Davies Creek Ridge Helicopter Mission
September 26, 2011

Facilitated Learning Analysis

US Forest Service, Pacific NW Research Station & Tongass National Forest

Contents

Introduction

On a remote mountain top on the Tongass National Forest, a helicopter overturned with a Forest Service employee and a contract pilot onboard. The crash resulted in no injuries but was, nevertheless, a very serious accident. Almost immediately, a national aviation accident investigation team was dispatched. As of the date of this Facilitated Learning Analysis report, the aviation accident investigation team has not completed their report. The cause of the accident has not been officially determined.

On November 4th, just over a month after the accident, the R-10Regional Forester and the Pacific Northwest Research Station Director issued a delegation letter forming a Facilitated Learning Analysis (FLA) team. This FLA team's mission is somewhat unique among FLAs in that the accident itself is not the focus of the FLA. Rather, the analysis covers the events leading up to the accident (inception and mission planning) and the follow-up actions (emergency response) after the accident. While the accident is the reason the FLA was initiated, the accident itself is not part of the analysis.

The FLA process is deliberately focused on the perspectives, the reflections and the learning of those directly involved in the incident. Key participants in the accident were interviewed and then all participants were guided through a facilitated dialogue that asked: *what did you learn from this accident*? And, *what does the organization need to learn from this accident?* Their answers form the basis of this report and are the clear bias of the report's recommendations.

The lessons shared by the employees are infused within the context of a complex aviation program that has had a very long record of excellent safety outcomes. This program however is undergoing a significant reorganization with resultant changes to processes and procedures. Indeed one of the lessons shared is that a new (new to the Tongass) process of flight approval has become so cumbersome this year that the employees involved believe it burdens their ability to be adaptable to the unique challenges and risks associated with Alaskan aviation operations. This is one of the lessons shared categorized under the heading of *Mission Approval*.

Throughout this document the reader will see quotations bracketed in text boxes. These are direct quotes from the people involved in this accident taken from interviews or the facilitated discussion. For example, a powerful quote the FLA team heard was, *"Our good weather may be someone else's marginal."* , The point of *featuring* this quote is to help the reader appreciate that Tongass NF aviation is quite different than aviation operations in most parts of the country. It is inherently higher risk because of several conditions, mostly, volatile weather, remote mountainous terrain and over water flights. Managing weather risks in R-10 has lead to a high degree of expertise in this area *and* a refined risk management process. To one with less expertise in this area (an aviation manager from a lower 48 forest outsider for example), Tongass NF aviation may be perceived as accepting too much risk.

> *Our 'good weather' may be someone else's marginal"*

The Facilitated Learning Analysis team was enormously impressed with the competency and professionalism of the Tongass National Forest aviation staff and is appreciative of the support they gave the team in completing this analysis. This analysis was conducted utilizing the 2011 Facilitated Learning Analysis Guide available on the Interagency Wildland Fire Lessons Learned Center website, www.wildlandfirelessons.net.

