AirSpace Transcript Season 10, Episode 7: Scoop There It Is

AirSpace theme in then under

Emily: Welcome to AirSpace from the Smithsonian's National Air and Space Museum. I'm Emily.

Matt: And I'm Matt. There are a lot of aircraft that fight fires in different ways; helicopters that drop water and smoke jumpers, big cargo planes that drop fire retardant. They all have important jobs, but the objectively coolest one is the Super Scooper.

Emily: This Canadian beauty flies low over lakes or sometimes oceans, scooping up tons of water in seconds before dropping it on a fire, circling back and doing it over and over again.

Matt: It's a really cool plane. We sat down with one pilot to see what it's like to fly it. That's today on AirSpace, sponsored by Lockheed Martin.

AirSpace theme up and out

Emily: Ok Matt, I feel like in my head, when I first thought about what does the airplane look like that scoops up water and dumps it on fires, there was definitely some kind of, like, cherry picker bucket sort of contraption underneath the plane, or that this was some kind of plane that was retrofitted to be able to do this job. Because I feel like on a lot of different episodes, we've talked about airplanes that have been retrofitted to do things like carry pandas or participate in the cold chain. But in this case, the Super Scooper is purpose built to do this job.

Matt: Yeah, and it's just the perfect name really for how it operates. But Super Scooper, also just incredible name, otherwise. So this is the Canadair Super Scooper[1], and there are a couple variations. The CL 215, the 415, the 515, lots of letters, specs, etc. You know, I'm not a plane person, but I appreciate the variety there.

And all of them are amphibious aircraft that fight forest fires.

Emily: And as you all know very, very well, Matt and I are not the airplane people, but we're really, really good at talking to people who are experts at other things. And so we thought it was best for us to learn about this airplane from somebody who flies one.

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[1] https://dehavilland.com/aerial-firefighters/

Scott: My name's Scott Blue. I, uh, fly for Bridger Aerospace[2] in the States. I fly a CL 215T. It's a, uh, scooping aircraft is a common term for it. I've been doing it since 2011, would be my first summer.

Matt: We've talked in previous episodes about other aircraft that fight fires. My favorite as I've mentioned I think multiple times on this show is the sky crane helicopter[3], which you can sometimes see in cities acting as a flying crane, which is impressive in itself. But is also able in other configurations to hover over a lake and suck up water through a long tube and then go off and fight fires without ever landing.

This plane is kind of unique in that sense too, right? It is purpose built to fight fires and do it rapidly.

Scott: It was designed specifically from day one to fight forest fires[4]. So they had a blank sheet of paper, and they said, 'Okay, what is the best design we can use for, you know, scooping water off a lake and putting it on a fire?[5]' And it was designed that from the get go, so it's a amphibious flying boat. So it's got a big boat hull, front to back and then it's got sponsons on the wings for when you're dipping left or dipping right.

It's one of those planes that if you saw it, you'd almost instantly say that's a firefighting airplane. You know, ours says fire on the side and it's red and it's white with some pretty cool white and black stripes on it.

Matt: So this is one of those planes that it looks like a boat with wings, right?

Emily: Yeah, and if you look at the fuselage, it has this kind of flat, wide bottom because it's picking up water by kind of skimming across the top of a body of water like a lake.

So to be clear, this isn't the Indiana Jones style float plane[6] that has pontoons for landing gear. This Super Scooper, if it does land on the water, which it can do, it's landing on its tummy with these little boats kinda pontoons on the tips of the wings to kind of help keep those wings afloat.

Matt: I like the idea of a plane with a tummy. That's kind of, that's kind of cute.

