Flying Mt. Washington Area Wave from Gorham, NH

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DISCLAIMER

Wave flying is dangerous – one of the more dangerous activities that humans voluntarily engage in. With experience and care, the risks can be lowered, but not eliminated. Some aspects of safety in wave and mountain flying are presented here, but this is far from a complete discussion, and some of this material is not aimed at beginners. Pilots should strive to develop the judgment that will keep them safe, understanding that mountains such as these can present conditions in which even excellent aircraft and skilled pilots cannot safely fly.

The Mt. Washington area in northern New Hampshire is famous for glider flights in mountain wave. In 1938, Lewin Barringer made the first U.S. wave flight in this area, and many soaring flights since then have yielded gold and diamond climbs, as well as interesting cross-country opportunities. In 2005, this long history of wave flying led to the area's designation as a National Soaring Landmark.

Over the years, glider pilots have flown in Mt. Washington area wave from several sites including Glen and North Conway in New Hampshire, and Fryeburg, Maine. Since the mid-1990s, the site has been Gorham, New Hampshire, which has proved superior to all others.

THE AIRFIELD

The Gorham airstrip is located at the western edge of the village of Gorham, New Hampshire, about 10 miles north of the summit of Mt. Washington, at an elevation of 835'. It consists of a single grass strip, oriented roughly east-west (true orientation is 107° - 287°). There is limited space on the ground for aircraft – substantially less than at most airfields where gliders fly. There is no taxiway, and opportunities to roll clear of the runway are limited. Care and cooperation are thus required of all pilots.

There is little routine activity at the airfield – no gliders and just a few powered aircraft. No water, landline telephone or electrical services are present, but good cellphone coverage is available. The airport CTAF is 122.8 MHz, but this is *not used during the wave camp*: all transmissions should be on 123.3 MHz.

The only area suitable for parking and staging gliders is at the east end of the field, and even here space is limited. In typical weather, most launches will be to the west, for which staging is easy – the launch point is handy to the parking area. Launches to the east are a

problem: gliders must be moved along the runway to its far end, where the staging area is small.

Fields to deal with rope breaks and other problems early in the tow are very limited. Off the west end of the runway is a cut in the trees next to Route 2, home to a runaway truck ramp. This is a bad option (it's narrow, and metal posts pretty well guarantee wing damage), but about the only one available to a glider west of the field that isn't high enough to return to the airstrip. To the east, a golf course offers better (though by no means trouble-free) possibilities – but is far enough away that it might not be reachable from a low-altitude emergency. It is thus especially important that towropes and towplanes be in good condition and that tows not be attempted in marginal conditions.

Due to nearby rising terrain south of home, all landing patterns are flown north of the field. The narrow airstrip makes crowding a potential problem when even a few aircraft are operating. Because opportunities to roll a glider clear of the runway are limited, it's easy for the runway to become blocked by pilots who fail to thoroughly plan their landing and rollout. Because it's lined by trees, airborne pilots may have trouble seeing the full runway and so not be aware it's temporarily unusable. Considerable care will be needed.

Pilots landing to the west should touch down as short as is safely possible, so they can make use of the rollout areas north of the first half of the runway – reasonable space is available as far west as the four hangars. Beyond a point about 1200' from the east end of the runway there is no area in which to roll clear except at the far west end of the runway. Pilots should plan their rollout well in advance, making every effort to leave the runway clear. If this proves impossible, the glider's tail should be quickly pushed into the grass, leaving room for another aircraft to use the runway.

Helpers on the ground will need to be alert and active to assist in towing gliders clear. All involved should be aware of traffic and the need to get the runway clear to make room for incoming aircraft. If you are on the ground, consider it part of your duty to help with this. Arriving pilots should make radio calls on 123.3 MHz and arrive with enough altitude that they can check to see the runway is clear and delay their landing as necessary.

Wind can be an issue: there is plenty of rotor-generating terrain in various directions, and great care may be needed as conditions get strong. It may at times be necessary to restrict flying to experienced pilots only, or to shut down flying operations altogether.

TERRAIN

Pilots should note that Mt. Washington is not a lone peak but in fact the highest point on an impressive mountain ridge (known as the Presidential Range) that includes numerous summits, many named after U.S. Presidents. From south to north these include Eisenhower (4725'), Monroe (5357'), Washington (6288'), Jefferson (5712'), Adams (5774') and Madison (5367'). It's useful to think of this as a ridge (though rather a curved one, concave to the east), and to understand the effect this has on glider flying in this area.

The Gorham airstrip lies beyond the north (more precisely, north-northeast) end of the Presidential ridge. It's bordered by trees, so not easily seen unless you are aligned with the runway. All pilots should learn to recognize Pine Mountain (2375'), a hill with antennas 2 miles south of the field: though lower and less conspicuous than many nearby peaks, it is easily spotted and shows the location of the often-hidden airstrip. Mt. Hayes (2555'), 2.5 miles NE of the field, sometimes provides useful "house" thermals. The Crescent Range is a ridge about 5 miles WNW of Gorham whose peaks barely reach 3000', but which can generate interesting and useful low-altitude wave in a northwest wind.