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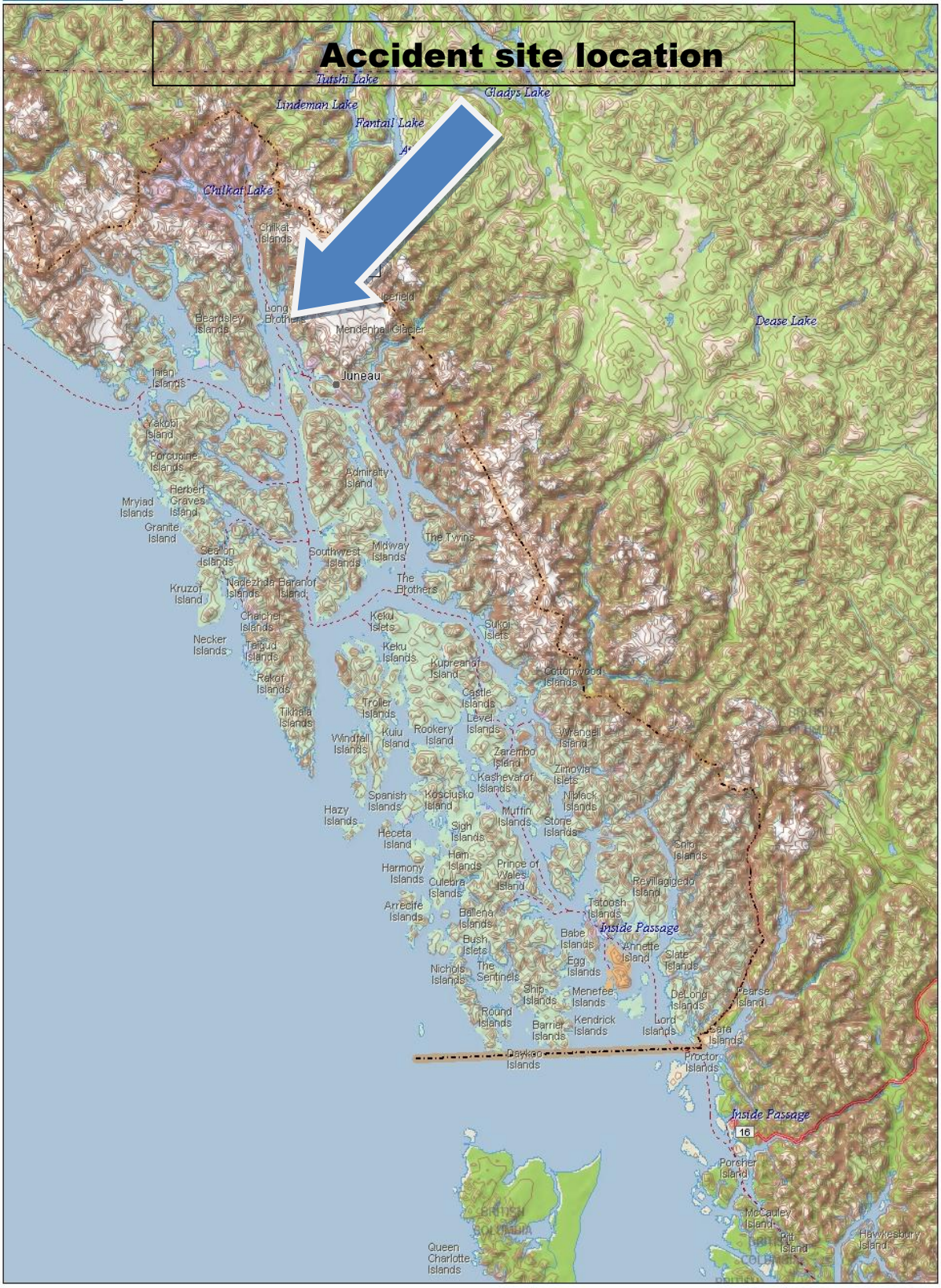

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Chronology of Events

The objective of the Davies Creek Ridge Project was to install a weather station in the Upper Davies Creek Valley. After initial recon to establish the best location for the weather station site, the mission required at a minimum three separate trips. The trips were to deliver equipment, drill and set the bolts in epoxy; install the weather station and program the equipment; and then verify the station was working.

Time	***Event***
2010	PNW Research Ecologist contacts Tongass Aviation for mission request.
Early August	Actual mission dates were yet to be determined.
8/03/2010	Initial recon mission of Yankee Basin/Cowee Creek occurs.
8/12/2010	Second recon mission of Cowee Creek/Davies Creek area.
08/17/2010	Third recon mission at which time final site was located, documented and photos taken.
2011	
Late August	Project and aviation planning resume.
9/02/2011	PNW employees (PNW) and Helicopter Manager (HMGB) work on details of the Project Aviation Safety Plan (PASP). PASP completed by Forest Aviation Officer (AO) and e-mailed to Regional Aviation Safety Officer (RASM) for approval.
9/03/2011	Phone conversations between Forest AO and RASM on PASP. Mission planning changes from internal to external load necessitating a PASP revision. New PASP e-mailed to RASM.

"The PASP approval process can take two hours or seven days, or more"

9/06/2011	RASM requests and gets additional information needed to approve PASP.
9/07/2011	RASM approved PASP
9/12/2011	1st Passenger transport mission – HMGB, PNW personnel & cargo fly to site to begin setup of weather station.
9/13/2011	2nd Mission. Returned to site to complete set up. Left soon after arrival due to deteriorating weather. Was not able to return due to logistical scheduling and inclement weather for 2 weeks.
9/26/2011	
0929 hours	HMGB, PNW Research Station employees and Pilot take off from Juneau and head to Davies Creek site.
0948 hours	Helicopter lands at Davies Creek Project site to drop 2 PNW Researchers and gear.
0953 hours	HMGB and pilot leave Davies Creek and return to Juneau.
1006 hours	HMGB and pilot back in Juneau
1006 - 1145	HMGB prepares for departure to another project location later in the day while waiting for the PNW employees to call dispatch advising they had

