Aviation Investigation Final Report

Location:	Weed, California	**Accident Number:**	WPR21LA268
Date & Time:	July 7, 2021, 16:45 Local	**Registration:**	N911KW
Aircraft:	Bell 212HP	**Aircraft Damage:**	Substantial
Defining Event:	External load event (Rotorcraft)	**Injuries:**	1 None
Flight Conducted Under:	Part 133: Rotorcraft ext. load		

Analysis

The flight was on an approach to a lake to retrieve water for a water bucket drop operation. During the approach, the instruments scanned normal, and the radar altimeter was set to 200 ft above ground level to provide a buffer between the bucket and terrain. When the helicopter crossed the shoreline, the pilot visually confirmed that the 100-ft long line and bucket were slightly trailing the helicopter and had not dipped in the water. Shortly afterward, he felt a "sudden onset of a significant vibration." The pilot aborted the water retrieval and noticed that helicopter lost altitude. He applied forward cyclic and raised the collective, but the helicopter continued to descend. The pilot realized that he would not be able to fly out of the descent, so he decided to make a forced water landing. The pilot did not jettison the long line and bucket. After he leveled the helicopter and the skids touched down on the water, he made another attempt to take off, but the helicopter settled into the lake. The pilot reduced both throttle settings to idle in preparation to ditch the helicopter and applied right cyclic as the main rotors slowed. The helicopter rolled right, and the main rotor blades struck the water, which resulted in substantial damage to the fuselage, rotor, and drive systems.

Postaccident examination of the engine revealed no preimpact mechanical anomalies. The airframe examination revealed an out-of-tolerance condition of both pylon damper rod end bearings that likely caused the vibration reported by the pilot. It is likely that, after the lateral vibration, the pilot allowed the helicopter to descend while he tried to determine the source of the vibration. As the helicopter settled into the lake, the bucket filled with water. The resulting increased weight, combined with the pilot's failure to release the water bucket, decreased the helicopter's out-of-ground-effect performance.

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 altitude during an approach to a lake. Contributing to the accident was the pilot's failure to release the full water bucket as the helicopter was settling, which reduced the helicopter's out-of-ground-effect performance.

Findings

Aircraft	Altitude - Not attained/maintained
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Lack of action - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	External load event (Rotorcraft) (Defining event)
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)

On July 7, 2021, about 1450 Pacific daylight time, a Bell 212 helicopter, N911KW, was substantially damaged when it was involved in an accident near Weed, California. The pilot was not injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 133 external load flight.

The pilot reported that he was supporting a US Forest Service contract involving water drop operations and that the accident flight was on approach to a lake to retrieve water using a 100-ft long line and bucket. When the helicopter was about 400 ft above ground level (agl), the pilot performed an instrument scan and noted no anomalies. The pilot added that the radar altimeter was set to 200 ft agl at the time. When the helicopter crossed the shoreline, the pilot observed that the long line and bucket were “not yet in view and still out behind [him].” Shortly afterward, he felt a “sudden onset of a significant vibration,” which he also described as once-per-minute rotation. (An inspector with the US Forest Service explained that the term “indicates an imbalance in main rotor head or main rotor blades.) The pilot scanned the instrument panel and saw no annunciator lights or indications that the engines had stopped producing power. He then glanced outside and realized that the helicopter had descended.

The pilot aborted the water retrieval, made a forward cyclic input, and raised the collective, but the helicopter continued to descend. The pilot determined that he would be unable to stop the descent, and he did not want the engines or transmission to overspeed, so he performed a forced landing on water. After he leveled the helicopter and the skids touched down on the water, the pilot made a last attempt to take off, which was unsuccessful. The pilot reduced both throttle settings to idle in preparation to ditch the helicopter and applied right cyclic as the main rotors slowed. The pilot stated that the helicopter controls responded normally and that the helicopter did not yaw significantly. The helicopter rolled right, causing the main rotor blades to strike the water, and the helicopter subsequently sank into the lake.

Automatic dependent surveillance-broadcast data showed that the bucket was about 35 ft above the water when the last data point was recorded. At that time, the helicopter's descent rate was about 768 ft per minute. The pilot did not jettison the long line and bucket because he thought that he would be able to fly away. The helicopter sustained substantial damage to the fuselage, main and tail rotor blades, and drive systems.