East of the Presidential ridge is a lower north-south ridge known as the Moriah-Carter (aka Wildcat) ridge. From south to north the significant peaks are Wildcat (4422' – top of the Wildcat ski area), Carter Dome (4780'), South, Middle & North Carter, Mt. Moriah, and Middle Moriah (3755'). This ridge is important because it often represents the best path from low altitudes both to the Mt. Washington wave and back to Gorham. Pilots should be familiar with it and the names of its landmarks. They should also contemplate the possibility of a glide from the north end of this ridge back to the airstrip at Gorham.

North of Gorham is the town of Berlin, formerly home to a large paper mill. North of that is the village of Milan (pronounced "MY-lin"), site of the Berlin airport. The Androscoggin River flows south past Berlin to Gorham, then turns east toward Maine. It is visible at a considerable distance from most altitudes. It includes a dammed-up lake bisected by a railroad causeway about 4 miles east of Gorham – a conspicuous feature visible for many miles.

Route 2 is a major east-west road that passes through Gorham. Route 16 runs south from Berlin through Gorham, where it joins Route 2 for about two miles. It then heads south in the valley between the Presidential ridge and the Moriah-Carter ridge, through Pinkham Notch (near the Wildcat ski area), past Jackson to the village of Glen (about 12 miles SSE of the summit), where it joins Route 302. Another 5 miles south is the town of North Conway, formerly home to many Mt. Washington wave camps, but now degraded to the status of a shopping mecca.

From the village of Glen, Route 302 heads generally NW. It passes south and west of the Presidential ridge, past Attitash ski area, Crawford Notch, the Bretton Woods golf course and ski area (east and west of the road, respectively), and on to the village of Twin Mountain.

LANDABILITY

This area has limited landability for gliders. Indeed, to a first approximation, there is only one acceptable landing place: Gorham airstrip. On many flights before you contact wave you'll be flying low enough that maintaining the option of a safe glide home must be a prime concern. Be sure you know how to recognize the location of the Gorham airfield from the local terrain clues (described above) – you'll often not be able to spot it.

If you're west of the Mt. Washington ridge, Twin Mountain and Whitefield (also known as Mt. Washington Regional) airports offer paved runways within reach of a medium-performance glider. A little higher and the excellent grass strip at Franconia comes within range. (But in wave conditions beware of making the assumptions about final glides that you'd use in thermal condition.) The Berlin airport is 13 miles north of Gorham (and 7 miles north of the town of Berlin).

Airports to the east could be significant: Pilots should be aware of Fryeburg (26 miles SE of the Mt. Washington summit, also known as Eastern Slopes) and Bethel (27 miles ENE of the summit, also known as Colonel Dyke), both in Maine. Either might offer safe haven to a glider caught "on top" – high in the wave with cloud forming below. (Wise pilots take great care to avoid that trap.)

If airfields are limited, off-field landing possibilities are even more so. There is a golf course in the town of Gorham, about 1.5 miles east of the airstrip, that might be useful in an emergency (though it has no obvious, easy landing option). A hayfield (known as the Durand Field) is found 3.8 miles WSW of the airfield, just south of Route 2 (inspection highly recommended). Roads are pretty much worthless – the few that are anything like wide enough to land on nearly always have enough traffic to make them thoroughly unsafe.

An area of interest is the Mt Washington auto road base station, located east of the summit along Route 16. It offers no attractive landing option with any high chance of an undamaged glider, but has the best emergency field in the area. To have any reasonable hope of a safe landing it would be necessary for a pilot to have inspected this area on the ground (an interesting drive on a non-flying day). Most pilots who've done so have probably resolved to stay within safe gliding range of Gorham.

Further south along Route 16 is the parking lot for the Wildcat ski area. This was once considered very marginally landable, but now has enough wires and traffic that it should be eliminated from consideration.

South of Mt. Washington, there is a golf course just east of Route 16 in Jackson, and a reasonably large field just SW of the intersection of Routes 16 and 302 near the village of Glen. The next landable area to the south is the North Conway valley (around 16 miles from the summit), which has several good agricultural fields. The site of the old North Conway airport is definitely not landable, and indeed is no longer recognizable as a once-famous airfield.

West of Mt. Washington lies the huge Mt. Washington Hotel and the Bretton Woods golf course. This golf course is not especially hospitable to gliders (too much rolling terrain) though a practice hole lying just north of the entrance road might work (again, prior inspection mandatory). Prudent pilots flying west or northwest of the mountain will take care to keep Gorham, Twin Mountain (a bit narrow) or Whitefield airport within range.