	completed installation of the weather station and were ready for pick up.
About 1145	HMGB attempts to contact PNW employees to determine pick up time. There was no response. Dispatch also tries and no response. Pilot noted to HMGB that winds were starting to pick up in certain areas that could affect their next mission later that day.
1200 hours	HMGB and pilot decide to head back to Davies Creek to check on PNW employees. There was a little concern about winds picking up and the potential for a change in weather at Davies Creek project site.
1213 hours	HMGB and Pilot depart Juneau for Davies Creek.
1227 hours	HMGB tries to contact PNW crew to discuss landing conditions
1230 hours	HMGB and Pilot land and begin shutdown at LZ at Davies Creek.
About 1230	**Helicopter lifts, rotates and violently flips over.**
	HMGB to Pilot: *"Are you okay? Is the fuel off? Power off?*
1238 hours	HMGB tries to contact dispatch via radio and is unsuccessful. Tries via cell phone and successfully makes contact. HMGB notified dispatch of an "accident" and takes charge of accident scene. • HMGB accounts for PPE, radios and survival equipment. • HMGB assesses potential LZs for evacuation of personnel from the accident site. Confirms alternate location for LZ for rescue helicopter.
1242 hours	Forest Aviation Officer notified helicopter company of incident and initiated Forest and Regional notifications.
1313 hours	Juneau District Ranger notified.
1349 hours	Rescue helicopter departs Juneau for Davies Creek accident site.
1402 hours	Rescue helicopter arrives at Davies Creek site
1407 hours	Rescue helicopter leaves Davies Creek with HMGB, Pilot, and 2 PNW Research Station employees.
1420 hours	Helicopter arrives back in Juneau. HMGB and pilot involved are taken to the local hospital to be evaluated for injuries.

FLA Lessons Learned

The following are the *Lessons Learned* and *Lessons Shared* by the employees directly involved with the accident. They are grouped within the categories of Training, Emergency Planning and Communications, Mission Approval, Flight Operations, Relationships, and Outcome Focused.

- **Training:**

The participants see that the lessons learned and the lessons lived through on the Davies Creek Ridge Helicopter Mission incident are valuable beyond this Forest. These lessons should be emphasized in the annual aviation training on the Tongass and incorporated into other Units as well.

Context:
When the helicopter was inbound to pick up the Research Station Crew, the helicopter manager called to the crew to, among other things, inquire about winds on the ridgeline and discuss the readiness of the crew to be picked up. The Research Station employees were, in this instance actually expecting a call from the Helicopter crew but did not receive the transmission probably due to a mistaken channel selection.

Many of the Tongass NF and PNW Research Station employees need a better understanding and perhaps greater skill in use of the radio system. The participants in this FLA see the need for a stronger focus on radio checks, check-in / check-out procedures with dispatch and especially a routine practice of field crews communicating with incoming helicopters. It is believed that in some instances radio protocols have become too casual. FLA participants feel employees should have more training on radio system use, options and expectations of communicating with incoming aviation. Perhaps most importantly, participants feel the need to get in the habit of doing routine radio checks frequently.

"Institutional knowledge needs to be institutionalized policy"

- **Emergency Planning and Communications:**

Participants felt there is a need to modify, improve, and periodically test, the Forest wide search and rescue plan and list the location and contact number of every medical facility, hoist helicopter, search and rescue organization etc. Similar plans on other Forests feature a flow chart that serves as a decision guide for dispatchers to follow in the event a variety of emergency responses. Dispatchers on these units are trained to activate and execute the plan, independently, under a set of preplanned criteria.

Context:
While the rescue of the employees involved in this incident went smoothly and quickly, this surfaced as a lesson learned because several fortuitous circumstances fell into their favor; most notably the fact that they happened to be in an area with cell coverage and the unit aviation officer, with significant institutional knowledge and skill in handling of emergency operations, happened to be in the office.

Secondly, many participants felt they were too dependent on a radio system that has become too unreliable. In this accident, a cell phone served as an unplanned, but vital, redundancy. After the accident, the now stranded crew had two handheld radios on site, one was trapped under the helicopter and the other would not reach the repeater. Many participants felt a lesson learned from this accident is that helicopter managers need a "planned for" backup system(s) to communicate in the event of a radio system failure. Equipping Helicopter Managers with current technology satellite phones and/or interactive GPS devices could be a cost effective backup system to fill this need. Participants had numerous other specific ideas; the important point is to invest in better, *planned for,* backup systems.

