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- fostering safety awareness, knowledge and action.

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ATSB TRANSPORT SAFETY REPORT  
Aviation Occurrence Investigation AO-2011-051  
Final

# Controlled flight into water, VH-RUR

## Lilli Pilli, New South Wales

### 24 April 2011

#### Abstract

On 24 April 2011, at about 1816 Eastern Standard Time, a Robinson Helicopter Co R44, registered VH-RUR, with a pilot and one passenger on board, collided with the sea off the northern headland of Lilli Pilli Bay, New South Wales.

The helicopter was being flown after last light and was on approach to a helicopter landing site when the accident occurred. The pilot was not approved, nor was the helicopter equipped, to fly at night.

The occupants escaped from the helicopter after the impact with the water. A witness to the accident assisted the pilot onto nearby rocks but the passenger was fatally injured.

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of aviation operations. However, the accident does provide a timely reminder of the importance of appropriate flight planning and informed in-flight decision making.

#### FACTUAL INFORMATION

The pilot reported that, at about 1705 Eastern Standard Time<sup>1</sup> on 24 April 2011, he departed Nerrigundah, New South Wales (NSW) in a Robinson Helicopter Co R44, registered VH-RUR (RUR). The pilot and one passenger were on board

for the private, visual flight rules (VFR)<sup>2</sup> flight to a property near Berry, NSW (Figure 1). The estimated flight time was 51 minutes and the flight had been delayed before takeoff by about 20 minutes.

Contrary to the requirements of the Aeronautical Information Publication (AIP) ENR 1.10 *Flight Planning*, paragraph 1.1, the pilot did not obtain a briefing for the flight. If obtained, that briefing would have provided him with information on the en route weather and the time of the end of daylight<sup>3</sup>. The pilot reported that his knowledge of the time of the end of daylight was based on his observations from recent days.

The pilot broadcast his position on the Moruya Airport Common Traffic Advisory Frequency<sup>4</sup> when passing abeam the airport at about 1724.

The end of daylight on 24 April for the property near Berry was 1750, according to a commonly-used calculator on the Geoscience Australia website.<sup>5</sup> The aircraft was about

1 Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

2 Visual flight rules (VFR) are a set of regulations that allow a pilot to operate an aircraft in weather conditions generally clear enough to allow the pilot to see where the aircraft is going. Extra rules and requirements apply to VFR flight at night, compared with daytime operations.

3 End of daylight for flight purposes means the end of civil twilight, when the centre of the sun passes 6° below the horizon.

4 Common Traffic Advisory Frequency, the name given to the radio frequency used for aircraft-to-aircraft communication at aerodromes without a control tower.

5 Available at [www.ga.gov.au](http://www.ga.gov.au).

20 minutes flight time from the property near Berry at that time.

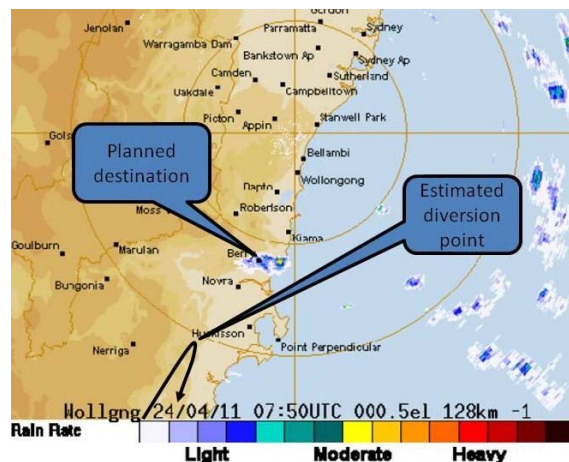
Figure 1: Flightpath<sup>6</sup>



At about 1753, when the helicopter was about 10 NM (19 km) north of Ulladulla (Figure 1), the pilot observed what he described at interview as cloud, moderate rain and low visibility between him and the destination. The pilot decided that the weather conditions ahead were unsuitable to continue the remaining 20 NM (37 km) to Berry under the VFR and initiated a turn back to maintain visual meteorological conditions. Based on that position and time, the estimated groundspeed for the flight was about 100 kts.

Aviation meteorological information, including a number of radar images of the Berry area around the estimated time of arrival at Berry, was provided by the Bureau of Meteorology. The radar image that was captured for 1750 (0750 UTC) showed low-to-moderate rainfall in the Berry area at that time (Figure 2).

Figure 2: 1750 weather radar image<sup>7</sup>



The pilot decided to divert to a private helicopter landing site (HLS) at Malua Bay, NSW (Figures 1 and 3). That decision was reported as being influenced by the limited mobility of the passenger, the fact that any earlier landing would be in unfamiliar terrain, and the pilot's familiarity with the HLS.

The pilot reported that, on approach to the HLS from the north, he descended to what he believed to be 100 ft, and approached the landing site at a reduced airspeed. The approach was conducted over water and in darkness.