The area east of the Moriah-Carter ridge can occasionally be a good place to find wave climbs, especially when conditions suggest that a Mt Washington wave cycle might be reinforced by that ridge. But the terrain between the Moriah-Carter ridge and a secondary ridge about 6 miles further east is absolutely unlandable (nothing but trees) so little flying has been done here. Yet there is a good outlanding option within reach: a friendly field along Route 113 – and just north of that field is a low place in the secondary ridge. It should not be necessary to add that this option must first be carefully scouted by any pilot who hopes to fly safely in this forbidding area.

WEATHER

Classic wave conditions at Mt. Washington involve the passage of a cold front and strong northwesterly winds that maintain a nearly constant direction and increase with altitude, perhaps exceeding 60 knots at 18,000'. Yet the area is also notable for good – occasionally excellent – wave lift in conditions rather different from this. There have been flights to over 25,000' from Gorham on warm days with surface winds of 5 knots.

The Presidential ridge can be a good wave producer any time the summit wind velocity exceeds 15 knots and the direction is anything between SSW and north. Other terrain features can produce wave in these and other wind conditions. Wave can be reinforced when terrain features are separated by an integral number of wavelengths. The terrain is complex and the wave can be too – probably only the basics are understood.

Wave can vary greatly in location and strength, but there's little question that the most reliable spot is near The Horn: the location of the northernmost loop in the Mt. Washington auto road, just south of the Great Gulf Wilderness. This seems to be the case for many different wind directions, and is no doubt due to the “focusing” effect of the curved Presidential ridge. But be aware that wavelength – the distance of the wave from the upwind obstruction that generates it – is influenced by wind strength (a weak wind generally produces a short wavelength).

There is a world-famous observatory at the summit of Mt. Washington, a place that claims to have "the worst weather in the world." That claim may be questionable, but there's no doubt that it's a windy spot, which glider pilots seeking wave tend to appreciate. It's helpful to have reports of conditions at the peak, but you should understand how to interpret them: There is a pronounced "venturi" effect that causes the wind at the peak to be higher than the general movement of the airmass. Pilots have struggled to ridge-soar the western face of the Presidential ridge after hearing reports of summit winds above 20 knots.

It should be obvious that the wind can be an enemy as well as an ally. Summit winds above 40 knots – sometimes well above – are by no means rare, and have produced rates of climb above 20 knots, sometimes for many thousands of feet (though 8 to 10 knots is more typical of the best wave lift on a good day). But when strong winds reach lower altitudes (as they often can), flying becomes treacherous. Rotor is possible anywhere below the altitude of upwind terrain, and it can be severe. Tales of broken canopies are told – you’ll appreciate

a 5-point harness that is really tight (and perhaps a piece of foam in your hat as well), especially at low altitudes. Gorham airfield can be a treacherous place in strong wind (especially a strong south wind) - and, as previously noted, there are few to no nearby landing alternates.

CLOUDS

Almost every discussion of wave flying mentions lenticular clouds. These are indeed fascinating – they represent a layer of relatively moist air that has been lifted by the wave and thus cooled below its dewpoint. They are continually forming at their upwind edge (where the ascending air cools) and dissipating at their downwind edge (where the air is descending and thus re-warming).

Lenticular clouds are caused by wave, but many are associated with weak, high wave unreachable by glider pilots, and most usable wave (including plenty of strong wave) occurs without lenticular clouds. So “lennies” are not a notably reliable guide. The exception seems to be when they are seen at moderate to low altitudes, and especially when they are stacked.

Cumulus clouds provide more common though less obvious clues to wave. They tend to be "controlled" by the wave above them: their formation will be enhanced under the wave crests and suppressed under the wave troughs. Cumulus clouds lined up across the wind and matching the pattern of upwind high terrain are a clue. When they are constantly forming in one fixed spot that correlates with upwind terrain you have a stronger clue. Rotor cumulus (fractured, shredded, and occasionally swirling cu, typically of short duration) are another indication.

Wave can exist with a more-or-less solid layer of clouds at lower altitudes (occasionally lower than the highest peaks). The cloud layer may be broken by wave “windows" – clear areas representing the wave troughs. Lift will be found at the downwind edges of these windows. They can be reliable indicators of low-level wave and where to find it.

But they are treacherous: they can close with little warning, leaving a pilot trapped in sunny conditions high above, without a safe way down. Any time the lower cloud cover is more than about 70%, pilots need to be alert for signs that the window below them might close. Sometimes "fingers" of cloud start to appear in the window. The window may shrink in length and/or width. Windows visible well upwind may begin to close, warning of the approach of moister air. Care and attention are called for, especially since it can take a long time to descend through a closing wave window.

The Mt. Washington area has a feature that pilots should be aware of in conditions when a wave window might close. To the east (i.e., downwind), terrain is lower and notably flatter. It is common that the skies over Maine are much less overcast than in the mountains of New Hampshire. A pilot caught "on top" may find an escape route to the east. Bethel and Fryeburg airports are each more than 25 miles from the summit, yet with a strong tailwind

they will be within reach from even moderate wave altitudes. But this could be tricky – you may need extra height to be sure of staying clear of the clouds during a downwind dash. Your first and best defense is much simpler: don't get caught on top.