"Never trust a radio"

- **Mission Approval:**

Several participants felt they needed to streamline the process of mission planning and approval. The current process is seen to be onerous and time-consuming, it reduces operational agility, flexibility and ultimately the resilience of the entire aviation program. A Lesson Learned by participants is simply that too much time and effort is spent in the perfunctory processing of paperwork and not enough time is spent in mission oversight. Also, the participants believe that the length of time it takes to get missions approved through the R-6 Regional Office - also reduces flexibility. The days, sometimes weeks, of time spent in obtaining mission approval results in missed opportunities to capitalize on good weather. Since all modes of transportation in southeast Alaska (especially aviation) are weather dependent, every bureaucratic or paperwork delay is seen as a constraint to their flexibility to managing flight risk. There is a strong sentiment that the Tongass NF and R-6 aviation leadership need to sit down together and agree on a better process for project planning, documentation and approval. The participants believe that this better process needs to be risk-based rather than process-based, defer to local expertise when appropriate (based on risk), and be more streamlined to enable the Forest to be more flexible and adaptable to take advantage of good flying conditions. Many specific solutions and ideas were suggested, (such as using programmatic, instead of project specific, Project Aviation Safety Plans for routine missions) but these solutions need the concurrence and support of R-6 in order to be implemented.

"I spend my time copying, cutting & pasting and revising Project Aviation Safety Plans ~ watching good weather days go by

Context:
A reorganization decision made in late 2009 resulted in a significant change to the Tongass Aviation program. Beginning in 2009, oversight of the Tongass Aviation program was moved from the R-10 Director of Engineering, to the Director of Fire and Aviation. The Director of Fire and Aviation is a shared position between R-6 and R-10, administratively located in Portland. In other words, oversight of the Tongass Aviation program was an R-10 Engineer responsibility and is now a Fire and Aviation responsibility administered out of the R-6 Regional Office. This reorganization resulted in a radically different procedure for planning and approving flight missions.

- **Flight Operations:**

One of the insights heard during the facilitated dialogue was the awareness that during the helicopter shutdown/cool down period (the time when the main helicopter rotor is slowing down to idle or to a full stop) there is not enough speed in the rotors to give the pilot the ability to control flight but the rotation of the rotors still gives the aircraft some degree of *wing effect (lift)*. In other words, during the cool down process the ship is more vulnerable to the adverse impacts of high winds as compared to either at flight speed or at full shutdown. It is a brief but uniquely risky point in time during the flight operation. The lesson learned is that the shutdown/ cool down period is a period of increased risk as compared to either flight idle or complete shutdown.

"During the shutdown process… we're at the whim of the elements"

This led to several ideas the Tongass Managers *will do next time* and good ideas for mangers nationwide. First is to give extra emphasis to passengers to keep seatbelts, gloves and helmets on - until the rotor is nearly completely stopped. Secondly, during the accident, when the rotor blades hit the ground, pieces of the blade and ground debris became deadly projectiles; a serious life threatening hazards to anyone nearby. We are extremely fortunate that the passengers that were to be picked up were still busy setting up a weather station some 300 yards from the landing zone. The lesson learned from this event is that during the shutdown / cool down period, anyone waiting for access to the helicopter should be in as safe a place as is reasonable. The standard 75' safety circle should be emphasized as *the minimum*, the standard should be further if available. In the future Tongass helicopter managers will give extra emphasis, in briefings to aviation users, to keep safely away from landing areas and to stay away until the pilot or manager motions that it is okay to approach. Also, it should <u>always</u> be the expectation that the HMGB and the crew awaiting pick up will make radio contact and discuss onsite weather conditions.

"The helicopter cool down time is not a safe time - its two minutes of danger"

"If your radio isn't on you ~ then you don't have a radio"

A third lesson learned, almost immediately after the accident, came about because the helicopter manager had placed her handheld radio in a gear bag in the storage compartment of the aircraft. After the accident the radio was inaccessible. Again this situation was mitigated by the lucky fact that she happened to be in area with cell coverage (and there was another radio available with the PNW crew). The lesson learned is that a manager's handheld radio should be stowed upfront with the manager or in a flight suit pocket. The new small handhelds may fit more easily into flight suit pockets.

