



International Commission for Alpine Rescue

# Considerations for HEMS and HEC Programs Operating in the Vicinity of Paragliders and BASE Jumpers

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NOW OPEN - FROM APRIL 1, 2023 to May 1, 2023.***

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## INTRODUCTION

With the increase in paraglider and BASE jumping activity comes a need for a greater awareness within and between Helicopter Emergency Management System (HEMS) and Human External Cargo (HEC) helicopter rescue programs and the communities of paraglider pilots and BASE jumpers. A further need exists for rescue programs to understand the many nuances of rescues of paragliders and BASE jumpers in the complicated terrain and circumstances in which their accidents and incidents occur.

This whitepaper defines human gliding activities and the hazards that these activities create for both the helicopter rescue communities and the glider pilots themselves.

## DEFINITIONS

### Paragliding

Paragliding is the recreational and competitive adventure sport of flying paragliders: lightweight, free-flying, foot-launched glider aircraft with no rigid primary structure. The pilot sits in a harness or lies supine in a cocoon-like 'pod' suspended below a fabric wing. Wing shape is maintained by the suspension lines, the pressure of air entering vents in the front of the wing, and the aerodynamic forces of the air flowing over the outside.

Despite not using an engine, paraglider flights can last many hours and cover many hundreds of kilometers though flights of one to two hours and covering some tens of kilometers are more the norm. By skillful exploitation of sources of lift, the pilot may gain height, often climbing to altitudes of a few thousand metres.<sup>i</sup>

### Hang gliding

Hang gliding is an air sport or recreational activity in which a pilot flies a light, non-motorized foot-launched heavier-than-air aircraft called a hang glider. Most modern hang gliders are made of an aluminum alloy or composite frame covered with synthetic sailcloth to form a wing. Typically, the pilot is in a harness suspended from the airframe, and controls the aircraft by shifting body weight in opposition to a control frame.



Early hang gliders had a low lift-to-drag ratio, so pilots were restricted to gliding down small hills. By the 1980s this ratio significantly improved, and since then pilots have been able to soar for hours, gain thousands of feet of altitude in thermal updrafts, perform aerobatics, and glide cross-country for hundreds of kilometers. The Federation Aeronautique Internationale and national airspace governing organisations control some regulatory aspects of hang gliding. Obtaining the safety benefits of being instructed is highly recommended and indeed a mandatory requirement in many countries.<sup>ii</sup>

## BASE Jumping

BASE jumping is the recreational sport of jumping from fixed objects, using a parachute to descend safely to the ground. "BASE" is an acronym that stands for four categories of fixed objects from which one can jump:

- **B**uildings,
- **A**ntenna (referring to radio masts),
- **S**pans (bridges), and
- **E**arth (cliffs)

Participants exit from a fixed object such as a cliff, and after an optional freefall delay, deploy a parachute to slow their descent and land. A popular form of BASE jumping is wingsuit BASE jumping.

In contrast to other forms of parachuting, such as skydiving from airplanes, BASE jumps are performed from fixed objects which are generally at much lower altitudes, and BASE jumpers only carry one parachute. BASE jumping is significantly more hazardous than other forms of parachuting, and is widely considered to be one of the most dangerous extreme sports.<sup>iii</sup>

## Wing Suit Flying

Wingsuit flying (or "wingsuiting") is the sport of skydiving using a webbing-sleeved jumpsuit, called a wingsuit, to add wetted area to the diver's body and generate increased lift, which allows extended air time by gliding flight rather than just free falling. The modern wingsuit, first developed in the late 1990s, uses a pair of fabric membranes stretched flat between the arms and flanks/thighs to imitate an airfoil, and often also between the legs to function as a tail and allow some aerial steering.

Like all skydiving disciplines, a wingsuit flight almost always ends by deploying a parachute, and so a wingsuit can be flown from any point that provides sufficient altitude for flight and parachute deployment – a drop aircraft, or BASE jump exit point such as a tall cliff or mountain top. The wingsuit flier wears parachuting equipment specially designed for skydiving or BASE jumping. While the parachute flight is normal, the canopy pilot must unzip arm wings (after deployment) to be able to reach the steering parachute toggles and control the descent path.<sup>iv</sup>

## HISTORY OF PARAGLIDING AND BASE JUMPING

The popularity of paragliding arose in the 1970's when pilots in the French town of Mieussy successfully launched the wing by running down the hillsides of the Alps. Andre Bohn and Gerard Bosson were mostly responsible for developing the sport into how it is today. Bosson introduced paragliding at the 1979 World Hang Gliding Championships. It was not long until paragliding schools were opening up around the world<sup>v</sup>.



