that capitalizes on shared experience—blaming is replaced by learning.”

**Facilitated Learning Analysis
Implementation Guide
August 2010**

On October 16, 2011 during the Pagami Creek Fire on the Superior National Forest in northeast Minnesota an incident occurred that resulted in a motorized canoe being swamped in the middle of a large lake within the Boundary Waters Canoe Area Wilderness (BWCAW). As a result, three firefighters were totally immersed in cold water and exposed to hypothermic conditions for a period of approximately 25 minutes until they were rescued by floatplane. As details of this incident began to filter out, it became apparent that the agency could benefit from the lessons of this event. Water based operations with canoes and aircraft are a standard practice in the BWCAW. These operations can become large scale, complex affairs when dealing with events such as wildfire, prescribed fire, or blowdown.

Facilitated Learning Analysis History and Intent

In 2006, in an effort to help encourage a learning culture and a safety culture within the wildland fire community, the Forest Service Risk Management Council introduces a learning-focused approach into the accident investigation process. In 2007, the Council formalizes this concept with two new safety analysis processes: The “Facilitated Learning Analysis” (FLA) and the “Accident Prevention Analysis” (APA). Since then, numerous FLAs and APAs have been conducted throughout the country on incidents that range from vehicle and equipment burnovers to entrapments and shelter deployments.

When used as intended, the APA and FLA will promote a learning culture and support organizational and individual performance, leadership, accountability, and responsibility. Concurrently, the FLA and APA analyses also serve to support program goals for developing a fundamentally sound and doctrine-based organizational safety culture.

The implementation guides for conducting both an FLA and an APA are available on the Wildland Fire Lessons Learned Center’s web site at:

http://wildfirelessons.net/documents/Organizational_Learning_APA_FLG_Guides_2010.pdf.

On October 18, 2011 a Facilitated Learning Analysis Team was formally commissioned and approved by the Pagami Creek Agency Administrator.

**Canoe Incident
Facilitated Learning Analysis Team**

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The primary objective of such an analysis is to determine factors which contributed to this incident and any measures which could be taken to prevent a recurrence. A secondary objective is to develop a report which clearly identifies what occurred and shares recommendations for reducing the likelihood of a recurrence.

This report will be posted on the Superior National Forest Intranet site in the Safety section <http://fsweb.superior.r9.fs.fed.us/depts/safety/safety.shtml>.

II. Summary of Event and Outcome

This incident occurred on the morning of October 16, 2011 on a division of a large wildland fire in the Boundary Waters Canoe Area Wilderness (BWCAW). Operations for the day included the aerial extraction of the Division Supervisor (DIVS) and Task Force Leader (TFLD) from the division by Beaver (deHavilland) floatplane (Figure 1). The Transport was planned for a time between 0900 and 0930 but the exact time was subject to the completion of a 9 person crew shuttle on Insula Lake (refer to Appendix A – Map1) just west of Alice Lake.



Figure 2. Square stern canoe with outboard motor – Beaver floatplane in background.



Figure 1. Beaver deHavilland Floatplane in lake during canoe pick-up

To meet the aerial transport, the DIVS and TFLD were to be transported to the float plane in a 19 foot square stern canoe outfitted with a 15hp outboard motor (Figure 2). The Division Supervisor Trainee (t), a local Forest resource, skilled in the use of this type of watercraft was scheduled to be the boat operator for this mission.

After a long deliberate assessment of the weather and water conditions on the lake that day, the DIVS, TFLD and the DIVS (t)/boat operator felt that they had accounted for all possible hazards and mitigated the known risks. Shortly after 1100 the three person crew launched from the eastern shore of Alice Lake (refer to Appendix A - Map 1 – Campsite 4 on Alice Lake) to rendezvous with the Beaver floatplane at a predetermined location in a bay on the southwest corner of the lake. From the campsite, the main body of the lake lay approximately 150 feet beyond a rock reef that shielded the immediate shoreline from the direct influence of the main body of the lake. After reaching the rock reef the waves began spilling over the bow of the canoe. The direction of the wind and the waves made turning around dangerous so the boat continued on. As they continued the boat encountered a series of swells that poured over the bow and the boat began to rapidly fill with water. The crew made attempts to bail the water and toss packs over the side to prevent capsizing but to no avail. The boat operator attempted to call for help on the radio but was uncertain if the transmission was heard. The boat eventually capsized and rolled immersing all three members totally in the water.

