

# LANDING GEAR AND THE AMPHIB PILOT'S SURVIVAL INSTINCT

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Photo by Jesse Weekly

Landing an amphibious seaplane gear-down in the water is a recurring theme in water flying, and the potential for this to happen will be with us as long as people fly these airplanes. I've written about this before, but it's worth revisiting every so often, and a rash of recent mishaps has generated some new interest in this old topic.

In the course of my flying career, whenever a gear-down water landing occurs I've respectfully asked about the particular circumstances that led up to it, and I've incorporated the lessons from this informal survey into my own personal habits to help avoid the same mistakes. What follows are some thoughts on flying amphibians and the strategy I've developed over the years to avoid a gear-related mishap.

The first thing that becomes apparent when we look at these accidents is that we can't put them in the category of things that only happen to other people. A lot of experienced and competent pilots have made this mistake, and I believe an important starting point is to acknowledge that we are all at risk. This is an insidious problem, and no matter who we are, there is some distraction or circumstance that can sneak up on us.

## THE CHECKLIST

When the topic of gear-down water landings comes up, there is usually someone who suggests that the problem can be entirely solved by just using the

checklist, and declares the conversation to be over. Really it's not as simple as that and the accident record shows that people can use the checklist and still manage to get it wrong. Pilots have accomplished the checklist and then absent-mindedly extended the gear out of habit from flying wheelplanes. Pilots have failed to retract the gear after takeoff and were content to see green lights on final to the water, even though those lights indicated a hazardous configuration. In a moment of distraction, pilots have dutifully accomplished the wrong checklist resulting in an inappropriate configuration. Pilots have accomplished the right checklist but then had a reason to change landing surfaces, and failed to reconfigure the gear. Conscientious pilots who have otherwise good checklist discipline have become saturated with other tasks and have failed to get it done. I know of an accident that has resulted from each one of these mistakes. Certainly the checklist is the first step in addressing the problem, and is our most important tool, but to say that it is the entire solution is to underestimate human creativity in making mistakes.

So if the checklist isn't enough, what more do we have to do to protect ourselves from this mistake? To start with, I believe we can make the checklist more effective by doing it at a specific time and in a specific manner.

#### WHEN AND HOW TO DO THE CHECKLIST

As for when to do it, I execute the checklist in response to specific cues that occur on every flight. The idea is to make sure the checklist gets done even in the most distracting circumstances, and for this purpose some cues are better than others. For example, if you normally execute the landing checklist on midfield downwind, that habit won't be of much help when you find yourself maneuvering around tight terrain to squeak into your destination on a straight-in approach in deteriorating weather with flat light onto water that might have some swell. Given the irregularities and distractions of the seaplane environment, the cues that direct you to the checklist should occur on every flight regardless of the details of your landing approach. I do the landing checklist three times in response to three separate cues.

My first cue to do the landing checklist is when I make the first power reduction for landing. I normally use the GUMP checklist (Gas, Undercarriage, Mixture, Prop), which covers the relevant items for most amphibians. Then when I make the first flap application, I re-visit the gear position to confirm it is in the desired position. Finally when I roll out on final with the landing area directly in front of me, I make visual contact with an aim-point that will guide the final approach. That is my cue to bring the props forward to complete the checklist and do a final compatibility check, making sure the gear position is appropriate for the surface I'm looking at.

These three prompts will occur regardless of what kind of approach I make. Whether it is a rectangular pattern, a straight-in, or some irregular exercise in snaking through the terrain, no matter what else is going on, at some point I'll reduce power for landing, initiate flap extension, and make a final turn to line up on the landing area. These cues will prompt you to think about the gear on every approach regardless of how it is conducted.

Does looking at the landing gear three times seem excessive? Given the mistakes other people have made, it's not a bad idea to revisit the landing gear to make sure you got it right. For example, the guy who was satisfied with seeing green

lights on final might have caught the mistake by taking a second look. Also given the distractions of the seaplane environment it's easy to miss one of these cues. For example, if you're making the first power reduction just as another airplane calls a position very near your own, looking for that traffic might cause you to miss that cue. In that case, the flap application would serve as the backup. A lot of things can distract you from accomplishing the checklist and there are numerous ways to incorrectly accomplish the checklist, so having three prompts increases the likelihood that it gets done correctly. This might seem like overkill on a normal day, but normal days aren't the problem. Accidents occur on the abnormal days when something out of the ordinary sneaks up on us and subverts our routine.

As for *how* to execute the checklist, when I come to 'undercarriage', I look at two things; I make visual contact with the landing gear *and* the landing surface, and I consciously make sure they are compatible with each other. If I look out and see the wheels are retracted, I say 'gear up for the water' and then look out the window at a water-landing area. If I look out and see the landing gear extended, I say 'gear-down for the runway' and then look out the window for the runway. The idea is that if I look at both the gear and the landing area, I'll be more likely to notice if they aren't a good match.

