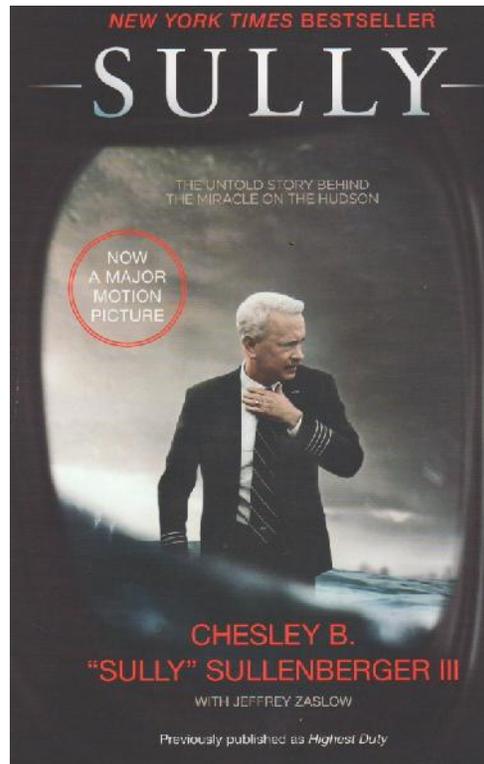


## ***Sully*** - the movie: Three Words

Gary Heartsill



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### Abstract

This paper points out the success of Captain Sullenberger's crash landing of an Airbus A320 in the Hudson River on January 15, 2009, suggests seeing the movie will probably depict some of the more remarkable events during this 'Miracle on the Hudson' and will point out the issues of not making it back to the airport and why he landed with the left engine still running while touting in the Appendix more information than is needed to see the Hanks/Eastwood movie.

*Key words: movie, airplane accident, investigation, 'Miracle on the Hudson,' Airbus, Sully*

## Introduction

The TV commercial was just released for the “Sully” movie due out in September. Perhaps anything Tom Hanks and Clint Eastwood put together is worth watching; however, I was struck rather forcibly with two items some of us have been pondering since January of 2009. In the commercial you hear an investigator and then a news person say “Simulations show you could make it back to the airport” and “The left engine was still operating...” I said to myself “Goodness gracious these two items are in the movie trailer? I wonder what else they will ask.”

The attached information maybe more than you need to get ready for the movie but here are some issues to consider before we see how Hollywood deals with it. The crash was a big deal.

What this paper promotes:

1. Supports the success of Captain Sullenberger’s water landing on the Hudson in an Airbus 320.
2. Suggests some information about the investigation of the crash not every movie goer will want to see, read, or review.
3. At the end, questions the ditching decision with three simple words.

What this paper does not promote:

4. Does not take on Hollywood, Sullenberger, Airbus, NTSB, or US Airways.
5. Does not provide serious answers to the serious questions about the crash.

Have wondered, and will still wonder why Sully about one minute after they took off made the statement “...**what a view of the Hudson today.**” This was made climbing through 2200 feet. He then retracted the flaps, completed the after takeoff checklist, and four seconds later they collided with the birds...Maybe this was some sort of cosmic foreboding or premonition?

The Airbus A320 has some features designed into it that are different than most aeroplanes. The Airbus has flight envelope protections. A ‘protection’ that overrides the pilot – it is sort of like a cocoon built around the pilot. There are ‘laws’ built into the machine controlled by the computer. A Boeing for instance has a button that can be pressed so the pilot can take complete control of the airplane. A Boeing airplane can stall. “An Airbus cannot be stalled in normal law.”<sup>1</sup> Airbus is different. (The details are beyond the scope of this paper.) However, we will have to give Sully his due for flying the Airbus and landing in the Hudson given the ‘protection’ built into the ship. He did good (well). He walked away from it and nobody got hurt.

Doing some “Monday morning quarter backing” a few years after the crash and looking at the ‘laws’ and ‘protection’ in the A320, the question of turning back to LaGuardia (LGA) is still a question some of us talk about. I don’t know about an Airbus but a Boeing 727 or a Learjet 35 could, nominally speaking (an engineless but glide-able airframe) make it back to the airport –

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<sup>1</sup> See The NTSB PDF file # 13 in the Appendix for a more detailed explanation noting this is for a “really interested person” as the fly-by-wire airplane is sometimes confusing as to who is in control and it may depend on what ‘law’ the plane is flying in. Lot’s of luck, by the way...

or make it to Teterboro (TEB) which would be a stretch lining up with the south 7,000 foot runway.