WAVE – AND HOW TO FIND IT

Experienced pilots know that the wave can be fickle and changeable. Almost anything you say about it can be contradicted by the experience of your next flight. Nevertheless, some useful generalizations are possible.

As previously noted, wave generated by the Presidential ridge is possible any time there is some west in the wind – and "back-side" wave lift in an easterly wind (rare) has also proved useful. The minimum wind speed for usable wave can be surprisingly low – occasionally under 15 knots at the summit. Yet this is rare – more typically, good wave conditions have summit winds above 30 knots (and velocities far above this are not rare). Wind speed that increases with altitude is a good sign (in a sense, the higher wave forms on the lower one). Another good sign is that the wind direction changes little with altitude.

There are several ways to enter the Mt. Washington wave. The simplest is a direct tow. On a day with little thermal activity and especially in a lower-performance glider, this may be the only practical way. The necessary tow altitude may be less than you'd suspect: wave is often found well below the peak of Mt. Washington (6288') – sometimes below 5000'. Absent other clues, the first place to look is near The Horn. Once one glider has found wave lift, it's often easy for others (pilots are expected to share useful information on 123.3 MHz, while not overloading the airwaves with chatter).

There are drawbacks to towing directly into the wave: Tows are expensive and long – fewer launches are possible. Tows can be rough – the short route to the wave passes through some of the most likely places to find rotor. Pilot towed into wave lift have little idea about the lower-altitude soaring conditions, so are apt to be unsure about what to do if they happen to fall out of the wave.

High tows are not essential – there are routes into the wave from lower altitudes. On any day with even moderate thermal activity, one is the Moriah-Carter ridge. A 3000' tow can be enough to reach this and ridge-soar to the top of its north end. On most wave days there should be wind sufficient to make this area sustainable in ridge lift. But caution will be needed – in moderate to strong wave conditions, this ridge can be influenced by rotor and wave sink, and may thus be much less reliable than consideration of the wind alone suggests. Nor does it have a consistently favorable shape. As you work your way south along it looking for an enhanced area, be aware that you may soon find yourself far enough from Gorham that a safe glide home is not guaranteed. In general, any trouble staying comfortably above ridgetop height is a clear indication that you should retreat toward Gorham.

Once established on the Moriah-Carter ridge, the idea is to reach a point downwind of the suspected best wave location (typically, The Horn), looking for as much height as possible in any thermals or rotor encountered. If cumulus clouds are present, they will give clues to the location of thermal and wave lift (their upwind edge is usually the place to be). At the best altitude you can reach, punch out west – you're hoping for an upwind lift street and, of course, signs of wave. Conserve altitude – even a few feet can matter here. If you find the smooth air characteristic of wave lift, work it carefully – a sustained weak climb is preferable to searching for something better, at least until you have 1000+ feet of wave climb in hand. If you fail to contact the wave and lose height, head back to the ridge with enough altitude that you can find another climb and try again.

If there are wave clues in the cumulus clouds, a crosswind route may be indicated: It's obviously better to follow a wave-enhanced line of cumulus from a point where it intersects the Moriah-Carter ridge than to try to climb from a stretch of the ridge that the clouds are saying may be suppressed by wave sink. With attention and some practice, the clouds yield important clues.

A less reliable and more spectacular route into the wave involves a tow to the northwest (i.e. upwind) side of the Presidential ridge. Tow to a comfortable altitude (this will depend on conditions and experience – if you're feeling particularly bold, would like a good low point on your barogram, and feel the wind is favorable and there is a good chance of help from thermals, release at Pine Mountain.) You'll have to do a lot of ridge soaring to reach the top, and this side of Mt. Washington is a difficult ridge, with many gullies and spurs. As you get higher, things get better – wind velocity tends to increase and the mountain presents a better shape. Low-altitude ridge soaring here is only for *very* experienced ridge pilots – and conditions that would make even these comfortable here are rare.

Once you've reached the top, breathe a sigh of relief and gain as much altitude as possible in ridge lift. Do some sightseeing along the ridge top – check out the Cog Railway trains on their improbable climb to the summit. Grab a thermal if you can (they may be too shredded to be of much use) but don't get downwind of the top before you're ready. Make your best guess as to where the wave will be found (again, it's likely to be near The Horn). When upwind of your chosen target at a safe altitude above the ridge, take a deep breath, tighten your belts, and head downwind. Don't fly too fast – you're going to encounter sink but also strong turbulence, so you need to stay below maneuvering speed.

If luck is with you, you'll still have all your teeth and have lost only about 500' when you enter the wave. You'll need to react quickly to any sign of smooth lift – flying with a strong tailwind, you're covering ground rapidly; it can be easy to blow right through the lift. Turn into wind and climb in the wave. If you miss the wave, you're headed to a favorable place: the Moriah-Carter ridge. Once there, follow the wave entry scheme described above.