From the 1980s, equipment has continued to improve, and the number of paragliding pilots and established sites has continued to increase. The first (unofficial) Paragliding World Championship was held in Verbier, Switzerland, in 1987, though the first officially sanctioned FAI World Paragliding Championship was held in Kössen, Austria, in 1989. Europe has seen the greatest growth in paragliding, with France alone registering in 2011 over 25,000 active pilots.<sup>vi</sup>

## ISSUES OF CONCERN TO HEMS AND HEC PROGRAMS RELATIVE TO PARAGLIDING AND BASE JUMPING ACTIVITY

There are a number of areas of concern for the HEMS and HEC community relative to paragliders and BASE Jumpers:

1. When seen by a HEMS/HEC pilot, airborne paragliders and BASE jumpers may unknowingly cause delays in an area where HEMS/HEC aircraft have been called to assist in an emergency. Helicopter pilots will understandably delay their response and approach to the ground in the presence of paragliders and BASE jumpers. Furthermore, helicopter pilots and crewmembers could potentially lose situational awareness related to flight operations while focusing on the paraglider or BASE jumping pilots in the sky.
2. When *not* seen by a HEMS/HEC pilot or crew, airborne paragliders and BASE jumpers present an even greater risk of an airborne collision that could result in catastrophic and tragic outcomes for both the recreationalist and the HEMS/HEC aircraft.

## ISSUES OF CONCERN TO PARAGLIDERS AND BASE JUMPERS RELATIVE TO HEMS AND HEC PROGRAMS ACTIVITY

Equally, paragliders and BASE jumpers have reason to be concerned when engaging in their sports in areas where helicopters may be operating. These include:

1. Having a method to be notified of pending flights by helicopter operators.
2. Having an in-depth knowledge of wake turbulence from a helicopter's rotors, and how it can cause a lengthy and long-lasting disruption to air in the wake of a helicopter's flight, creating a hazard to paragliders and BASE jumpers.

## DECONFLICTING AIRSPACE FOR PARAGLIDERS, BASE JUMPERS, AND RESCUE HELICOPTERS

Deconflicting airspace for paragliders/BASE jumpers and rescue helicopters is a complicated task, one that requires pre-established coordination and direct communication between the recreationalists and the helicopter rescue programs well in advance of the moment of an emergency flight into a popular paragliding or BASE jumping area.



## Coordination and Communication

To solve this problem, many helicopter rescue programs have implemented protocols designed to increase communication and coordination between these two communities. These protocols include:

- In Canada
  - After an incident where an in-flight paraglider delayed the air rescue of an injured BASE jumper on a cliff, the local paragliding community became more active with Alberta Parks land managers to avoid repeating this situation. Local paragliders now call the helibase in Canmore before launching and many of them carry air-to-air radios so they can communicate through traditional aircraft radio communication methods. The Alberta Parks permitting process is also exploring options for increasing safety measures, such as these, as requirements for paragliders.
- In France
  - Sécurité Civile reports that an educational brochure has been printed and issued to the paragliding and BASE jumping communities. The brochure has also been posted on signs that have been installed at parking areas of popular paragliding sites. This information includes:
    - What to do when a paragliding incident/accident occurs
    - What to *not* do during a helicopter rescue operation in the area
  - Sécurité Civile also reports that when they have to operate in popular gliding areas, their pilots make a radio call on the paragliding frequency and fly over their lift off sites to inform paragliders ready to lift off that a rescue operation is in progress.
- In Norway
  - The Norwegian Red Cross reports on key rescue criteria, including
    - Performing a reconnaissance flight to assess whether the subject is alive, keeping a safe distance from the parachute
    - Deploying rescuers a safe distance from the victim and the parachute
    - Securing the victim quickly and wrapping the parachute
- In Switzerland:
  - Air Glaciers notes that they have created a full presentation of information that they produced in 3 languages.
  - Rega created something similar and all paragliding schools and associations were contacted and a Rega guideline was presented.
  - In the BASE jumper area in Lauterbrunnen, Switzerland, Air-Glaciers has published small placards with the Air Glaciers base phone number and asked all BASE jumpers to call before their intended jump in order to coordinate with an eventual approach or start of a helicopter. Air Glaciers reports that this is quite effective and that the BASE jumpers respect this approach.
  - Air Glaciers also reports that they published a recommendation not to jump in days where they have heavy helicopter traffic (such as during the Lauberhorn World Cup Downhill ski race).
- In USA
  - Snohomish County, in Washington, reports Issues of the growth of popularity of Paragliding/BASE Jumping/Wing suiting, noting the importance of communication and coordination between land managers/rescue agencies and the Paragliding/BASE Jumping/Wing suiting communities.