What Sully initially asked for was clearance back to LaGuardia as he began a slight turn to the west. He did not maintain an exact gliding air speed. He asked for the Quick Reference Checklist (QRC) to get the engines restarted and then was having to deal with ATC and what was available for him to land while flying his crippled jet. However, we know the rest of the story. He successfully landed the A320 in the Hudson River. Again, he gets the credit. Tip of the hat to him for making the 'miracle' landing<sup>2</sup>.

### Sully Track (orientation)

Observing the Sully Track on the next page the first focus is bottom right corner where LaGuardia is located or at the blue LGA. The yellow/pencil highlight going north up to the "May Day" call, west/southwest across the green top of the pie, and down the river to the red zero.

Notice the blue clock times all the way around from take off at 25:00 (start of roll) to the 30:43 time of crash landing.

Notice the red numbers reflect the altitude, first at 700' to the top at 3200,' 1500' at the bridge and on around to 200', 360', 200', and zero.

Have shown the callouts of "switching to departure," "view of Hudson," "Bird Strike," "TEB?" "Brace," and "Hudson." There are mile markers (statute) 1 thru 12 miles for his track.

There is shown one minute to 1500' – second minute to just before the 4 mile marker at 2900' and then the last three minutes 2700'-1500'; 1500'-500'; and 500' to 0'.

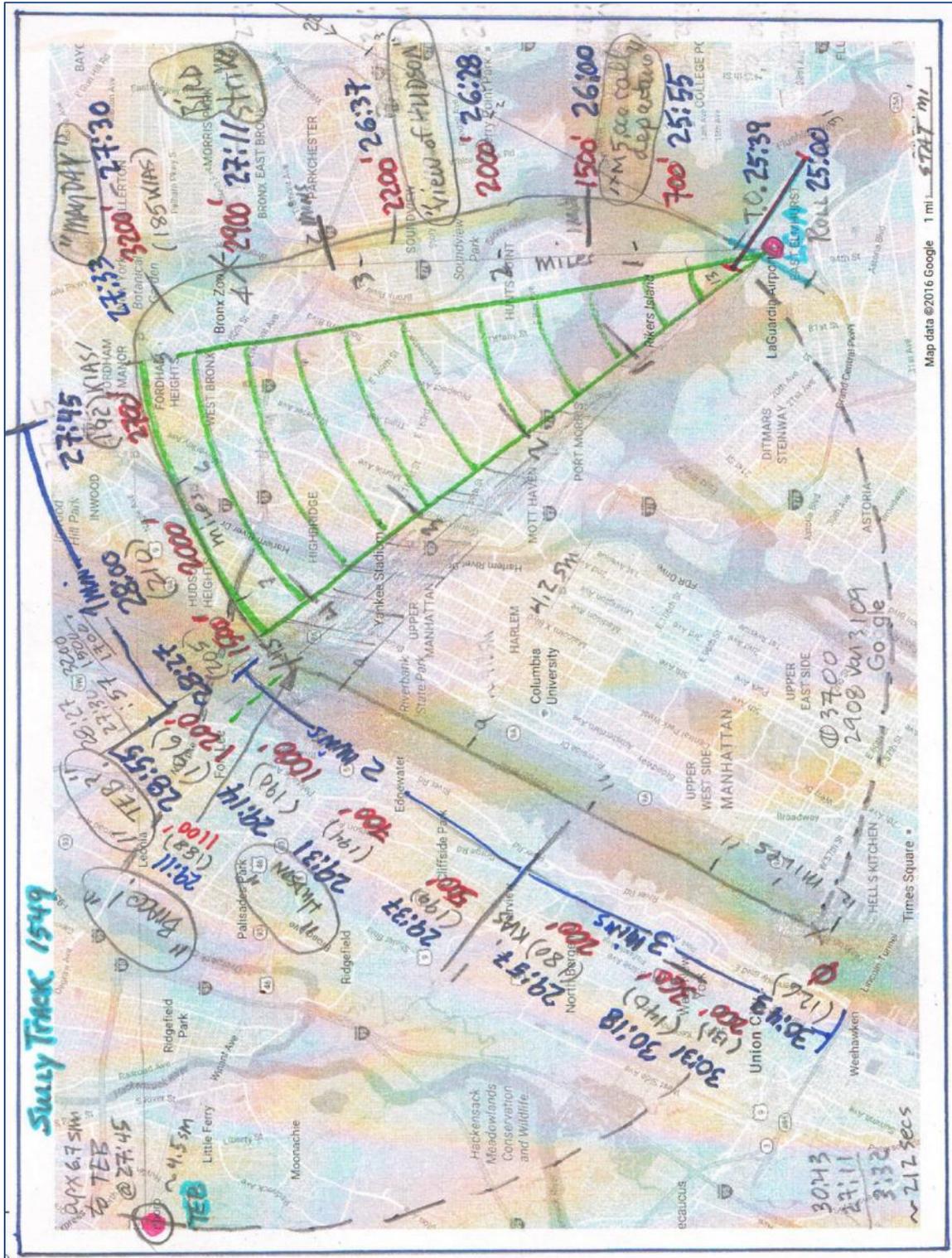
Note the green pie. This is the area of successful return with a turn back to LGA from about 27:33/27:45 at 2700' to about 28:27 at 1500' (G. W. Bridge) would allow enough time to glide back to LGA. Notice the distance from the Bridge to LGA is the same as to 0' in the Hudson.

