PHILIP GREENSPUN: Hi. We're going to talk about seaplanes. And there's two different designs. You can have a boat hull seaplane, or you can have a conventional airplane on floats.

So there at the bottom left is part of the Grumman series. They made a huge number of these around World War II, and many of them are still flying. You can see always probably 15 or 20 of these at Oshkosh every year in different sizes. The Widgeon is the smallest. The Albatross is the biggest. I forget if that's a Martin Mars up there on the top left. There are some truly huge seaplanes. Boeing, Sikorsky, and Martin, I think, all made huge seaplanes during World War II and just before.

The bush pilots don't like the small boat hull seaplanes, like the Lake Amphibian. And I guess the Icon they probably wouldn't like if it ever did ship out there to Alaska. I think one issue with the boat hull planes is they are very hard to dock. You have to design some special dock for them. They're really designed more for beaching, whereas the float planes very naturally come up to a dock like a boat.

That's one issue. So yeah, you might think those float planes look so unstable, but the bush pilots love them. It's hard to get on and off the water, which is why a practical seaplane really should have, in most cases, a turbo prop engine to get enough power to really get off the water.

So we do have, in Alaska, locally-- it's called Maine. There's a fair amount of seaplane flying up there. These are a couple of US government planes. If you want to know why your taxes are going in the direction that they're going, look on the bottom right. That was the government's. I saw these two plane side by side on the ramp.

Portland, Maine has a wonderful FBO called MAC Jets, which is very hospitable. They have crew cars, reasonably priced 100 low lead. They're really just operating it as a gift to the piston crowd, of course. They're really there for the turbine-- as a business, they're there for the Jets. But it's a great place that you can use, and jump in the crew car, go into town.

But anyway, on the ramp, I happened to see there's a little Piston Cessna on floats that they bought 15 or 20 years ago for Fish and Wildlife patrol or something. I think this is a federal government airplane. And now, they have this monster thing that they're replacing it with, that has a fire-breathing turboprop engine that probably costs five times as much per hour to run.

OK. Every year in September, there is the Moosehead Lake Seaplane Fly-in. And you might ask, can you fly in the air in the East Coast Aero Club plane that you've rented? The answer is yes, although you probably can't fly back out if you choose the lake as your landing destination. But there is a wheeled airport there as well that's pretty reasonable. I think it's about a 4,000-foot runway. So if the weather's nice, that's a great place to go, up in Moosehead Lake. It's a long drive. It's about probably a five-hour drive from here.

The hard thing about seaplanes is if the float is all the way in the water, it will never take off. There's so much drag. You have to get up on the step, which if you're a boater corresponds to getting up on the plane, I guess, of a planing haul. So basically, you can't have the entire float in the water if you ever want to take off. Let's just show a short YouTube video here. We have no sound. Oh well, that's fine.

So you can see this Caravan on floats. I think it's a Caravan. It's beginning to get up on the step. And finally, it can break loose. Anyway, that's how it's done. Crosswind landing-- this is how it's done, according to the FAA. So the FAA's mission--

[LAUGHTER]

The FAA's mission is, in addition to regulating aviation, they're explicitly supposed to promote aviation. It's a rare agency. So part of their mission is to encourage people to fly. And this is the best that they can do for seaplanes. So it does tell you-- Like I was telling you, the problem with seaplanes is if you make an error on Hanscom on Runway 29, first of all, it's 150 feet wide. And the gear on your airplane might only be 10 feet wide. So you can slide quite a bit, left or right, before you even leave the pavement.

If you do leave the pavement, you're skidding along the grass, and the owner is going to have some harsh words for you, perhaps. But otherwise, nothing too dramatic is going to happen. Glassy-- this is the FAA's glassy water landing demonstration. So if there is no wind at all, you might think, that's great. That's perfect for seaplane flying. It's hard to judge where the water is. A little bit of wind that causes some ripples on the water makes it much easier to judge your distance.

So here's your alternatives. You can not flare at all, and crash into the water that way. Or you can flare too high, and then crash into the water. What's that?

AUDIENCE: Those are the only possibilities.

PHILIP GREENSPUN: Those are the only possibilities. What's the question, radar altimeter?

AUDIENCE: No. So hello. For seaplanes, do you wait until you have seen VR before while taking off, or do you have the floats clear the water and [? take ?] [? off? ?]