It has been reported that, in some places, there has not yet been similar discussions with the BASE and wing-suit community, as these user groups remain more “underground” in certain



areas. They may be reluctant to engage with land managers since their activity may be illegal in certain areas.

## RESCUES OF PARAGLIDERS AND BASE JUMPERS

The rescue of paragliders and BASE jumpers can be quite difficult depending on the place the pilot is found:

- The pilot will often still be connected by harness to their parachute, perhaps suspended from the parachute.
- The pilot may be suspended from terrain (cliff, rock wall, etc.) or from a tree or power line
- The position of the pilot may make critical medical care and spinal mobilization difficult.

Furthermore, the rotor wash from a hovering helicopter can be significant during rescues of paragliders and BASE jumpers who encounter a failed flight and are hanging by their parachute on a rock wall or from a tree.

- The situation with the parachute opening and catching rotor wash is very complex.
  - There is the risk that the helicopter rotor wash will catch the wing of the parachute and cause it to become dislodged from the entanglement with the trees or rock that had originally suspended it, causing the parachute and pilot to fall further. Rescue teams must take this possibility into consideration when planning for a HEC rescuer insertion.
  - Any reconnaissance flight should be at the subject altitude or below, to avoid any rotor wash issues.
  - The helicopter pilot should be careful to deploy rescuers out of downwash distance to the subject.
  - Some programs are careful not to fly close to, or above, the patient due to the possibility of rotor downwash disrupting the air around the parachute.
  - Whenever possible, helicopter rescue agencies should dispatch the aircraft with the smallest downwash profile.
- Even without rotor wash hazards, entanglement of a helicopter HEC rescue system can become a very real hazard:
  - Entanglement with trees/branches becomes possible as a rescuer is lowered or raised in HEC operations.
  - Entanglement with the multiple lines of the parachute becomes possible since rotor wash can cause those very lightweight lines to swing wildly during the rescue operation.

### Rescues of Paragliders and BASE Jumpers Whose Parachutes Are Entangled in Trees

The rescue of paragliders and BASE jumpers entangled in or suspended from trees presents a unique challenge to rescuers.

- As already mentioned, the pilot will often still be connected by harness to their parachute, perhaps suspended from the parachute.
- Rescuers may not be trained in climbing trees to determine a rescue system suitable to lower the pilot from his or her parachute.
- There are many cords on a parachute. When entangled in trees, it takes time to cut them all, and they can be a hazard in themselves to the rescue team. Rescuers must be equipped with a hook knife to cut the parachute cords when necessary. At the same



time, rescuers must secure the parachute so that it does not become airborne under rotor wash or wind once it is free of its cords.

- There might be additional hazards to account for – loose rocks / dead branches (trees) at the site, and scene safety must be the first priority of HEC rescuers once on the ground.
- Both ground and air rescue organizations must train in these types of rescue operations.

## Rescues of Paragliders and BASE Jumpers Stuck on Rock Walls

The rescue of paragliders and BASE jumpers suspended from rock walls presents its own unique challenge to rescuers.

- As with rescues of pilots suspended from trees, the pilot will often still be connected by harness to their parachute, perhaps suspended from the parachute.
- Rescuers must be certain to anchor themselves into the terrain to avoid falling from the accident site.
- The risk of the hang glider or BASE jumper pilot falling from a rock wall is very real. The connection to the wall may be precarious, and even if the parachute is hanging by many of its cords from a stable rock ledge or horn, the fabric of the parachute may tear, potentially causing the pilot to fall. For this reason, rescuers must determine how to secure the pilot, who is likely only attached to the terrain by their suspended parachute.
- The scene of the rescue may not be near an area popular for climbing, so routes to ascend or descend to the pilot by ground may be unknown to the rescuers.
- If the area is not popular for climbing, it may be because the rock is unstable and/or unsuitable for climbing. This makes the hazard of rockfall very real while approaching the pilot from above.
- Entanglement of a HEC rescue system with the multiple lines of the parachute is again a very real hazard, particularly since rotor wash can cause any loose lines to swing wildly during the rescue
- The situation with the parachute opening and catching rotor wash is very complex, and must be avoided.
- Often these rescues can be in high angle terrain. HEC rescue teams must be very mindful of helicopter clearance to the rock wall, as this may not be a typical rescue scenario for HEC programs.
- The rescue of a suspended pilot could involve complex rigging. Both ground and air rescue organizations must train in these types of rescue operations, and have appropriate gear for the operation.

