Aviation Investigation Final Report

Location:	Burnham, Maine	**Accident Number:**	ERA13LA314
Date & Time:	July 3, 2013, 16:48 Local	**Registration:**	N888ZW
Aircraft:	Sikorsky 269C	**Aircraft Damage:**	Substantial
Defining Event:	Loss of tail rotor effectiveness	**Injuries:**	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Aerial observation		

Analysis

This report was modified on February 23, 2015. Please see the public docket for this accident to view the original report.

The pilot reported that, during a black bear-tracking flight while flying the helicopter about 50 feet above tree tops at an airspeed of between 10 and 20 knots with a "fairly calm" wind and the engine instruments reading normal, he began a "fading right turn" (that is, a right turn with a sideways component of flight leading into it.) During the turn, the pilot input a "modicum" of left antitorque pedal while slowing. About 2 seconds after initiating the right turn and while the helicopter was about 30 to 40 feet above the trees, the turn escalated into a right (or clockwise) spin about the main rotor axis despite the pilot's left pedal inputs, which is consistent with a sudden loss of tail rotor authority. The helicopter subsequently impacted trees and terrain. The passenger, who had only been flown once previously in a helicopter, reported that the helicopter spun counterclockwise.

Postaccident examinations of the airframe, flight controls, main and tail rotor drive system components, engine, and engine accessories revealed no evidence of preimpact failure or malfunction. Although the pilot and passenger descriptions of the direction of the spin were inconsistent, the lack of any mechanical issue with the helicopter or its engine, the pilot's comment that the engine readings were normal at the start of the turn, and the helicopter's flight condition when the loss of control occurred (operating out of ground effect and turning right at a low airspeed) were consistent with a loss of tail rotor effectiveness during the right turn, resulting in a right (clockwise) spin.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's failure to maintain yaw control while operating out of ground effect at a low airspeed, which resulted in the loss of tail rotor effectiveness, an uncontrolled descent, and an in-flight collision with trees and terrain. Contributing to the accident was the pilot's failure to recognize that the low-altitude maneuvering during the aerial observation flight could lead to a loss of tail rotor effectiveness.

Findings

Aircraft	Directional control - Not attained/maintained
Aircraft	Altitude - Not specified
Personnel issues	Decision making/judgment - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Loss of tail rotor effectiveness (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On July 3, 2013, about 1648 eastern daylight time, a Schweizer 269C, N888ZW, registered to and operated by Point of View Helicopter Services, LLC, collided with terrain near Burnham, Maine. Visual meteorological conditions prevailed at the time and no flight plan was filed for the 14 Code of Federal Regulation (CFR) Part 91 aerial observation bear spotting flight that originated about 1544 from the Waterville Robert LaFleur Airport (WVL), Waterville, Maine. The helicopter sustained substantial damage and the commercial pilot sustained serious injuries while the passenger sustained minor injuries.

The pilot reported that earlier that day he flew the helicopter uneventfully from Auburn/Lewiston Municipal Airport (LEW), Auburn/Lewiston, Maine, to WVL. After landing at KWVL, he disengaged the main rotor but with the engine running fueled the helicopter filling both fuel tanks; he added 13.5 gallons. He did not check the fuel tanks or fuel strainer for contamination, reporting that there was not adequate time for possible contaminants to settle and that he had drained the fuel prior to take off from KLEW. He further reported that he had previously fueled at KWVL and had not had a problem with the fuel from that airport.

Before takeoff from KWVL, the pilot set up the passenger's gear, gave her a safety briefing, and informed her of the operational aspects of the helicopter which included explaining engine instruments and controls. He recalled showing her the needle split, but does not recall doing a check of the magnetos since the engine had been continuously running. The weather in the area included calm wind and high overcast clouds. He departed for a black bear tracking flight, and proceeded to the study area northeast of KWVL. While en-route to the study area, and flying up the Sebasticook River as far as Benton Falls Dam, he showed the passenger a number of bald eagles and eagle nests he regularly monitors in conjunction with the Maine Dept. of Inland Fisheries and Wildlife, and then began tracking the bears.

They first started high between 1,000 and 2,000 feet performing a grid search until receiving radio collar signals, then when homing in on bears, began descending (they were using 2 different antennas). While flying about 50 feet above the tops of trees at an airspeed between 10 and 20 knots, with a wind "fairly calm", or no more than1 to 3 knots, with the engine instruments reading normal, he began a "fading right turn" (a right turn with a sideways component of flight leading into it) with a "modicum" of left anti-torque pedal input while slowing.

He reported that perhaps 2 seconds from initiation of the right turn (with the helicopter approximately 30-40 feet above the trees), the turn escalated in the same direction into a spin (despite left pedal) about the main rotor axis consistent with sudden loss of tail rotor authority. As the out of control spin began and helicopter descended, his passenger asked "what's going on?" to which he replied "I don't know" before pulling up on the collective to ease their imminent contact with the trees (approximately 40 feet in height). Because the flight was so low he could not lower collective (increasing his rate of descent),

apply forward cyclic and accelerate out of any possible disturbed air. He does not know how many turns were completed but the helicopter was in the trees within about 2 seconds of the time from spin initiation, or the time it took for his passenger to ask her question and for his response.