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[2] https://bridgeraerospace.com/
[3] https://en.wikipedia.org/wiki/Sikorsky_S-64_Skycrane
[4] https://www.nbcnews.com/tech/super-scooper-planes-fight-wildfires-are-rugged-reliable-rare-rcna187795
[5] https://en.wikipedia.org/wiki/Canadair_CL-415
[6] https://indianajones.fandom.com/wiki/OB-CPO This is from Raiders of the Lost Ark, it's a plane hired to get Indiana Jones in and out of the South American Jungle. Also in Raiders, Indy does board a flying boat, in this case Pan-Am's China Clipper, which was *the* way to fly long distance pre-WWII.

Emily: Well, it is cute because it's kind of a cute plane!

Matt: Yeah. And it also can fit a lot in that tummy, right? 1,400 gallons of water that it can scoop up in 12 seconds, which seems kind of impossible.

Scott: As we touch down on the water, when we're in firefighting, uh, capacity, um, we have two big scoops come out from the bottom of the plane. And actually, I say big, but they're, they're really not too large. They're probably, they're about, four by five inches or so each one[7].

Emily: That's…that doesn't feel big enough. That's too small for that amount of water.

Matt: Four by five…like an index card! They're like index card size

Emily: *laughing* It's so small! I mean that's, that's hand sized. I mean normal person hand sized not NBA player hand sized[8].

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Emily: When a team of pilots that fly Super Scoopers are called in to help fight a fire, before they do anything, they need to take a look at maps of the region to identify bodies of water where they can actually fill up. And they're looking for bodies of water that are pretty free of obstacles, so no islands, no heavy boat traffic, that kind of stuff.

Because they really need to have rapid access to a body of water within close proximity to a fire to be their most efficient.

Matt: And it also has to be a body of water that's kind of deep enough and long enough that the plane can actually get what it needs without having to, like, pull up prematurely or something like that.

Scott: But then when you get there, it's all about just flying over the lake and doing some inspection passes and flying over at 1,000 feet, having a good overall, what are, what are the obstacles? What, what terrain is around there? Are there power lines? Is it a busy lake with a lot of, you know, boats and people out, you know, enjoying the day? Is there a shallow end? Is there a deep end of the lake? Are there rocks? Can you see through the water? Can you not see through the water?

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[7] https://www.youtube.com/shorts/7OyFmZYqaI8

[8] This is actually not *quite* true. The average American has a hand just over 7 inches long. NBA players' hands are, on average, 9.5 inches long.

Sometimes it's like you fly over, you do one pass and you're like, this lake is perfect. This is a dream lake for us. Easy peasy. Great. Let's go in and have some fun. And then there's other times where you have to do a couple laps and really have a good look at it and be like 'ok this isn't ideal'

Emily: What I think is also really important is I've never seen one of these airplanes in action in real life. But when I see really interesting aircraft, either in places I don't expect them or doing things I don't expect, I stop and I stare and I try and figure out how to get a better view.

For Super Scoopers, this has become a really big challenge because people love getting videos of cool things happening and posting them on the internet. And so if you ever see one of these airplanes, one of these Super Scoopers out in the wild, it's really important that you give them their space and not get too close to them.

Scott mentioned that a lot of curious boaters are becoming more and more of a danger to their operations and it really hampers the firefighting efforts

Matt: Yeah, so I guess if I see one of these in action, which now I really do want to because they look super cool, I'm gonna, you know, keep a safe distance and take my photo. Instead of trying to say, like, get a selfie up close to it by boating next to it or skiing next to it, I'd really rather not get in the way of this important operation. I can take my picture from the shoreline.

Music button

Emily: These really little four by five inch scoops go down, it takes 12 seconds to completely fill the inside of a Super Scooper's belly and at that point they've covered about 1,300 meters of lake surface. Then the scoops come back up into the plane, which is now much heavier, takes off and heads towards the fire.

Matt: So they're picking up a little bit more than a gallon for every meter that they fly over the surface, right? 1,400 gallons of water over 1,300 meters of lake surface. That's not even a mile. That's pretty impressive.

Emily: That is pretty impressive.

Scott: But whenever I'm giving a tour, you take people over to the planes and what I like to say is you've seen photos of them dropping water and how much water comes out.