It should not be necessary to add that entering the wave from upwind is the most difficult and least safe of the three methods described above. It's clearly not for beginners, and probably not for intermediate pilots, especially on a strong day. Use good judgment.

Wave generated by the Crescent Range can be useful. When it's working (typically, in wind directions from 290 to 340) this wave is just a few miles upwind of the airfield, and may be usable from low altitudes – tows to less than 3000' MSL have occasionally been sufficient. It can be better marked by clouds than other local waves. Should it fail to work, there's little problem returning to the airfield even from low altitude – and you can always flop onto Pine Mountain or Mt. Hayes, planning to stay aloft in ridge lift until something better is available. Crescent Range wave may not be as strong or go as high as others, but it can be the best way to start a Gorham wave flight – if you are able to connect, it will usually yield climbs to altitudes that bring many other options within range.

Once you have connected with wave and have climbed enough that you have some reserve height, it's a good habit to explore. Try penetrating forward or drifting back to see where the best lift is. Lateral excursions are also useful. At times, wave lift is broad and generous; other times it can vary sharply over a short distance – a well-positioned glider may see twice the climb rate of a nearby one whose pilot has not taken the trouble to explore a bit.

If you're looking for a high climb – say for an altitude diamond (16,404' of altitude gain) or a Lennie pin (25,000' MSL) – you'll probably need some patience. On a good day you may be able to climb well to within a few thousand feet of your goal, but further progress becomes a struggle: the lift declines and the wind increases, forcing you to fly faster, thus increasing your sink rate. Your final thousand feet may require many minutes, and some real care in searching for a spot where the lift is slightly better.

SAFETY IN MOUNTAINS & WAVE

These are the subjects of full-length books; only a few points are presented here.

As with all glider flying, the primary rule is to have a route to safety at all times. This is less easy and requires much more work of the pilot in mountainous terrain. Wind and weather seriously compound the problem. Things can go wrong quickly.

We've already seen that the only good landing place anywhere near Gorham is the Gorham airstrip. Know how to get there from any point during your flight (or have another airport "in your pocket"). The best route back to Gorham is often along the Moriah-Carter ridge. When in doubt, head for this ridge and work your way north along it. From the northernmost high peak (Middle Moriah) it's just over 5 miles to the airfield, and you should have over 2500' in hand – a 10:1 glide.

Experience has shown that just because you are flying near or on the Moriah-Carter ridge on a day with westerly winds, a safe return to the Gorham airfield is not guaranteed. (This is true in any glider, and especially one of medium or low performance.) Even when this ridge "should" be working, wave effects can complicate things. In particular, note that when flying near the Wildcat Ski Area, the straight-line distance to Gorham is around 10 miles, and you may be less than 3000' above the runway elevation – so even modest sink along the way can put you in trouble (in an area with poor landing options). Other hazards

along this route include clouds that may cover parts of the ridge, slopes that are uncomfortably shallow in places, and spurs that can make lift very sensitive to wind direction. Even after an easy run south, the northbound return can be difficult. This ridge has shown it deserves a lot of respect.

From Gorham, you'll generally be attempting to contact the primary Mt. Washington wave. Once you have climbed in it, many others are possible. It can be rewarding to explore the area, and rather little is known about the full White Mountain wave system (which is obviously complex and varies from day to day and even hour to hour).

If you choose to explore, keep several rules in mind. You must at all times have a safe place to land within reach. As we've seen, this usually means an airfield. Understand that "within reach" can be hard to define in wave conditions. Glide computers have thermal flying in mind, where extended areas of strong sink (say, 6+ knots) are rare; in mountain wave conditions, these can be common. You must be very aware of likely conditions along your route (wind, terrain and clouds provide the clues), and much more conservative than in thermal conditions. Your computer's calculations may be close to worthless. A standard mountain-flying rule of thumb is to use half your glider's best L/D as an estimate of safe glide-to-a-landing performance. This is more reliable than what a typical glide computer will offer, but even this can quickly be confounded by wave sink and strong headwinds.

Wave is associated with moderate to strong winds. So when you fly downwind at any airspeed, you cover ground quickly – it's easy to fly further than you meant to, especially at high altitudes where your sense of distance may be distorted. Headed upwind, progress is always slow and consumes a surprising amount of altitude, even when no significant sink is encountered. If you are trying to move between wave cycles, especially upwind – for example, trying to penetrate from a secondary to a primary wave – you should climb high in the strong part of the wave and then move crosswind before heading down- or upwind. The idea is to seek out strong parts of the wave for your climbs (which nearly everyone does) and weak parts for your transitions through sink (which surprisingly few pilots think of doing).