PHILIP GREENSPUN: The question is, do you wait until VR to take off, or do you just wait till the floats have cleared the water and take off? That's a good question. It's so inefficient to be dragged into the water. I think you lift out of the water just as soon as you can. And then you'll probably float-- you'll fly along the ground effect for a little bit, and then finally take off. But yeah, just like on a soft field, like slightly muddy grass or something, the best thing you can do is to get away from the surface that's dragging on you. Great question.

All right. Here's the docking and beaching. So one challenge with a seaplane, if you're all by yourself, is you have to be tremendously agile and nimble to get out of the plane, kill the engine, scramble around usually the front of the airplane and the propeller-- because you're sitting on the left, and the passengers are going to get off on the right-- and tie up the airplane to the dock. It's very hard to do. That's one of the hardest things, I think, about seaplanes.

And also, if the magnetos aren't perfectly grounded, airplane engines can start by themselves. After saying we shouldn't tell you stuff that's scary-- if it's not perfectly grounded by that switch, and you don't starve the engine of the fuel by killing it with the mixture, it may be able to start all by itself, at least run for a half a rotation or full rotation, and hurt somebody.

So you always want to be cautious around propellers and not spin them. But of course, if you're trying to get around the front of your seaplane, the propeller is the most obvious thing to grab onto. Anyway, I don't think I would ever want to fly a seaplane unless there were dock handlers who were going to deal with that part of welcoming the airplane to the dock and tying it all up. But of course, the folks in Alaska do this all the time. So have respect when you see a seaplane.

So there are a lot of bad things that you can do. Believe it or not, landing in the sea is something that's almost-- in practice, it's almost impossible on a seaplane because there's too much in the way of waves, that really-- for harbors, rivers, lakes, if you have more than a foot of-- if the waves are more than about a foot, it just bangs up the seaplane so much that it will

be damaged.

Landing the amphibious plane with the wheels down is one of the most common mistakes. You might think software would fix this, that if you have a database of where all the runways are in the US, you have a database of where the lakes are, and other bodies of water-- but you don't even really need that. So you could have a lot. You could have a camera out in the front that can tell the difference between water and not water.

So you would think that the airplane would provide significant assistance in configuring an amphibious plane with having their wheels down for a hard surface or just the bare floats for water. And there's very little of that, unfortunately. There's certainly nothing like the intelligence that I'm describing. You might be able to press a button and have the plane tell you, with the synthesized voices and aftermarket thing, "the wheels are down for runway landing" or something.

So one common thing that people forget-- not that common, but this is an illustration of why you might want a two-pilot crew. But there's a video that's linked here from the slide about a father-- so he sounds like a good pilot, and a careful pilot. He was with his son, and he left the wheels down, landed in the water, flipped it over, and the son was killed. Really tragic. So watch that if you want to cry.

But anyway, I think it's a good illustration of a seaplane-- an amphibious seaplane operation is a great example of where a two-pilot crew with a checklist would be very unlikely to have that kind of accident. So it also illustrates how it's too bad that these manned airplanes don't have one one-hundreth of the intelligence of a DGI drone.

There are rare exceptions. Like I said, at Burning Man, the terrain warning system had to be silenced because it was freaking out that we were not going to make it, even though there was a 5,000-foot temporary runway that had been rolled out there by the Burners-- the uber Burners.

OK. Salt waters-- people do this commercially, but the airplane has to be hosed off every day because the saltwater is corrosive, even to aluminum. Question.

AUDIENCE: Lakes and harbors tend to have a lot of people on them. How do you avoid hitting a swimmer or a boater?

PHILIP Yeah, how do you avoid hitting swimmers and boaters in lakes and harbors? Yeah, that's one

GREENSPUN: of the challenges of seaplanes. If you're cleared to land in an airport, the air traffic controller has looked out on the runway and made sure that there's no other aircraft, pretty sure that there is no deer on the runway. The seaplane you have to orbit around. It's a little bit like landing a helicopter off airport to really make sure that there's nobody in a canoe.

I will tell you that for my seaplane training up in Maine, I have a seaplane rating that I got up in Maine. And there's a great school up there called Twitchell's. But anyway, yeah, kayakers can paddle pretty fast when they see a seaplane in their vicinity. Head towards the shore.