Teterboro airport (TEB) is the red dot to the west is within a half mile of being the same distance from the bridge as to LGA.

There is a 'shady' area south of the bridge down to 1200' that would make LGA but is close...

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<sup>2</sup> All accidents have to be investigated by the NTSB. See the Accident Report AAR-10/03 file, # 13 in the Appendix. Let me say the investigation is quite (was quite) detailed. They don't miss much. As a matter of fact the key witness at one of these hearings would almost be better off to drop his trousers, bend over and spread his cheeks so everyone can see because he will get bore sighted before it is over with...I promise you. Please Review for your benefit these items as it will explain better than I can some of the Airbus/Accident details:  
Executive Summary – xv.  
Flight Track – 4.  
Airspeed Displays – 10-12.  
Dual-Engine Failure Training – 59-61.  
Conclusions – 119-121.  
Probable Cause – 123.



### Looking forward to see the movie

I will be looking to see if they show some landings at LGA in the Airbus A320 simulator. It shouldn't be that difficult but I only had one ride in an Airbus so I would not know; however, let's talk about this for a minute. Remember we are Monday morning quarter backing and we are not going to get into Sully's success with comments like "Well, I could have made it."

For drill, same numbers as accident aeroplane: max weight takeoff, runway 4, cleared to five, 3700 feet broken, winds 290 at 8 kts variable 310 at 9 kts. We know what we are going to do so watch this! At 2800 feet the flocking birds hit the ship and we lose both motors. "I got the jet" Pitch for best lift over drag speed and maybe the **Green** dot will show something like (my guess) 200 KIAS – maybe 180... The pitch is done at the same time as a left turn is started.

**Loss of two engines** is an immediate response:

Pitch for best Lift over Drag, Turn for the nearest airport, Set up a pattern to land half way down the runway and when that point is made or you can see you can land half way down, extend the landing gear and move the point half way to the approach end. Maintain the speed all the way to touchdown. Next extend the flaps to move the landing point to one quarter of the way down.<sup>3</sup> Note: The radio call is to tell ATC you are going to land on runway 13 at LGA and run the trucks because you have lost both engines...period. You should own the airport and the airspace getting there at this time.<sup>4</sup> (These are my comments. ATC won't buy being told...)

[The other issues of what checklists to call for, and appropriate behavior to keep the feds and chief pilot off your case is, or should be, written in the Operation Specifications of the airline.]

One cannot dilly-dally about pitching and turning. This is makeable, but you must fly the biggest piece to the ground giving yourself and the airplane the best approach possible keeping the best airspeed and the most altitude. Note: Given the ambiguity, stress, and not much time to turn back to the field and thread the needle to land at LGA, one could decide down at about 1000 or 500 feet if the field can be made or landing a tad to the north in the East River. This would be a backup or Plan B. (Maybe the East River is not as deep as the Hudson.)

Back to Sully. One reason he did not go to LGA<sup>5</sup> is because he is in an Airbus. It is my opinion with the protection, laws (normal, alternate, and direct), and the fly-by-wire issues (side stick and all) he was better off with a two or three mile long runway. Then he could focus on the best angle to let the ship contact the water. This is where he gets the credit because it didn't break

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<sup>3</sup> This sounds a lot easier than it is because there are some training issues that take time to see, feel, and accomplish. The training experience will show how to decide to not extend the gear or flaps if the approach is going to be short. Questions of using ground effect to help nurse the last few knots of speed may help and to hold off on the flaps to selectively extend "to get you over the fence."

<sup>4</sup> Sully spends some time talking in his book about Patrick the controller who was a source of help by not asking the fed questions of how many souls on board, fuel remaining, and other (at this time) superfluous questions but realizing the nature of the problem and the severity of not having all day to figure things out.