## RISK MANAGEMENT AND DECISION-MAKING IN RESCUES OF PARAGLIDERS AND BASE JUMPERS

Oftentimes, paragliders and BASE jumpers may suffer minor injuries or, at a minimum, be conscious and signaling rescuers after the accident, making it easier for helicopter crews to recognize that the pilot has survived the accident.

Survival probability of paragliders and BASE jumpers who encounter a failed flight and make contact with terrain is certainly lower than for individuals involved in ground-based recreational activities (hiking, climbing, mountain biking). The first scene assessment and patient



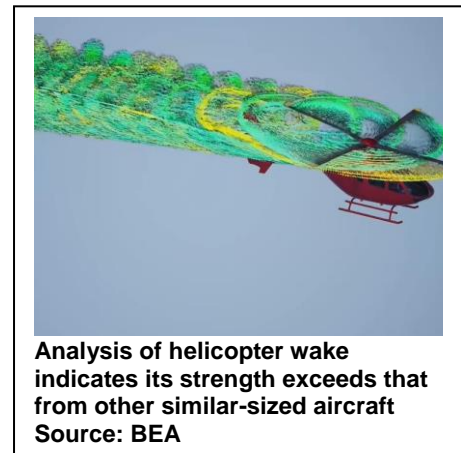
assessment of a paraglider or BASE jumper may often be by helicopter, as the remote nature of the accident site might make access by ground rescue teams difficult and time-consuming.

In situations where the first assessment is by air, it may be difficult to determine whether a non-moving pilot is unconscious or deceased. Knowing whether the operation is a rescue or a recovery is a key factor in determining the risk management profile for the operation. Assessing this through a helicopter window is often difficult.

## WAKE TURBULENCE

Another critical point concerning the impact of the helicopter on paragliders and BASE jumpers is the issue of “wake turbulence.” The French BEA recently published a detailed report on the impact of the rotor turbulences from helicopters on the human flight. The report is available here: <https://youtu.be/iHqN7PQraMs>.

- The message was published following a fatal accident where a paraglider fell to the ground after crossing the wake turbulence of a nearby medical helicopter responding to an accident on the beach. A similar accident occurred in Switzerland, which was fortunately not fatal.
- This BEA report should be shared with all helicopter crew AND the paragliding community in order to draw attention to helicopters and human flight in the same airspace.



**Analysis of helicopter wake indicates its strength exceeds that from other similar-sized aircraft**  
Source: BEA

Recent analysis of the effect of wake turbulence initiated from the helicopter main rotors shows that “The few published studies show that the wake turbulence of a helicopter is greater than that of an aircraft having an equivalent weight,” according to BEA investigator Angelique Lefevre.

## EDUCATION AND COMMUNICATION FROM HEMS PROGRAMS TO THE PARAGLIDING AND BASE JUMPING COMMUNITIES, CLUBS, AND SCHOOLS

Communication with the paraglider and BASE jumping communities, clubs and schools is important, and must be well developed. HEMS and HEC programs must make helicopter and paraglider/BASE jumping pilots aware of each other, and organize meetings with the association and schools.

Please direct any comments or questions to:  
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## Endnotes

- <sup>i</sup> Source: <https://en.wikipedia.org/wiki/Paragliding>
- <sup>ii</sup> Source: [https://en.wikipedia.org/wiki/Hang\\_gliding](https://en.wikipedia.org/wiki/Hang_gliding)
- <sup>iii</sup> Source: [https://en.wikipedia.org/wiki/BASE\\_jumping](https://en.wikipedia.org/wiki/BASE_jumping)
- <sup>iv</sup> Source: [https://en.wikipedia.org/wiki/Wingsuit\\_flying](https://en.wikipedia.org/wiki/Wingsuit_flying)
- <sup>v</sup> Source: [www.open-site.org](http://www.open-site.org)
- <sup>vi</sup> Source: <https://en.wikipedia.org/wiki/Paragliding>