But yeah, there could be a log in the water. So there's just-- there are hazards that you can't control and get rid of. So the accident rate does tend to be higher. In the military-- I think there's a slide later where we talk about that-- they've gotten away from seaplanes and into helicopters for that reason. Just so you know, the helicopter-- you can be down to within two feet of the ground and say, I don't like what I see. I'm going to go somewhere else.

The propeller tends to get beaten up. You'll see some seaplane designs where the propeller is up high and in the back, and that's to keep the water-- the propeller's going near supersonic speeds at the tips. So if it gets water on it, it'll be eroded. Same deal with flying your airplane in heavy rain. You can get erosion on the leading edges of the wing and on the prop.

All right. So yeah, the seaplane pilot skills include a lot more judgment. To some extent, they'll be the dimensions of these lakes. And in Alaska, there's even a lighted water runway. But generally speaking, you don't have a lot of information to go by. So you've got to evaluate all this stuff by yourself.

One thing you can do-- I'll use this coffee cup as an example. You can usually see where the wind's coming from. If there's trees all around the lake, the lake will be calm right next to-- let's assume this coffee cup is a tree. The lake will be calm and glassy right next to the tree. And that tells you the wind is coming from this direction, because that part of the lake is being sheltered from the wind.

So you can actually read the wind off the lake by looking at which parts are rippled and which parts are glassy. But you still have to decide, right, are there floating logs in the water? Are there swimmers? Are there boats?

Here are some unusual skills that you have to have-- well, you might have to have. After maintenance-- or to get the airplane maintained. Ah! All right. So that was straight floats in the

grass. So at the end of the season, if you want to get the airplane maintained, there's not a lot of airplane mechanics hanging around the typical lake. So you just land it on the floats in the grass at an airport.

And what about when you want to get it out? Yeah. To get the sound, watch that at home.

So as I said earlier, the problem with seaplanes is that it's just a lot less forgiving than a hard surface runway, which is the most forgiving environment. You can enhance that safety with a two-pilot crew, especially an experienced seaplane pilot, or-- fair stuff, it'll be on the test-- you can learn about accident reporting.

So this is a different part of the federal regulations. This is the part that regulates what the NTSB does-- National Transportation Safety Board. So first, they define what an accident is. So there has to be a serious injury.

And if you go in there, they define what a serious injury is. And I think substantial damage to the aircraft-- if it's just the landing gear that's a bit trashed, I don't think that qualifies. If somebody dies within 30 days of the accident, it becomes fatal. Here's your definition of serious injury-- not too much fun.

You have to immediately notify the NTSB if the flight controls malfunction. They don't really care if the Lycoming or continental piston engine fails in some way. But if the flight controls fail, and you can't bank your Cessna or Piper or Cirrus, that's something they'll want to hear about. If more than half of your glass cockpit goes dark, they want to hear about that.

I think 830.15 is in the test something. There's time periods, like report within 10 days of the accident. Oh yeah, and required info when notifying. OK.

So the bottom line on seaplanes is that it does combine the hazards of a boat and a plane. And therefore, you need the skills of both a sailor and a pilot to manage those hazards. On the other hand, I think it's a lot of fun. When the Icon first came out at $100,000 and change, I thought, oh, this would be great. We'll just get one of these. We'll split it four ways. We'll keep it at Hanscom, and we'll go up for a 15-minute flight to New Hampshire-- splash and dash, come back, and it'll be really cool.

Now that it's a $400,000 airplane, it's not enough--

AUDIENCE: [INAUDIBLE] seven days. [? But ?] [? that ?] said, what does overdue mean?

PHILIP GREENSPUN: Overdue. The question is-- go back to that slide. Yeah-- file a report within seven days if an aircraft is overdue. So that means you expect an airplane to come back from the fishing camp in Alaska and it hasn't returned. So you don't know if it's crashed or not.

That was like me. Remember I told you that story about landing a PBK in Atlanta? And I forgot to close my flight plan. And so my Diamond Star was considered overdue. And I kept rejecting calls from an unfamiliar phone number-- not my proudest moment.

All right. So insurance is kind of expensive, as I noted, especially for the amphibs. An airplane on straight floats isn't that much more expensive to insure than a regular airplane. Actually, that's a great way to evaluate risk. If an insurance company is willing to write a policy for a Cessna on floats, it can't be all that dangerous. But like I said, the military has decided, let's do most of the things we used to do with seaplanes with helicopters. Question?