<sup>5</sup> In his book Sully justifies his reasons for not turning to LGA. He says not being certain he could make the runway would have "catastrophic consequences" and among other things, he said "we didn't know if we'd be able to lower the landing gear and lock it into position" (pp. 221-225).

into, break into parts, or sink. He got the ship down and floated the 75 million dollar airplane down the river. Again, it doesn't matter to him as he did his job. He did it splendidly and, again, no one was hurt. You can cover up a lot of errors in the system for using ditching procedures dated in 1968. You can talk about one engine still running, hull breach in the rear bulkhead, and the silliness of the third Probable Cause "(3) The captain's resulting difficulty maintaining his intended airspeed on final approach due to the task saturation resulting from the emergency situation." If the guy who wrote that had been in the back when it landed he would not have come up with such a riveting [bleeping] remark about as good an aviator as there is...

Back to the simulator. Same song, second verse. This time plug in the weather to something like 500 and 2 and see how well your crew can make a right descending turn to intercept the ILS to runway 22 at LGA. The challenge will be to stay at Green dot speed until you can decide to put the gear down and make the landing, or maybe land on the flaps, or if short when breaking out, turn a bit to the left to miss the ILS and ditch in the water, gear up, and full flaps.

I wonder if the training folks, due to Sully's successful landing are doing much of this in the simulators?

#### Relevant Issues – Just a note...

The question has come up about the cabin floor being breached during the ditching. The argument is that the Airbus A320 was not certified by our rules and regulations and President Carter accepted the French certification in this area. The crash results show the three areas of the main cabin floor. A flight attendant was injured near the aft, center, aisle, jump seat. See the NTSB report pages 30-33 for the impact information. Note the pictures of how the rear bottom of the airplane was destroyed...part of the reason it filled up with water.

The question about the engines, especially the left or number one engine still running, as was commented on in the movie trailer question to Sully. The reports, especially the Airbus (p. 32), NTSB (pp. 33-35), and (see my # 14) *2011 – Air Crash Investigation* video spend time explaining how destroyed the engines were and unable to supply power to get the jet back to LGA. Note they say the engines were not tested, or were required to have been tested, with birds the size of the 10 pound Canadian birds that went through both engines. Some say the engines should have provided thrust from the core even if the fans were damaged. The last problem is about the computer auto-throttle protection under the French engine warranty that will not allow the pilot to over ride; hence, the argument for having an engine (or part of one) – as they had with number one – but couldn't control it.

#### Finally

I have a little heart burn about all this. Aeroplanes are not supposed to be landed in the water and have said, before Sully doing so well, that there were not one in 10,000 airline pilots that would chose to ditch in a river. Just shows how long in tooth this ole round gauge pilot is. So be it. However, let me tell you a story.

Was working with a crew of two flying a two-engine aeroplane working the front course of runway 28 in Portland (has the Columbia River running by the north bank of the aerodrome). In spite of what Sully says in the commercial about no one getting training in loss of all engines low to the ground "...no one has ever trained for an incident like that," well, that's not really true.

This crew, just like everyone else that was in this training, was told they could not land the jet in my simulator with any engines running. All were to be 'dead stick.' One would fail somewhere in the scenario, and the other would fail before the landing. This crew had lost their second engine out on final and were gliding in to land. They also were having trouble extending the landing gear and at about 400 feet, distracted by the gear not coming down, they passed up the perfect approach to land on concrete and announced "we are going to land in the water."

Well, I will tell you I did keep my mouth shut until they crashed in the water and then in my tertiary language asked why. He responded in a very calm and confident manner and said ***"Sully did it."***

#### Epilogue

A note found during the investigation from one of the passengers:

**We were lucky!**

gh

## Appendix

1. The Warner Brothers "Sully" movie trailer - 2:03 minutes  
<https://www.youtube.com/watch?v=mjKEXxO2KNE>
2. Flight 1549 Reconstruction...Ditching Jan 15, 2009 - 7:21 minutes (3D animation, multiple screens)  
[https://www.youtube.com/embed/tE\\_5eiYn0D0#t=109](https://www.youtube.com/embed/tE_5eiYn0D0#t=109)
3. Captain Sullenberger's Moment 6:14 mins. TV interview with Harry Smith and Maggie Rodriguez.  
<https://www.youtube.com/watch?v=7pn5alsFbL8>
4. Cockpit Voice Recorder (CVR) Transcript (excerpt below) <http://www.tailstrike.com/150109.htm>