6 Courtesy of Google Earth.

7 Courtesy of Bureau of Meteorology.

Figure 3: Malua Bay HLS and accident location<sup>6</sup>



The helicopter collided with the sea near rocks off the northern headland of Lilli Pilli Bay, about 1 km north of the landing site (Figure 3). A witness who observed the collision reported immediately contacting the police on emergency 000. The relevant police operational log recorded advice of the accident at 1817.

The pilot reported that both occupants exited the helicopter before it sank and that he assisted the passenger towards shore. A witness to the accident assisted the pilot onto nearby rocks but the passenger was fatally injured. The pilot was subsequently recovered from the rocks by a rescue helicopter with minor injuries.

### Pilot information

The pilot obtained a Private Pilot (Helicopter) Licence in 2004 and had accrued 1,500 hours total aeronautical experience in helicopters. Of those, 980 hours were in RUR. That included 150 hours in the past year, and frequent flights on the same route as the accident flight. The pilot

was qualified to fly helicopters under the VFR by day.

The pilot did not have sight in one eye. He had a current medical certificate, with a condition for the carriage of vision correction for close vision.

No abnormal events were identified in the 72 hours before the accident that may have affected the pilot's performance.

### Helicopter information

The pilot purchased the helicopter new in 2006 and it had flown 987.5 hours since that time.

The helicopter was equipped and approved for operation under the VFR by day and the pilot reported that the helicopter was operating normally before the accident.

### Weather and lighting information

Witness reports indicated that there was no visible moon, and that there was overcast cloud at the accident site shortly after the accident. Some reflected light from a nearby town was reported, but the accident site was near a less built-up area with little visible direct lighting. Cliffs and woodland on top of the cliffs adjacent to the accident site further reduced the potential for reflected urban lighting at the accident site.

The Aeronautical Information Publication (AIP) ENR 1.10 *Flight planning*, paragraph 1.1 stated that a pilot in command of a flight away from the vicinity of an aerodrome must:

...study all available information appropriate to the operation

and make a careful study of:

...current weather reports and forecasts<sup>[8]</sup> for the route to be flown and the aerodromes to be used.

Paragraph 1.2.6 of ENR 1.10 stated that:

When a flight is delayed so that the meteorological and operational information does not cover the period of flight, updates must be obtained as necessary, to allow the flight to conclude safely.

<sup>8</sup> A forecast comprised either a flight forecast or alternately, an area forecast and aerodrome forecast (TAF) for the destination.

The pilot did not obtain flight or area forecasts or knowledge of the time of the end of daylight before the flight. However, the pilot reported obtaining:

...a relevant briefing on regional weather suitable for his intended VFR Helicopter flight. In particular, he had on hand a three day forecast and reviewed weather by watching regional TV shortly prior to the flight.

In terms of his flight and the planned altitude, the pilot indicated that the weather reported on TV, and seen during a return drive to Batemans Bay that day, 'was no different from that which would have been obtained from a formal briefing,...'.

Aviation weather information that was available before and during the flight indicated that there would be low cloud and isolated rain showers along the planned flightpath. In particular, the aerodrome forecast for Nowra Airport, which was the closest aerodrome to the property near Berry, predicted intermittent<sup>9</sup> periods of showers, visibility 5,000 m and Broken<sup>10</sup> cloud with a base of 1,000 ft. The wind was forecast light and variable at the pilot's cruising altitude.

AIP ENR 1.2 *Visual flight rules*, paragraph 1.1.2 stated that a flight operating under day VFR rules must not depart from an aerodrome after last light, or if the estimated time of arrival at the destination was less than 10 minutes before last light after allowing for any required holding periods. A pilot may obtain information on the end of daylight by request on radio during a flight.

Later, a representative of the pilot reported having calculated the end of daylight as 1756 that day. The representative's calculation was made using the Visual Flight Guide (VFG)<sup>11</sup>, which was reported to be 'the chart available to [the pilot] to refer to.'

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9 An intermittent deterioration in the forecast weather conditions, during which a significant variation in prevailing conditions is expected to last for periods of less than 30 minutes duration.

10 Cloud cover is normally reported using expressions that denote the extent of the cover. The expression Broken indicates that more than half to almost all the sky was covered.

11 Available at [http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD:pc=PC\\_90008](http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD:pc=PC_90008)

## Wreckage information

The helicopter was recovered by the NSW Police Force. The damage to the helicopter was consistent with the helicopter descending into the sea with a low forward speed and a low rate of descent, in a level flying attitude.

No evidence was identified of any defect that might have contributed to the accident.

An observer on a nearby cliff reported that the helicopter was moving forward and descending slowly before it descended into the sea in a 'normal' flying attitude.

## Survival aspects

The planned route from Nerrigundah to Berry did not fly over water and therefore did not require the occupants of the helicopter to have life jackets available.

The final approach to the HLS required the pilot to fly over water. Civil Aviation Order (CAO) 20.11 paragraph 5.1.1 stated that:

Aircraft shall be equipped with 1 life jacket for each occupant when the aircraft is over water and at a distance from land:

- (a) in the case of a single engine aircraft - greater than that which would allow the aircraft to reach land with the engine inoperative...