Training records showed that the pilot completed six recurrent long-line training flights from May 3 to 29, 2021. On May 31, 2021, the pilot completed a helicopter pilot evaluation checkride with a US Forest Service pilot inspector and was cleared for solo external-load water bucket operations.

The 240-gallon water bucket was configured to gather 90% of its total capacity, which would add an additional weight of about 1,966 pounds to the helicopter and increase its 8,150-pound gross weight to about 10,116 pounds. The bucket was recovered attached to the helicopter by a cargo hook and the long line. Postaccident examination of the bucket and engine powerpack revealed no preimpact mechanical malfunctions or failures that would have precluded normal operations.

The pylon corner mounts and pylon dampers were hydraulically tested with dynamic loads and exhibited normal operational performance. The rod end bearings for the pylon dampers had tolerances that were more than the *Bell 212 Maintenance Repair and Overhaul Manual* tolerance of 0.004-inch radial play: the right aft damper bearing play was 0.006 inch, and the left aft damper bearing play was 0.016 inch. According to Bell Textron, the excessive radial clearance of rod end bearings reduces the amount of damper stroking to counteract vibratory motion of the pylon. Also, a flight crew in a separate event experienced a vibration that was traced back to excessive radial wear of the pylon damper rod end bearings. The helicopter's hover out of ground effect (OGE) performance was computed using the helicopter operator's *Rotorcraft External Load Manual*, which included a performance chart from Bell Helicopter's BHT-212-MD-1 manual. According to the performance chart, at an air temperature of 35°C, heater OFF, engine rpm at 100%, skid height of 50 ft, a 15-knot headwind, and generator values of 150 amperes, the helicopter had an OGE takeoff power gross weight limitation of about 10,250 pounds. According to the *Bell 212 Rotorcraft Flight Manual: Supplement Cargo Hook*, at a helicopter gross weight of 8,150 pounds, an air temperature of 35°C, heater OFF, engine rpm at 100%, skid height of 60 ft, and generator values of 150 amperes, the helicopter had an OGE takeoff power limitation at a pressure altitude of about 8,000 ft and a maximum continuous power setting limitation at a pressure altitude of about 6,600 ft. The Bell Helicopters manual also showed that, at a gross weight of about 10, 116 pounds, the helicopter had an OGE takeoff power limitation at a pressure altitude of about 3,700 ft and a maximum continuous power setting limitation of 9,300 pounds.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	35,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Lap only
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	
Medical Certification:	Class 1 None	**Last FAA Medical Exam:**	December 3, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 5, 2021
Flight Time:	4636 hours (Total, all aircraft), 239 hours (Total, this make and model), 4407 hours (Pilot In Command, all aircraft), 19 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N911KW
Model/Series:	212HP	**Aircraft Category:**	Helicopter
Year of Manufacture:	1973	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	30592
Landing Gear Type:	None; Skid	**Seats:**	11
Date/Type of Last Inspection:	June 29, 2021 Continuous airworthiness	**Certified Max Gross Wt.:**	11200 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo shaft
Airframe Total Time:	14543.5 Hrs as of last inspection	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	PT6T-3B
Registered Owner:	ROGERS HELICOPTERS INC	**Rated Power:**	
Operator:	ROGERS HELICOPTERS INC	**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:	KSIY,2651 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	345°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	15 knots / 20 knots	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	34°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Dunsmuir, CA (1O6)	**Type of Flight Plan Filed:**	None
Destination:	Dunsmuir, CA (1O6)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	41.537,-122.378(est)

Administrative Information

Investigator In Charge (IIC):	Nepomuceno, Eleazar
Additional Participating Persons:	Michael Lenard; FAA; Sacramento, CA Gary Howe; Bell Helicopters Inc; Fort Worth, TX Mark Stutzner; Bell Helicopters Inc; Fort Worth, TX Nora Vallee; TSB André Doyon; Pratt & Whitney Eric Shambora; USFS; Sacramento, CA
Original Publish Date:	June 28, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=103465