Head over to the plane, just imagine in your mind how big the water tanks[9] are inside of the plane.

And when I first saw these things, I'm like, oh, the whole thing must be full of water. But then you take a couple steps up the ladder and you get inside of the plane and everyone's like, that's it? And I mean, you basically got what, like, looks like an upside-down sort of bathtub on each side of the plane. And then obviously it continues down in the hull, but it's a surprisingly small of water by volume. But like you said, very heavy. Um, and the entire plane was designed around that amount of water.

Matt: So to put that in perspective, 1,400 gallons of water, that's 12,000 pounds of water that they have that they can release once they open their doors over the fire. But that's a lot of weight to carry too. I mean this must be a pretty impressive maneuver for a pilot going from an aircraft that weighs 12,000 pounds less in the beginning to 12,000 pounds more, and then lifting up from the water, carrying it, dropping it and suddenly again, weighing 12,000 pounds less.

Scott: You're heading down into the water and it feels like, 'Oh, kind of light and, you know, easy going.' And then you load up the weight and it's like, 'Oh, wow, this is, this has turned into a bit more of a dog.'

And, you know, you have to be much more gentle on the controls. Understand that, you know, you can't bank as much. You can't be as abrupt. You just kind of slow down and change your flying a little bit.

And then, 12 seconds to load it, but then of course the flip side is, it's one second to drop the water. Yeah, you just push the button, two big doors at the bottom of the plane open, and the water goes, bye!

Emily: It only takes about a second for them to dump that water, but they dump the water differently depending on what the needs are, and that's a big part of the teamwork that's involved here in terms of saying, how high do I need to be in order to drop this water? And how fast do you need me to be going to disperse the water? To do the thing they need in that moment.

Scott: Our ideal drop speed is 105 to 110 knots. Is what we're aiming for over the fire. And the ballpark height is 150 feet above the ground. And never any less than 100 feet. Because you're just getting too close to the ground. And the closer to the ground you are, the more of a punch the water is going to have.

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[9] https://youtu.be/GiJx48hyVWg?si=X2mYEBgCIGnmNQBY&t=185

You have to be cognizant of what's around you and, you know, vehicles and houses, and it's very, it would be very easy for us to break windows, uh, damage, you know, property. God forbid ever, you know, hit someone with the water and possibly hurt them. So you gotta be very careful about that.

And the higher you go, you the more it just basically turns into rain, because the water will be traveling at that 110 knots, but as it comes out of the airplane, and gets into the air, it just slows down naturally, and, you know, spreads out more and more and more, and eventually the inertia will stop, and the water will just drop like rain.

So if we're just trying to wet down a large area, sometimes we'll drop from higher, and then it just, it just turns into a big bunch of rain.

Emily: So while there's large teams involved in fighting fires from the air, because you have not just a single kind of aircraft up there, you have a relatively small team on each Super Scooper aircraft. So each plane has a captain and a first officer, and once in a while you're going to have a third person who's there because they need to be transported, or they're training, or they're there for some additional assistance if need be.

But in any case, all of the choreography that goes into helping Super Scoopers know where they need to be, how they need to be fighting that fire, is all organized by a much larger group so that they can all work together.

Scott: It is absolutely a team effort on all fronts and we are one of the tools for fighting a forest fire, and we are probably our largest role is assisting ground people who are the ones that really fight the fire and really put it out. But for our individual little pocket of team is we will be on the ground, we have a scooper manager, and they will give us all the information to coordinate where we're going, what we're doing, who we're talking to, who we're meeting over the fire, who we're leaving from that base from.

But, um, we're almost always paired up with either an air attack or a lead plane. So, and those are the ones that are telling us what to do. They are the shepherd and we are the sheep. So, as they're telling us what to do over the fire, where they'd like us to attack the fire they're also coordinating other aircraft that could be in the area.