Another point to bear in mind – especially during upwind transitions – is cloud clearance. Floating thousands of feet above the clouds, it's easy to forget that there are bands of sink between them. Your judgment as to how much altitude you'll need to safely skim upwind over the top of a cloud into the wave window beyond it may not work – it's easy for a careless pilot to find himself sinking into the cloud. Another way to get caught is by flying where cumulus clouds are forming not far beneath you. These can occasionally build quickly, both vertically and upwind of you; in either case, they can engulf you with little warning. Yet another trap is letting a strong wind drift you downwind into a cloud forming behind you. Clouds – especially those influenced by mountain winds – are dynamic and few pilots have much experience flying near them.

In all cases, flying above clouds restricts your view of the ground. From high altitude, even prominent terrain features can be hard to recognize. So it's easy to become disoriented, perhaps to the point that you descend into the wrong valley.

Flying in cloud can be big trouble: without a horizon reference, you'll be able to maintain controlled flight for only a short time. One typical result is that the glider enters a spiral dive, the pilot opens the spoilers, and the wings fail. You may be tempted to think that an artificial horizon is the way to deal with this – but that cloud you plan to fly in might quickly ice your wings and canopy; it may contain rocks, or another glider. *Staying clear of cloud is fundamental to mountain flying safety*.

Though you should resolve never to put yourself in a situation where you might need it, all pilots should probably investigate their glider's benign spiral mode. In clear, low-wind conditions with plenty of altitude, trim your glider so it flies hands-free about 40% faster than its straight-and-level stall speed. Fully open the divebrakes and take your hands and feet off all controls. Many gliders will descend at about 800 fpm while remaining under reasonable control indefinitely. Once checked, this can be the best way to descend if you are caught in cloud (always provided there is sufficient clearance between the bottom of the cloud and the terrain below).

October days are short. It's easy to stay aloft later than you should. High in the wave you may not notice that the sun is getting low and the ground dark. When you decide it's time to land you may have 30 or more minutes of flying to do if you wish to use a reasonable descent rate (rapid descents may be okay in metal ships, but can be hard on composite finishes). This could mean landing near dark – not a good idea. And after an hour or two of peaceful wave flying, it's easy to forget about the struggle with rotor and turbulence that may await you near the ground. Prepare yourself.

If you find that a rapid descent is needed, the safest way to do one is often to leave the wave lift and seek out the wave sink. The air is smooth there, even if it’s descending rapidly.

GPS navigation guidance is extremely useful; essentially all pilots have it. But beware of over-dependence on it in the mountains. Unless you are fully comfortable with visual navigation, your GPS receiver can be a treacherous instrument, possibly leading you into places you can't easily get yourself out of. In particular, you should always be able to find your way to a safe landing without help from any instrument, and you must not use your GPS receiver as a rationalization for getting caught on top: "Sure, I can't see the ground any more, but my GPS tells me exactly where I am, so everything's fine." Remember that the cold conditions typical of wave flights are hard on batteries, making electrical/electronic failures more common than during other types of flying.

It shouldn’t really be necessary to point out that in mountainous terrain, altimeters should be set to field elevation before takeoff, so that all reported altitudes are MSL. It makes little sense to report an altitude as AGL, when the altitude of the ground you are over bears no relationship to that of the field from which you launched hours earlier. There is also the point that gliders from other airfields occasionally fly near Mt. Washington.

Potential tow hazards have already been mentioned. The only safe assumption is that unexpectedly severe rotor can be encountered on any flight. Loose objects (e.g. cameras) have broken canopies. There can be no excuse for a failure to have everything well secured.

OXYGEN

It is not the purpose of this document to present a course in high-altitude physiology. All pilots who come to fly in the Mt. Washington wave should already understand the importance of supplemental oxygen and how to use it. A brief summary should suffice here.

FARs require oxygen on all flights above 14,000'. This is a moderate altitude on a wave day at Mt. Washington, so it should be an unusual flight for which oxygen is not aboard. Healthy and fit non-smokers typically show few short-term problems at altitudes below 15,000', so there is some temptation to regard the regulations as overly conservative. But organizations that have carefully studied the issue (e.g. the US Navy and Air Force) have reached the opposite conclusion, and require supplemental oxygen well below 14,000'.

It's also worth noting that any level of exertion or stress can cause a pilot used to near-sea-level altitudes to show significant symptoms of anoxia at even moderate altitudes. Don't cut corners here.

Glider oxygen systems often employ a nasal cannula, whose use is limited to altitudes below 18,000'. Even with an oxygen mask, few glider oxygen systems are suitable above 25,000' – an altitude it's often possible to exceed in the Mt. Washington wave. Really high flights (approaching 30,000', and above) require pressure-breathing systems and full backup: this is the "death zone" for everyone except the properly equipped expert.

Oxygen fills will be available on the airfield. Oxygen is not expensive, and it's foolish to use it in a miserly way. If you believe there is any reasonable chance of exceeding 12,000', have your system in operation by 10,000', and be carrying enough oxygen that you feel no need to conserve. While descending, stay on oxygen until below 10,000'.