AUDIENCE: Insurance [INAUDIBLE] delayed [INAUDIBLE]. What about-- so our insurance-- we [? haven't ?] had personal insurance. So if we fly, but we hurt ourselves, is our medical coverage going to cover that? So you're saying [INAUDIBLE].

PHILIP GREENSPUN: Oh, no. I think-- so the question is, does your regular medical insurance cover an injury from flying? Sure. Yeah, there's no exclusion for that. I think somebody if you get an umbrella liability policy they say, well, that's great but we're not going to like to add $5 million if you injure somebody with your Cessna. So they can have exclusions. AOPA has a big insurance business, actually, selling life insurance at pretty reasonable rates to pilots.

So there, again, that tells you-- when your friend says, you're stupid, why would you fly a Piper or a Cessna? That thing's old. It doesn't look safe. You can say, well, insurance companies aren't stupid, and they have a huge business marketing life insurance to the members of AOPA, who are all flying little airplanes like this. And it's only a 10% higher rate than what you can get in the market elsewhere.

Of course, pilots are healthier than the-- that's one issue, right? Since pilots by definition have passed a medical exam, they tend to be a little bit healthier than average. Same reason, like the military-- the death rate of people who serve in the military is quite a bit lower than the death rate of the same age people who are in the civilian workforce, partly because not that many of them are actually in combat, and partly because the military rejects people who are unhealthy. So you're not going to die of cancer at age 23 if you're in the military, because they

would have not let you enlist, probably, if they saw that you were suffering from the beginning stages of cancer.

All right. Light sport flying boats-- Searey is fun. This is a real one. There are 700 of these out there, and they sell it as a kit. And they also sell it as a built airplane. So here it is-- look how much fun. Somebody put one of these on a yacht and flew it in all different parts of the world. They would take off-- I guess they would winch it down into the water, take off, fly around, and then winch it back up. And I think they were in some fairly open oceans at the time. And the thing survived, so that's pretty cool.

They stuff a Garmin G3X glass cockpit in there. And that's the same thing as the Gamebird has. The white sport folks have a lot of flexibility. It has a road tax engine, which is conventional. The Icon A5 is the airplane-- see, look at Oshkosh. Their booth is always packed. People love it. People want it. And it's one of the few airplanes that's marketed to people that don't have any flying experience.

I wrote a review of it in 2010, saying that it would be available in 2014. I think it had been originally promised for 2012. So it's just coming out. These composite planes are hard to manufacturer. I talked to the Gamebird guys. They said they spend 500 hours-- 500 person hours-- prepping the airplane to be painted, just like sanding, and smoothing everything to be painted. So I think it's just very hard to make these things at an economical price.

We still don't have sound, I don't think, do we? Here's my review of the plane. I made this little video that was fun. Well, I thought it was fun. I'm sure Icon doesn't think it's fun. All right. Questions about seaplanes? Who wants one? Who would buy an Icon if it were reasonably priced? A lot of people's questions.

AUDIENCE: You were talking about [INAUDIBLE] sides of a lake, and don't land out at sea. But what would be your opinion about the Great Lakes? I know sometimes the waves can be higher than a foot. But when you just look at it, [INAUDIBLE] judge what the waves [INAUDIBLE].

PHILIP GREENSPUN: The question is, what would, by my opinion, be a landing in the Great Lakes? I think people do a lot of flying of seaplanes up in the Great Lakes. But there again, the Great Lakes-- there are harbors. There are calmer areas. So I think they're not really landing in the middle of the Great Lakes. And then, they don't say, I just want to go to the middle of Lake Superior and fish off the float for a while. They're going to some destination, and by definition, the destination will have a calmer area for boats to hang out in.

I think there's actually a commercial seaplane service that's starting up between Manhattan and Boston. So you'll go to the-- there's a seaplane-- I should have mentioned this. For helicopters, there are helipads all around Manhattan. So you can actually go to the downtown Wall Street heliport, land-- it used to be really cheap. It was $75 an hour for parking, I think, or maybe $25. I don't know, it wasn't that much more than parking a car. Go in and have lunch.

Now, they've leased those helipads to some government crony monopoly that owns all three of them. And they cranked the rates up by a factor of four immediately. But anyway, I don't know if it's the same company, but they have a public seaplane port there on the East River. And I think it's a Cape Air affiliate, maybe, that's going to start operating downtown to downtown in a Cessna Caravan on floats.