So far I've been talking about the landing checklist, but a cruise checklist is also important in amphibians. It is not an uncommon accident scenario for a pilot to neglect retracting the gear after takeoff, and then go on to land in the water. For that reason, leveling off from the climb and reducing power to the cruise setting serves as a cue to accomplish a cruise checklist that includes verifying the gear has been fully retracted. Whether you make this power reduction at 500 feet or 5000 feet, checking the gear at this time will make sure it is not hanging out when you start a descent. This not only protects against an oversight on your part, but it will also call attention to any mechanical problem that may have prevented the gear from fully retracting. I once took off from a runway for a brief repositioning flight to the water (one of the classic scenarios), and even though I moved the gear lever up, a hydraulic problem precluded retraction and the cruise check caught the failure.

## THE SURVIVAL INSTINCT

While the checklist is the front line of defense, there is something else quietly at work in the background that can also help prevent mistakes, which is the very way we *think* about amphibious airplanes.

How we think about an airplane underlies how we fly it, and I believe there is such a thing as thinking like an amphib pilot. By that I mean having the general philosophical position that the amphib is primarily a seaplane, its natural condition is being configured for flying on the water, and extending the wheels puts the airplane in an abnormal configuration that is contrary to its basic nature.

This is different from the wheelplane way of thinking. The wheelplane pilot always returns to dry land and considers gear-down a reliably safe configuration. The amphib pilot sees the gear-down position as inherently dangerous. This is a very different perspective. In amphibians, you should have a strong sense of awareness that the airplane is really a water plane, that runway landings are an exception to its nature, and that the potential for disaster exists any time the wheels are extended. There is only one time when the gear-down configuration is appropriate; when you

can look out the window and make visual contact with a runway that you are about to land on.

This position leads to what I call the 'amphib pilot's survival instinct', which is a heightened sense of alertness that you get anytime the gear is down. Extending the gear raises a red flag that calls attention to the existence of an abnormal and potentially dangerous configuration. If extending the gear produces an uneasy feeling that can only be alleviated by making visual contact with a runway, then you have this survival instinct.

This survival instinct gives the amphib pilot an important advantage. Should everything else fail you, this gut awareness might get your attention and save the day. This survival instinct does not come automatically, rather it must be consciously cultivated, and I take every opportunity to do that during an amphib checkout. For example, when it comes time to do runway landings, the question usually arises whether it is even worth raising the gear since you're just staying in the pattern anyway. The answer is yes, and this is a good opportunity to reinforce the point that no matter how long the gear takes to cycle, no matter how much you want to prevent wear on those impossible-to-find old gearboxes, you should always retract the gear immediately after every takeoff with no exceptions for the sake of habit. Retracting the wheels after liftoff transitions the airplane to a safe configuration and should be an integral part of every takeoff. I believe you should never climb out with the gear down for any reason, and the only time it should be down is when you are on approach to a runway.

How we think about the amphibious airplane also finds expression in the gear indicator lights. Blue lights normally indicate the gear-up configuration (for the water), and for some unfathomable reason airplane manufacturers stuck with the wheelplane convention of green lights to indicate gear-down. Using the color associated with a safe configuration to indicate gear-down reflects a wheelplane way of thinking that is completely inappropriate to amphibious airplanes and has contributed to more than a few accidents. Pilots who come from a wheelplane background are conditioned to look for green lights on final, and green lights are not likely to alert them to impending disaster when flying an approach to the water. What is the solution? When I first moved to Alaska, I noticed that some operators replaced these green gear-down lights with red lights to call attention to the hazard that exists whenever the gear is down. Glancing down at red lights on final is a little unsettling, it makes you think twice and ask yourself if the gear is really where you want it, and there's nothing wrong with that. Red lights illuminated on the panel *shouldn't* feel right, they should get your attention and they should make you think about what you're doing. In this way, the red lights promote the heightened state of alertness when the gear is down that defines the amphib pilot's survival instinct.



**Figure 1** Gear position lights that have been modified to indicate the gear-down position with a red light. This calls attention to the fact that that 'wheels-down' is an inherently hazardous configuration.

What I've described here is the strategy I've used throughout my career to avoid a gear-related mishap. So far it's done well for me, but it would be foolish to take anything for granted. The only thing that is certain is that the potential for a gear-related mishap exists for each of us. That is a little disconcerting, but then it should be. In order to do what it takes to be safe, we have to be aware that an accident is possible.

Getting the gear in the correct position is a simple task. It is easy to accomplish it correctly on any particular flight, but we are not just thinking of a particular flight. Rather we are concerned with accomplishing this simple task thousands of times under all different circumstances with the full range of distractions for the duration of our careers without *ever* making a single mistake. To do this, we need to develop habits that will protect us in unforeseen circumstances that have conspired to circumvent the vigilance of a lot of good pilots.