Note 2 ...the provisions of this paragraph need not apply to land aircraft departing from or landing at an aerodrome in accordance with a normal navigational procedure for departing from or landing at that aerodrome.

Paragraph 5.1.7 of the CAO stated that:

Where life jackets are required to be carried in accordance with subparagraph 5.1.1 (a) each occupant shall wear a life jacket during flight over water. However, occupants of aeroplanes need not wear life jackets during flight above 2 000 feet above the water.

Life jackets were not carried in the helicopter.

## Additional information

### *Risks associated with night flying*

The helicopter manufacturer issued a safety notice in November 1999 that highlighted the risks associated with night flying. Safety notice SN-26 *Night Flight Plus Bad Weather Can Be Deadly* stated:

Many fatal accidents have occurred at night when the pilot attempted to fly in marginal weather after dark. The fatal accident rate during night flight is many times higher than during daylight hours.

When it is dark, the pilot cannot see wires or the bottom of clouds, nor low hanging scud or fog. Even when he does see it, he is unable to judge its altitude because there is no horizon for reference. He doesn't realize it is there until he has actually flown into it and suddenly loses his outside visual references and his ability to control the attitude of the helicopter. As helicopters are not inherently stable and have very high roll rates, the aircraft will quickly go out of control, resulting in a high velocity crash which is usually fatal.

Be sure you NEVER fly at night unless you have clear weather with unlimited or very high ceilings and plenty of celestial or ground lights for reference.

### *Depth perception*

The ability to perceive depth is fundamental to many aspects of flying.

Human depth perception is the result of both binocular and monocular depth cues. Binocular depth cues require visual input from both eyes, while monocular depth cues can be processed using information from only one eye. However, monocular cues are dominant even for depth judgments within a few meters, and are completely sufficient for all normal phases of flight<sup>12</sup>.

The Designated Aviation Medical Examiner's Handbook permits the issue of a medical certificate to pilots with monocular vision, subject

to conditions. Those conditions would not have affected the pilot's permission to conduct this flight.

## ANALYSIS

The application of the estimated groundspeed from Moruya to the position north of Ulladulla to the initial portion of the flight meant that the departure from Nerrigundah was likely closer to 1713. In that case, a direct flight to Berry would have been completed about 14 minutes after the end of daylight. However, there was a requirement for the flight to reach its destination 10 minutes before the end of daylight to avoid the increased risks for a flight that was not equipped to operate safely in darkness.

The pilot did not obtain an accurate time for the end of daylight. A more accurate understanding by the pilot of the actual time of the end of daylight might have more appropriately influenced the pilot to land before dark.

The initiation of a diversion by the pilot to a more distant location, instead of conducting a precautionary landing shortly before the end of daylight, constrained him to flying in conditions for which he was not qualified, and the helicopter was not equipped. The overwater approach to the helicopter landing site, and the helicopter's inability to reach land until late in the approach, increased the risk of a ditching should a critical failure occur. Wearing life jackets would have reduced the risks associated with a ditching, or with a collision with water, but they were not carried on the aircraft.

Ultimately, the helicopter collided with the sea 25 minutes after the end of daylight.

The pilot had an incorrect understanding of the helicopter's height as a result of flying over dark water, with few ambient lights visible to help judge height as the pilot approached the landing site. That would explain the pilot's lack of awareness of the proximity of the sea surface until the helicopter hit the water.

No evidence was found to indicate that the pilot's vision would have adversely affected his ability to conduct the flight.

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of aviation

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12 Gibb R, Gray R, and Scharff L (2010). *Aviation Visual Perception: Research, Misperception and Mishaps*. Ashgate: Farnham, UK.

operations. However, the accident does provide a timely reminder of the importance of appropriate flight planning and informed in-flight decision making.

Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26(1)(a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

## FINDINGS

### Context

From the evidence available, the following findings are made with respect to the controlled flight into the water at Lilli Pilli, New South Wales on 24 April 2011 involving Robinson Helicopter Co R44, registered VH-RUR, and should not be read as apportioning blame or liability to any particular organisation or individual.

A draft of this report was provided to the pilot and CASA. Submissions were received from CASA and the pilot. Those submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

### Contributing safety factors

- The flight was commenced with insufficient daylight remaining to complete the planned flight under the day visual flight rules.
- The pilot did not obtain end of daylight information that would have indicated that the planned flight could not be completed in the remaining available daylight.
- The action by the pilot to not land as darkness approached constrained him to flying in night conditions for which he was not qualified, and the helicopter was not equipped.
- The pilot had no visual reference with the sea surface immediately before the helicopter descended into the water.

### Other safety factors

- Life jackets were not available for the overwater approach, increasing risk in the case of a ditching or collision with the water.

### Sources of Information

The main sources of information during the investigation included:

- the pilot in command
- a number of witnesses
- the Civil Aviation Safety Authority (CASA).

### Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003* (the Act), the Australian Transport Safety