CLOTHING

During October in Gorham, any temperature between about 15 and 85 degrees F is possible on the ground. High in the wave, it will be cold – possibly well below zero. Dressing for these extremes can be challenging. The familiar principle of clothing in layers that can easily be donned or removed (which may call for practice in a tight cockpit) works well.

The single most versatile piece of clothing is a warm winter hat, preferably one that covers the ears as well as the head. It is small and easily stowed when not in use, yet it makes more difference to heat loss than any other item can. Second in value is warm footgear – but make sure it's not so bulky that it restricts movement of the rudder pedals.

Even in late Fall, the sun at altitude is always bright – don't forget sunglasses.

RISK ASSESSMENT

Here are some risk factors that Mt. Washington wave pilots should be aware of. Your chance of problems reliably increases if:

- You have made few glider flights in the previous 30 days
- The glider you plan to fly is new to you, or has any maintenance deficiencies
- You have limited experience with:
  - Your oxygen system
  - Ridge, mountain and wave soaring
  - Takeoffs and landings in windy conditions at a narrow, busy airfield
  - Flight above cloudbase, when cloud cover may be increasing
- You are not sharp on planning your landing, hitting your chosen touchdown point and rolling safely clear of the runway
- You are reluctant to accept advice and guidance from experienced pilots
- The lure of a big flight makes you willing to suspend good judgment

It should be obvious that some of these will apply to many pilots at a New Hampshire wave encampment, especially those here for their first time. This should not deter you from attending, but should make you careful about your preparation & the conditions you choose to fly in – and perhaps eager to take some dual instruction before flying solo.

THE MT. WASHINGTON GLIDER AREA

As all pilots should know, FARs prohibit flight in Class A airspace (above Flight Level 180 – 18,000') without an ATC clearance. Such clearances normally require that both the pilot and the aircraft be "instrument rated and equipped," which effectively excludes gliders. By prior arrangement, it is possible to get permission to fly by Visual Flight Rules above FL 180.

A Letter of Agreement with the FAA has been obtained for glider flying near Mt. Washington. It represents much work; violations of its requirements could lead to its withdrawal, and thus cannot be tolerated at this encampment. The essential points are:

- All glider pilots who fly in the area must read, understand and comply with the Letter of Agreement.
- Other than altitude restrictions, all requirements of VFR flight remain in force, including rules governing cloud clearance and visual separation from other aircraft.
- You must not be above FL 180 unless:
  - you know the airspace is open, when it closes, and the maximum altitude allowed
  - you remain within the horizontal limits of the Mt. Washington Glider Area and below the maximum altitude that currently applies
  - your radio is operational, on and monitoring 123.3 Mhz

- You must descend below FL 180:
  - before exiting the horizontal limits of the Mt. Washington Glider Area
  - by the agreed-on closing time each day
  - if you hear on 123.3 that a recall has been issued
  - if it has been more than 30 minutes since you last heard a confirmation that the airspace remains open

The Mt. Washington Glider Area is a cylinder with a radius of 10 nautical miles, centered on the Mt. Washington Auto Road base station (44-17.43N,71-13.67W – located along Route 16 about 4 miles ENE of the Mt. Washington summit).

The Mt. Washington Glider Area is often informally referred to as "the wave window". As this term is easily confused with the name of the clear area in a cloud layer generated by a wave, it should not be used this way. The term “airspace waiver” has been used in the past. It turns out that this is not the term that the FAA uses, so to avoid confusion, glider pilots should not, either. Preferred terminology is “the Mt. Washington Glider Area”, or simply "the airspace".

PILOT FAMILIARIZATION

Here are some suggestions for pilots new to this area:

1. Read this briefing and study a map (e.g. GoogleEarth). Learn the local landmarks, especially:
   - Pine Mountain
   - Androscoggin River (and its railroad causeway)
   - Mt. Washington
   - Mt. Jefferson, Mt. Adams & Mt. Madison (south to north, that’s “JAM”)
   - The Horn (northernmost loop in Mt. Washington auto road)
   - Mt. Washington auto road base station
   - Wildcat ski area
   - Carter Dome
   - Mt. Moriah
   - Routes 2, 16 and 302
   - Gorham golf course
   - Mt. Hayes
   - Crescent Range
   - Mt. Washington Hotel
2. Before arriving at the wave encampment:
   - Have at least 3 takeoffs and landing in the previous 30 days.
   - Make sure the glider you’ll fly is fully ready, with a good oxygen system installed and tested.
   - Learn the airspace procedures and the Mt. Washington Glider Area.