A final Flight Operation Lesson Learned in the wake of the accident was that the dispatchers had no protocols for checking on a helicopter crew that had landed and was shut down. During the facilitation it was learned that the last radio transmission from the helicopter manager to Dispatch was *"...landing and standing by"* After that transmission the dispatchers felt there was no expectation for them to check on the wellbeing of the crew until the helicopter manager notified dispatch that they were airborne again. It could have been an hour, or two, or three, before either of the dispatchers would have suspected something might be wrong on the mountain. The lesson learned is that the Tongass NF needs to clarify protocols for dispatchers to check in with remote crews at least once after landing to ensure everyone is okay and then on some regular frequency during standby. Other forests across the country may benefit from this protocol as well.

- **Planning and Operational Relationships:**

One outcome of this incident has been strengthened relationships within the dispatch and aviation staff on the Tongass. It was actually *during* the facilitated dialogue session that some of the participants met for the first time face to face. A lesson learned from this accident is that providing more opportunities for "face-to-face" interactions between Helicopter Managers and Dispatch Personnel would enhance communications, trust, and working relationships.

- **Outcome Focused:**

The Region 10 aviation program is well known for having an outstanding record of accident free outcomes. This is both a source of pride and encouragement for employees. Indeed a long history of accident free performance was mentioned in the facilitated dialogue as a reason why their accident response plan "wasn't polished". The Region 10 aviation staff website proudly displays a "***10-Again***" banner which (as everyone in R 10 knows) means that they have gone 10-years without a serious aviation accident and they're on their way to another *Perfect 10*.

This emphasis on outcomes and this slogan in particular came up frequently during the Facilitated Learning Analysis. A difficult lesson learned is that this slogan and the aviation program's focus on outcomes may be doing more harm than good. Almost immediately after the accident senior managers and safety personnel were heard asking, ***"who broke the record?"*** This question was not only hurtful and unjust to those involved but it also betrayed a climate antagonistic to risk management where *safety* is synonymous with *good outcomes* (regardless of the quality of the risk management decisions involved)

"It's hard to accept that you can do everything right - and still have an accident "

One of the most powerful quotes the FLA team heard during the dialogues was, ***'It's hard to accept that you can do everything right and still have an accident."*** Accepting this truth is necessary to maintain the constant vigilance needed in such a dangerous environment. In conclusion every Forest Service employee involved in this incident performed very well and in full compliance with policy. The manager on this flight performed exceedingly well. It is a distraction to sound risk management and to aviation safety to reflect on this accident as the result of the aviation team's failure.

Context:

Contemporary scholars in high reliability organizing, just culture and human performance are generally critical of using outcome data as a motivational aid. Messages such as *"10-Again"* or the placards posted on industrial worksites posting the *"number of days since last accident"* carry a host of unintended consequences. One of the most obvious is the undercutting of a reporting culture. Even non-accident close-call reporting can be undermined because these instances threaten the social team's cherished reputation. Touting accident free performance may be most harmful in that over time it tends to lull managers, crew members and passengers into the false belief that the workplace is ***safe***, which it most certainly is ***not!*** Aviation (especially in southeast Alaska) is inherently unsafe. It is the helicopter managers, pilots, dispatchers and aviation supervisors that create safety through highly skilled, adaptive practice in context.

And finally, if we measure safety by outcomes, there is little incentive to take on the much harder task of measuring safety by assessing the quality of our risk management decisions. Risk management is about managing risks; not outcomes.

Recommendations:

1. Tongass NF investment in the improvement update and proficiency testing of the "Emergency Response Plan" would enhance organizational capabilities for dealing with emergency aviation situations in remote work environments. Rationale for an improved Emergency Response Plan would significantly enhance organizational response capability by allowing R-10 dispatchers to take a more proactive role in the emergency response process through pre-planned strategies that clearly define emergency response attributes (e.g., closest resource availability, closest medical personnel and facilities, and closest aircraft landing areas). Currently, the Tongass NF Emergency Response Plan is primarily focused on over-due aircraft/boats/personnel for response and "dead battery (handheld radio) rescues" for drills.

2. R-6 and R-10 Leadership and R-6 Fire, Fuels and Aviation Program Managers would benefit from further discussions on the organization, mission delivery and safety implications of moving the R-10 aviation program oversight to R-6. Rationale for these discussions will likely provide new insights and opportunities leading to improved program efficiencies.

3. The Davies Creek Ridge Helicopter Mission FLA document should be posted on the Wildland Fire Lesson Learned Center website and used nationwide for improved risk management in aviation operations. Consideration should be given to the Tongass National Forest aviation group for securing the needed resources and support to implement these FLA lessons learned as soon as practical.