In water the crew members talked to each other and made the decision not to swim to shore because of the long distance. They tried to climb onto the canoe but couldn't because it rolled with each wave. The canoe stern (with the outboard motor) sank beneath the surface but the bow remained afloat. The crew members huddled together in the water and hung onto the bow of the canoe and one of the crew members hung onto one of the canoe packs that was floating. They continued to talk to each other to assess their condition and waited for help.

The LaGrande Hot Shots working on Fishdance Lake (Map 1) to the south heard a radio transmission about an overturned canoe on Alice Lake (not sure if this report came from the DIVS(t) or the EMT at the campsite). The hot shot crew called Air Attack for assistance. Air Attack, approximately 5 minutes away from Alice Lake, quickly responded to the scene. When they arrived they circled the lake and spotted the overturned canoe and crew members in the water. Air Attack contacted the Beaver floatplane that was waiting on the lake for the crew pick-up and alerted him to the situation. The Beaver started up and took off, circled the lake and located the crew. The Beaver floatplane was able to land and taxi to the crew in the water and started retrieving the crew. With all three crew members safely onboard the Beaver flew back to the seaplane base.

Upon arrival at the seaplane base all crew members were evaluated for their medical condition. Two crew members were sent to the local hospital and treated for hypothermia. All crew members were released in a relatively short period of time.

III. Conditions

The Pagami Creek Fire started in the middle of August when summer weather conditions prevailed. This incident occurred in the middle of October and fall weather conditions were beginning to settle in.

The daytime temperatures were in the low to mid 40s and night time lows were dropping into the 30s. Because of the cooler temperatures and scattered precipitation, fire management was attempting to remove crews from the spike camps across the fire to reduce personnel exposure to the elements. Cooler air temperatures and reduced solar heating equated to cooler lake water temperatures on the day of the incident. Estimated water temperature was probably less than 50 degrees.

Wind was also a factor affecting operations during the period preceding this event. Average wind speeds of 10-12 miles per hour were common with gusts between 15-20 mph. Wind affected operations throughout the period by delaying or postponing aerial transport of crews, equipment, and food. There were several days when no crews went to the line because of high winds and the over head hazard of falling snags. Winds on the day of the incident were blowing from the west/northwest with reported higher wind gusts. Winds were producing white capped waves and the duration of the wind over the preceding days lead to increased swells in the lake.

In the wilderness, fire operations were linked heavily to floatplane and canoes for transportation. On the date of this event and in the preceding days, personnel traveling on the lakes were experiencing the effects of the wind on the water but were able to successfully navigate in those conditions.

The Alice Lake Spike Camp (refer to Map 1 - camp site #4) was located on the eastern shores of Alice Lake. The water access to the site was shielded by a rock reef located about 150 feet from the shore that acted like a breakwater. Water conditions in this area were sheltered somewhat by this reef as compared to the main body of the lake. From the shore the crew could see the white caps on the main body of the lake but were unable to judge their size nor were they able to see if there were swells in the lake. The crew noted that on the day of the incident that the lake looked the way it had for several days and as stated previously, they had been able to navigate canoes during those periods.