15:24:54 TWR Cactus fifteen forty nine runway four clear for takeoff.  
 15:24:56.7 RDO-1 Cactus fifteen forty nine clear for takeoff.  
 15:25:06 CAM [sound similar to increase in engine noise/speed]  
 15:25:09 CAM-2 TOGA.  
 15:25:10 HOT-1 TOGA set.  
 15:25:20 HOT-1 eighty.  
 15:25:21 HOT-2 checked.  
 15:25:33 HOT-1 V one, rotate.  
 15:25:38 HOT-1 positive rate.  
 15:25:39 HOT-2 gear up please.  
 15:25:39 HOT-1 gear up.  
 15:25:45 TWR Cactus fifteen forty nine contact New York departure, good day.  
 15:25:48 RDO-1 good day.  
 15:25:49 HOT-2 heading select please.  
 15:25:51.2 RDO-1 Cactus fifteen forty nine, seven hundred, climbing five thousand.  
 15:26:00 DEP Cactus fifteen forty nine New York departure radar contact, climb and maintain one five thousand.  
 15:26:02 CAM [sound similar to decrease in engine noise/speed]  
 15:26:03.9 RDO-1 maintain one five thousand Cactus fifteen forty nine.  
 15:26:07 HOT-1 fifteen.  
 15:26:08 HOT-2 fifteen. climb.  
 15:26:10 HOT-1 climb set.  
 15:26:16 HOT-2 and flaps one please.  
 15:26:17 HOT-1 flaps one.  
 15:26:37 HOT-1 uh what a view of the Hudson today.  
 15:26:42 HOT-2 yeah.  
 15:26:52 HOT-2 flaps up please, after takeoff checklist.  
 15:26:54 HOT-1 flaps up.  
 15:27:07 HOT-1 after takeoff checklist complete.  
 15:27:10.4 HOT-1 birds.  
 15:27:11 HOT-2 whoa.

5. [MOVING ON](#) OCTOBER 14, 2009 What We Can Learn From Sully's Journey  
The Wall Street Journal By [JEFFREY ZASLOW](#) (note: Co-author of Sully)  
<http://www.wsj.com/articles/SB10001424052748703790404574469160016077646>



6. US\_Airways\_Flight\_1549\_Sully\_Skiles\_Hudson\_River\_Miracle\_Apch\_Chart.pdf

This is sort of a spoof of what the approach and landing looks using Jeppesen as a model. Note the names of all the crew members.

7. Raw footage of the water landing – 1.25 minutes.

[https://www.youtube.com/watch?v=IC7gBV\\_jUR0](https://www.youtube.com/watch?v=IC7gBV_jUR0)

8. Miracle of the Hudson Plane Crash (“what really happened”) – 48:26 minutes

<https://www.youtube.com/watch?v=5SL1A2d2e7M>

9. Hudson Crash...Reconstruction from inside the plane – 5:19 minutes (animated view from cockpit)

<https://www.youtube.com/watch?v=BQRuQJoa5IE>

10. US Airways Flight 1549...[Original ATC] - 4:30 minutes (animated view of aircraft)

<https://www.youtube.com/watch?v=E8itHvXd0oM>

11. An EXO Sphere 3D of the airplane being brought up out of the water. There are some other films in this site. - 7:21 minutes. This is a repeat from the EXO site and not the YouTube 2 above.

[http://www.exosphere3d.com/pubwww/pages/project\\_gallery/cactus\\_1549\\_hudson\\_river.html](http://www.exosphere3d.com/pubwww/pages/project_gallery/cactus_1549_hudson_river.html)

12. **PDF file** – Submission of Airbus to the NTSB for US Airways Flight 1549 – Accident Investigation

[http://www.exosphere3d.com/pubwww/pdf/flight\\_1549/ntsb\\_docket/441039.pdf](http://www.exosphere3d.com/pubwww/pdf/flight_1549/ntsb_docket/441039.pdf)

13. **PDF file** – NTSB AAR1003 Accident Report – 213 pages

<http://www.nts.gov/investigations/AccidentReports/Reports/AAR1003.pdf>

14. 2011 – Air Crash Investigation – Hudson Splash Flight 1549 – A National Geographic video Published or shown on Jun 27, 2012. Good review of feds looking at the crew, engines, and 10 pound bird strikes.

<https://www.youtube.com/watch?v=RuxCBYAaZ9M>

15. Recovery of US Airways Flight 1549 from the Hudson – 4:48 minutes, being put on a barge.

[https://www.youtube.com/watch?v=IC7gBV\\_jUR0](https://www.youtube.com/watch?v=IC7gBV_jUR0)

See [Amazon.com](#) for his book noting the newer edition is titled *Sully: My Search for What Really Matters*. A nice easy read. His stories are similar to some people I know. He is a nice guy.