He blacked out upon entering the trees, and believes he was unconscious for 40 minutes; the passenger helped him from the helicopter then helped stabilize him. Their phone/radio communications were inoperative, and at his instruction the passenger got the survival bag out of the helicopter. The next time reference he had by his watch was the passenger leaving to get help about 1800. She walked to get help flagging down a passing motorist. He estimated it was 45 minutes to 1 hour before 1st responders arrived. He was placed on a litter and walked out of the site, and was transported to a hospital for treatment of his injuries.

The passenger reported that while flying straight but descending over trees using audio equipment to track a bear equipped with a radio transmitter, she heard a sound from the helicopter unlike she had heard since takeoff. The helicopter began turning counterclockwise (contrary to the pilot statement of turning clockwise), and she asked the pilot what had occurred and he said he did not know. The helicopter descended through trees and impacted the ground. After a period of time she came to and was aware of her location. She noticed fuel leaking and heard a buzzing sound and helped the pilot out and away from the helicopter. She then walked to a road and summoned the assistance of a passing motorist.

Following recovery of the helicopter, inspection of the airframe and engine by representatives of the airframe and engine manufacturer was performed with oversight from a Federal Aviation Administration (FAA) Aviation Safety Inspector (ASI). The examination of the airframe, flight controls, and drive system components revealed no evidence of preimpact failure or malfunction. Inspection of the fuel strainer which contained fuel revealed no evidence of contamination. The on-board Electronics International MUX-8A was retained and sent to the NTSB Vehicle Recorders Laboratory for read-out. A copy of the report from the airframe manufacturer representative and FAA concurring statement are contained in the NTSB public docket.

Inspection of the engine revealed no evidence of preimpact failure or malfunction. The magnetos, servo fuel injector, fuel injector nozzles and lines were removed and operationally tested at a FAA certified repair stations with no evidence of preimpact failure or malfunction. A copy of the statement from the FAA inspector-in-charge concerning the engine examination, and the NTSB engine accessories report are contained in the NTSB public docket.

According to the NTSB Recording Device Specialist's Factual Report, the MUX-8A was downloaded and found to have recorded and retained data in 1 minute increments consisting of 157 data points associated with the accident flight. The recorded data points included date, time (device calculated), cylinder head temperature (CHT), and exhaust gas temperature (EGT). The downloaded data indicates that after the estimated takeoff time, the EGT's remained above 1,350 for the remainder of the recording, and the CHT values fluctuate between about 290 and 330 degrees Fahrenheit until about 1632, then begin to increase until the end of the recording. A copy of the NTSB Recording Device Report and downloaded data is contained in the NTSB public docket.

FAA Advisory Circular (AC) 90-95 titled Unanticipated Right Yaw in Helicopters, indicates in part that unanticipated right yaw, or loss of tail rotor effectiveness (LTE) is a critical, low speed aerodynamic flight characteristic which can result in an uncommanded rapid yaw rate which does not subside of its

own accord and, if not corrected, can result in loss of aircraft control. The AC also indicates that there is greater susceptibility for LTE in right turns, which is especially true during flight at low airspeed since the pilot may not be able to stop the rotation, which will be a yaw to the right. The AC indicates that the recommended recovery technique is to apply full left pedal and simultaneously move the cyclic full forward to increase speed, and if altitude permits, reduce power.

Pilot Information

Certificate:	Commercial; Private	**Age:**	58
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	March 22, 2013
Occupational Pilot:		**Last Flight Review or Equivalent:**	March 15, 2012
Flight Time:	1165 hours (Total, all aircraft), 419 hours (Total, this make and model), 1024 hours (Pilot In Command, all aircraft), 27 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 1.5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Sikorsky	**Registration:**	N888ZW
Model/Series:	269C	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	S1497
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:	May 30, 2013 Annual	**Certified Max Gross Wt.:**	2050 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2233 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	C126 installed, activated, aided in locating accident	**Engine Model/Series:**	HIO-360-D1A
Registered Owner:	POINT OF VIEW HELICOPTER SERVICES LLC	**Rated Power:**	190 Horsepower
Operator:	POINT OF VIEW HELICOPTER SERVICES LLC	**Operating Certificate(s) Held:**	Rotorcraft external load (133)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	WVL,333 ft msl	**Distance from Accident Site:**	14 Nautical Miles
Observation Time:	16:55 Local	**Direction from Accident Site:**	233°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.07 inches Hg	**Temperature/Dew Point:**	26°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Waterville, ME (WVL)	**Type of Flight Plan Filed:**	None
Destination:	Waterville, ME (WVL)	**Type of Clearance:**	None
Departure Time:	15:44 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 1 Minor	**Latitude, Longitude:**	44.672779,-69.408058

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Mark Auclair; FAA/FSDO; Portland, ME John Butler; Lycoming Engines; Williamsport Steve Gleason; Sikorsky Aircraft Corporation; Stratford, CT
Original Publish Date:	August 7, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=87387