IV. Sequence of Events/Chronology

Date: October 16, 2011

Location: Alice Lake

- ❖ 0730 Alice Lake Spike Camp - fire crews attend morning radio briefing. Briefing includes weather forecast, fire behavior expectations, and division assignment. Division assignment for that day included the aerial extraction of the DIVS and TFLD from Alice Lake by Beaver floatplane sometime around 0900 – 0930, following completion of aerial shuttle of a 9-person crew on Insula Lake just to the west of Alice Lake.
 - ❖ DIVS, TFLD, DIVS(t) recognized that the water travel could be rough so they discussed ways to proceed with the safe canoe transport to the arranged pick-up spot on Alice Lake:
 - Don't leave shore in watercraft until floatplane lands on the lake to reduce exposure to wind and waves on lake.
 - DIVS talked with EMT about emergency plan if something happens during water transport. Inspected EMT's radio, replaced batteries. Tells EMT to watch them on the water and if something goes wrong to communicate with air attack immediately.
 - DIVS(t)/boat operator plans to keep radio readily available inside jacket inside PFD to enable quick communications in case of emergency.
 - Plan to load canoe low to keep weight low in the boat to enhance stability. Also checked capacity of the watercraft to ensure the boat was not overloaded. (Note: square stern canoe does well in rough water based on experience of the forest wilderness personnel).
 - Made arrangements to be picked up in the southwest bay to take advantage of the wind direction for travel and loading.
 - Crew repeatedly assessed the situation repeatedly throughout the morning prior to the shuttle.
 - ❖ Beaver 2 completes crew shuttle mission on Insula Lake to the west and flies to Alice Lake for pick-up. It is now just past 1100. (Note: successful extraction of crews from this adjacent lake also provided information that the crew used in determining whether it would be safe to attempt a similar transport – even though water conditions vary on different lakes based on size, depth, and orientation into the prevailing wind)
 - ❖ 1107 crew leaves shore and begins trip across lake to pre-arranged pick-up site on southwest corner of Alice Lake.
 - ❖ Beaver 2 spots the canoe leaving the eastern shore just prior to landing on Alice Lake.
 - ❖ Crew makes it to the rock reef begins to hit white cap waves and large swells.

- ❖ Beaver 2 lands on Alice Lake and taxis to prearranged pickup location, shuts down, and awaits crew. (When plane is shut down the radio turns off). Beaver 2 does not have a visual on crew coming across lake in canoe from this vantage.
- ❖ Waves begin to come over the bow of the canoe, the boat begins to take on water. Crew member grabs hard hat and starts to bail. Shortly afterwards the crew begins to ditch gear overboard. Water level in boat gets deeper, very quickly – boat operator attempts to radio Beaver 2.
- ❖ Canoe fills with water and overturns. Three crew members and gear are now immersed in the water.
- ❖ 1120 Crew (LaGrande Hot Shots) working on Fishdance Lake to the south, hears radio transmission about a canoe with people that capsized in Alice Lake. The Hot Shot crew then radios Air Attack and relays that there is a canoe in the water on Alice Lake – Source of radio transmission that LaGrande copied not identified could be the EMT at Alice Lake Spike Camp or maybe from DIVS (t) prior to total water immersion.
- ❖ Air Attack leaves mission on south east portion of fire and heads to Alice Lake – about 5 minutes away.
- ❖ Air Attack attempts to contact Beaver 2 but is unable.
- ❖ Air Attack makes radio contact with Beaver 3 and Beaver 4 in route to seaplane base on Shagawa Lake. Beaver 3 and Beaver 4 turn around and circle back to Alice Lake.
- ❖ Air Attack arrives at Alice Lake attempts to raise the DIVS(t) by radio but no contact.
- ❖ Air Attack on scene and observes overturned canoe, personnel, and gear floating in water. Makes tight circle over the scene, personnel in water acknowledge seeing Air Attack over head.
- ❖ Beaver 2 spots Air Attack wonders where crew watercraft shuttle is – starts aircraft and makes radio contact with Air Attack. Air Attack informs Beaver 2 about the situation.
- ❖ Beaver 2 is unable to taxi to the upturned canoe because of wind direction and waves so takes off to try and get closer to the canoe and personnel.
- ❖ Once airborne, Beaver 2 circles overhead over the scene to recon a safe, suitable landing site near the personnel in the water. Concerns about the waves and the ‘rocks’. From the air the crew packs looked like rocks.
- ❖ Beaver 2 lands and is able to taxi directly to the crew floating in the water.
- ❖ Beaver 3 is circling over Alice Lake now in case it is needed for the rescue. Air Attack moves up to a position above Beaver 3.
- ❖ Beaver 2 loads one crew member then needs to re-start aircraft and taxi over to the other two crew members still in the water – they are drifting away from the plane.
- ❖ 1140 all crew are safely aboard the Beaver. Approximate time on the water 10 minutes. Crew time in the water approximately 25 minutes.
- ❖ Beaver 2 heads back to seaplane base.