3. Walk the airfield to learn its exact layout, and especially the places where a glider can (and can't) safely roll clear of the runway.
4. Take a familiarization flight:
   - Note how the airstrip is not visible from low (or even moderate) altitudes when you are not aligned with the runway.
   - Learn to recognize Pine Mountain, as this landmark shows the location of the airstrip from a long way off.
   - Note how the Androscoggin River is visible from a long distance, especially the lake and railroad causeway east of the airfield.
   - Learn the general appearance and features of the Presidential ridge and the Moriah-Carter ridge.
5. Understand some common problems for glider pilots flying at Gorham:
   - Failure to appreciate the possibilities for turbulence, resulting in loose items in the cockpit and possibly cracked/broken canopies.
   - Returning for a landing without enough altitude to allow time for the runway to clear and to safely mix with other landing gliders.
   - Failure to fully plan the pattern, touchdown and rollout, leading to failure to roll clear of the runway, and thus a runway that's blocked for an unnecessary time.
   - Failure to plan for a landing no later than 17:30, resulting in a pattern flown with insufficient light for full safety.
6. Plan some details of your wave flight:
   - Wear appropriate clothing.
   - Have more than enough oxygen on board for the flight you hope to accomplish.
   - Before takeoff: Set your altimeter to field elevation (835'), so your altitude reports will be referenced to sea level. Test your oxygen system.
   - Keep your harness really tight at low altitudes. Avoid loose items (e.g. cameras) in the cockpit.
   - Plan on touching down no later than 17:30 local time. Start your descent early enough that no extraordinary flying is needed to do this.
   - When inbound for landing, call on 123.3 when several minutes out: "Xray Yankee Zulu will be landing Gorham in about 5 minutes." Arrive at Gorham with enough height (at least 1800' MSL) to check that the runway is clear and to sequence your landing with other arriving gliders. Don't assume that all radios are working, or that the pilot landing ahead of you will necessarily do a good job of rolling clear of the runway.
   - Fly all patterns north of the Gorham airfield. This means a right-hand pattern when landing to the west (much the most common landing direction).
   - On final, plan your touchdown and rollout so that you finish well clear of the runway, leaving it open for others. (*Very important, and often overlooked*.)
   - If you can't land short (say, because the pilot ahead of you didn't roll clear of the runway) land very long and accept the need for a long towback in the interests of safety.

ADDITIONAL INFORMATION

Interesting websites

Mt. Washington: www.mountwashington.com
Info about the summit park, the weather observatory, and the auto road.

Mt. Washington Observatory: www.mountwashington.org
Info about current and recent weather.

Mt. Washington Auto Road: www.mt-washington.com
Info about the auto road and the Great Glen trails center.

Mt. Washington Cog Railway: www.cog-railway.com
Schedule, prices and many interesting facts. (Check out the "Devil's shingle.")

Mt. Washington hotel: www.mtwashington.com
Just the place for well-heeled pilots seeking luxury accommodations.

Driving directions

From the SE (e.g. Boston) the best choice is usually I-93 north through Franconia Notch, then Route 3 north, Route 115 east, Route 2 east to Route 16 in the town of Gorham. From the intersection of Routes 2 and 16, follow Route 16 south about 0.3 mile (across the Moose River), then turn right just past the sign announcing the airport. Take the first left after crossing railroad tracks.

Another option is I-93 north, Route 104 east, Route 25 east, then Route 16 north through North Conway to the town of Gorham. This route is somewhat shorter in distance but almost always longer in time due to normally heavy traffic in North Conway (an outlet shopping mecca).

From the south or SW (e.g. New York or Albany), the best option is to get to I-91 north, either via I-84 in Hartford or I-90 in Springfield. For the simplest route, follow I-91 north to Route 302 east, then follow Route 302 to Route 3 north, to Route 115 east; from this point, the route matches that described above. For the shortest route, follow I-91 north to Route 25 near Bradford; take Route 25 east across the river, turn left on River Road; follow this to Route 10 north which leads to the town of Haverhill and a right turn onto Route 116 east; follow Route 116 east (across Route 112, which it briefly joins) toward the town of Franconia; just before the Franconia airfield, turn right onto Wells Road and follow this to Route 18; turn left (north) on Route 18, then take the first right onto Route 141 east; follow Route 141 to its end and turn left onto Route 3 north; follow this to Route 115 east; from this point the route matches that described above.

Automated weather sites

Mt. Washington summit		603-356-0300
Berlin, NH	135.175	603-449-3328
Whitefield, NH	118.525	603-837-2769
Fryeburg, ME	135.775	207-935-2882
Montpelier, VT	132.675	802-229-2037

Morrisville, VT 135.625 802-888-7934

Gorham NH Airport information

ICAO designator: NH05 (some sources also list 2G8)
Elevation: 835’ MSL
Magnetic variation: 17 degrees west
Runway: 12-30, turf
Runway dimensions: 2770’ x 70’
Sectional map: Montreal (New York may also be needed)

No services (water, electricity or landline phone) are available on the airfield. A porta-potty is put there by the town of Gorham during wave encampments.

The Gorham Water & Sewer department has an interest in the airfield. One of the main town wells is on airport property, which results in a strict rule that fuel for towplanes can be transferred only on the small paved ramp area.

Map file

The file `GorhamNH.kmz`, when displayed using GoogleEarth, shows airfields and points of interest in the Mt. Washington area.