We are, we're often mixing in with, um, retardant tankers and, uh, helicopters and, um, you know, survey planes up above. So, they'll, they'll be telling us where we'd like to go, what we'd like to do, and there's constant communication between everybody. I'm here, you're here, you're there, okay, and it's a very visual environment.

And we've been in groups as many as eight planes in a row, kind of following one after the another, you know, scooping water, dropping, scooping water, dropping.

Matt: One thing that I learned when we did our previous episode about aerial firefighting[10] is that there's a large encampment of people that springs up that then coordinates all of the efforts that are being undertaken to fight the fire, whether that's in the air or on the ground, but definitely, you know, coordinating all of the different types of aircraft and the different teams that are in the air at any given time, because as you can imagine, right, to fight a large wildfire or forest fire, you really need a lot of logistics and a lot of coordination.

Emily: Sure. And so with Super Scoopers, you may have a bunch of airplanes flying picking up water and dropping it on the fire. But in addition to that, you're going to have larger fixed wing aircraft that are carrying that bright red sort of powdery fire retardant that you often see on television being dropped on fires.

You also have helicopters that are picking up water and dropping it. And then we have things like smokejumpers, and we've done an episode interviewing some smokejumpers who are going to parachute down in and actually fight the fire from the ground among many, many others. And so you can imagine that it can be a really congested area, not just on the ground, but also from the sky. And that takes a lot of sort of choreography and a lot of teamwork

Matt: So, as with a lot of the other specialized firefighting aircraft, fire departments just don't have these things on hand, rather there are small companies that operate maybe a small fleet of these planes or helicopters, and these contractors get called in when there's actually something, some part of the country that needs their attention. They might go to fight fires wherever those fires are at that moment.

Emily: And I think this makes a lot of sense because this is a pretty specialized skill set, right, that you don't always need in all firefighting circumstances, and so to kind of distribute those resources in a way that allows those unique skill sets to be employed in the right places at the right time, makes a lot of sense because it would be absolutely unrealistic for each city or county fire department to maintain a complete airborne crew of firefighting technologies

Matt: And so, as we mentioned before, for these planes, it really requires that there be kind of an ideal environment for them with the types of bodies of water that they require in order to do their job. So we asked Scott how they sort of set up for their firefighting operations.

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[10] https://airandspace.si.edu/editorial/host-favorites-matt

Scott: The closer we are to a suitable water source, the more efficient we are for fighting fire. I mean, we can be so close to a suitable lake that it's every two to three minutes. We're putting a full load of water on the fire. And that's very busy, um, and tiring.

My personal best day was 99 in two missions, 99 drops. And I have co-workers and friends that have done more than that, you know, like 60 or 70 drops per mission. If you're at the lake, if the lake and the fire are really close to your, uh, airport that you're based at.

And you're there in five minutes. And you're there. The fire is basically on the shore of the lake. And you just go round and round and round. If you imagine a pattern where you just scoop water, take off, make a turn, set up for the drop, drop, get reconfigured to go back into the lake, because we're always making sure that the switch is in the right place, the doors are closed, and it's safe to go back into the water.

And then back in the water, pick up another load, and around and around you go.

Emily: So after about four hours, these planes are going to head back to their base for refueling of the airplanes, refueling of the pilots. And keep in mind, this isn't necessarily their home base, this is just the base that they're using for that particular fire. And then they'll head back out and do as much flying as they can until it turns dark, usually it’s about four hours.

Matt: Right. And the Super Scoopers don't fly at night. That's not because they can't fly at night, but because it's really not safe to scoop up water on a lake or fight a fire that you can't see very well. So there's a much greater chance of dangerous accidents flying at night, which is why they limit themselves to when they can actually, you know, see and have good visibility.

Emily: Sure and as you mentioned, the planes can be flown at night, but that nighttime flying is restricted to moving the planes around to the different places that they need to be in order to fight that fire. So they'll go between airfields sometimes at night, or if they're flying to go fight a fire from an airbase that's much further away, they will often do that flying at night. So the planes can be flown at night. They're just not going to be fighting fires at night.