V. Lessons Learned and Recommendations from FLA Participants

- ✚ From the perspective of the DIVS who was not a local Forest resource and was not familiar with water based fire operations with extensive use of canoes and floatplanes – the water safety training that ALL fire personnel are required to take prior to their involvement in operations in the BWCAW was good prep for this situation. However, this training did not deal with cold water survival and navigation in waves and high swells. RECOMMENDATION: continue with training but include discussion on cold weather survival techniques in water safety training during the appropriate season.
- ✚ When/if you are totally immersed in a cold water situation the participants agreed that:
 - Stay together as a group for reassurance and keep talking to each other. Staying together in a group configuration makes it easier to be spotted and safer than a person going out solo and getting in trouble. The crew did think about swimming to shore but with the potential for immediate aerial rescue they decided to stay together versus swimming to shore.
 - Pull legs and arms together to try and reduce movement in cold water to retain warmth to core. One crew member mentioned that he felt the effects of the cold water more when trying to swim which could possibly lead to the on-set of hypothermia quicker.
 - Stay with the watercraft. Staying with the watercraft makes you more visible and the watercraft aids floatation. In this incident Air Attack saw the swamped canoe even though only the bow was above the water.
 - Hang onto something that floats. In this event the boat operator grabbed onto one of the canoe packs that was floating. This provided additional floatation for the crew.
(Note: The recommendations listed above worked in this particular instance where there was immediate aerial support to use as spotters and for rescue. In some instances where that support doesn't exist it may be necessary to swim in order to reach the shore. Without the aerial support the crew felt had they made it to shore they might have been OK because the EMT was still at the camp, there was a fire going, the DIVS (t) still had warm clothing and sleeping bag back at the camp. However, it is not sure how deeply affected the crew members might have been by hypothermia.)
- ✚ Regardless of the season when boating make sure you have some bright colored object (clothing, gear, etc.) out and available to enhance your visibility if you end up in the water.
- ✚ Make sure your Personal Floatation Device fits and is worn properly. One crew member noted that they had their PFD partially unzipped and that probably was the reason the PFD kept trying to ride up on their shoulders.
- ✚ When boating in cold water where there is a probability you could get wet or immersed wear your rain gear (jacket and pants) and make sure it is closed up. Even though you may get wet, the rain gear may prevent the continual flushing of water against your body.
- ✚ When conducting crew shuttle operations on open water where the crew is not be readily visible, the Beaver pilot should keep a radio on to maintain contact with crews in case of emergency.

VI. Lessons Learned from the FLA Team's Perspective

- ✚ The mission for the crew that day was clear – aerial transport for the DIVS and TFLD between the hours of 0900 and 0930. The crew was briefed on the expected weather conditions for the day and planned their mission accordingly and made the necessary contingencies based on expected and observed weather and condition of the lake.
- ✚ All members of the crew stated that there appeared to be a sense of urgency on the part of operations to get this transport mission done – all three firefighters had difficulty understanding the urgency however. The crew related to the FLA Team that perhaps this was because of the remoteness of the spike camp and the difficulty in having face-to-face conversations with operational overhead – in this instance the Branch Director. The division had not seen the Branch Director for over three days. It is believed that overhead flights to the line were reduced because of the increasing amount of backlog with other higher priority aerial missions – crew shuttles and equipment backhaul. There was a backlog in aerial missions because of the sustained wind over the past several days that resulted in the delay or canceling of aerial missions. Subsequently, communications with the Branch Director were by radio only and those conversations were concise messages with little opportunity for a longer discussion to get a full understanding in the urgency in the mission. (Note: The FLA Team does not believe that the crew took on this mission due to the perceived sense of urgency. As was stated previously, the crew considered all expected and observed conditions and the fact that a similar aerial mission was completed on an adjacent lake before launching the boat. This observation is primarily highlighting with the difficulties with communications between the field and management and the problems related to an operation that is highly dependent on aerial resources when the weather is a factor.)
- ✚ Agency should consider using only qualified, experienced motor boat operators. There were instances noted of overhead on this fire that may have not been qualified or experienced motor boat operators. All personnel on the local Forest are required to have training for operating all motorized equipment of any kind.
- ✚ This was a long duration fire that started in summer conditions and transitioned into fall conditions while there were still a large number of firefighting personnel scattered in spike camp locations across the fire. This added to another level of exposure to risks that everyone may have not been properly prepared for or mitigated.
- ✚ On extremely windy, gusty days do not have fire personnel operating on large bodies of water. Typically winds are calmer in early morning and late afternoon, plan accordingly.
- ✚ All crew members had reservations about the high winds and waves that morning, the message that should be stressed is go with your gut feelings and wait for a calmer day.