Matt: And so far we've only talked about scooping up water from lakes, but actually, Super Scoopers can pick up ocean water, which you might have noticed them doing during the LA fires earlier this year. They can do that, and they will do that, but they don't really like doing it because, as you can imagine, seawater is not great for an aircraft.

Emily: Or the ecosystems. So it's usually a last resort.

Scott: Saltwater is, we can do it, um, but it's very hard on the airplane[11].

And there is a huge amount of procedures both with us and maintenance at the end of the flight that we have to deal with, where we'll have to go, let's say you're just scooping out of the Pacific like the guys were for, you know, the LA fire. I can't speak to their specific procedure, but if it was us, we'd go to a freshwater lake and we would come to a full stop.

We drop the gear, retract the gear, just kind of give it a little rinse, and do a couple of really long scoops where we're leaving the scoops down, and it's just flushing water through the tanks and it's overflowing. And then at the end of the day when we get back to the maintenance base, the crew's gonna have a really late night, um, because they gotta hose the plane down, try to find a fire hose, they literally hose the thing from top to bottom.

Um, they have equipment to literally wash the inside of the engines, the turbine wash. Um, because the salt gets everywhere. And even after all of that, a few months later, it'll be getting over maintenance and they'll still find salt. So, it's, yeah, and of course corrosion and wear and tear, it's, it's a last resort.

Matt: And, as you can imagine, a Super Scooper might not be the right aircraft for your fire if it's happening in the middle of a desert environment. Right? You really have to have water around. And so there are parts of the southwest, for example, where the Super Scooper just isn't the right aircraft to fight a fire.

Emily: But in a lot of places, as our planet warms and wildfires become more and more common, and our fire season becomes longer and longer, the Super Scooper is a really important tool that can help fight these fires.

Scott: The seasons are getting longer and longer and longer. I, that, you know, that LA fire was in January. I moved a plane home in the middle of November last year.

It's, it's, you know, becoming a year round thing. It's not a fire season anymore. It's just when and, when and where are you? So, yeah, we just got to accept that that's where we are and do the best we can to help out everybody and protect lives and property as much as we can.

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[11] Scott also told us there can be unusual obstacles in the ocean, like breaching whales.

Matt: So we've been celebrating the Super Scooper in today's episode and really it's an incredible plane. But of course it would be better if we didn't have to fight forest fires at all and a lot of those forest fires really can be prevented so, pay attention to your fire risk level, don't play with fireworks in dry areas, put all fires completely out, you know, be a good Boy Scout.

And as Smokey says, only you can prevent forest fires.

Emily: That's not how Smokey says it, Matt.

Matt: *in a deep voice* Only you can prevent forest fires.

AirSpace theme in and under

Emily: AirSpace is from the National Air and Space Museum. AirSpace is produced by Jennifer Weingart and mixed by Tarek Fouda. Hosted by Dr. Matt Shindell and me, Dr. Emily Martin.

Our managing producer is Erika Novak. Our production coordinator is Sofia Soto Sugar, and our social media manager is Amy Stamm.

A big thank you to our guest in this episode, Scott Blue from Bridger Aerospace. Additional thanks to Cal Fire and to Devin Johnson at Bridger Aerospace.

Did you know the transcripts of our episodes include citations and extra fun facts? You can find them linked in the show notes. For additional content, photos, and more, follow AirSpacePod on Instagram and X.

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AirSpace theme up and out

Emily: They're TV commercials[12]! *(imitating Smokey the Bear)* He has the really deep voice and he points. There's a lot of pointing. There's none of the like, you know the political finger on the thumb..like thumb on the finger like not pointing pointing. Smokey is aggressive about it.

[12] https://youtu.be/IZLjnMyqYWI?si=ynI5U_xX16zB8SGf