Australian Government
Australian Transport Safety Bureau

Collision with water involving Cessna 182, VH-WNR

6 km north-west of Moreton Island, Queensland, on 22 January 2020

ATSB Transport Safety Report
Aviation Occurrence Investigation (Defined)
AO-2020-006
Final – 10 February 2022

Cover photo: Aircraft operator

Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Publishing information

Published by: Australian Transport Safety Bureau
Postal address: PO Box 967, Civic Square ACT 2608
Office: 12 Moore Street, Canberra, ACT 2601
Telephone: 1800 020 616, from overseas +61 2 6257 2463
Accident and incident notification: 1800 011 034 (24 hours)
Email: atsbinfo@atsb.gov.au
Website: www.atsb.gov.au

Addendum

Page	Change	Date

Safety summary

What happened

On 22 January 2020, a Cessna 182Q, registered VH-WNR, took off from Caloundra Aerodrome, Queensland. The pilot was conducting a private sightseeing flight with one passenger on board. At 1624, the aircraft passed the northern tip of Moreton Island at about 1,200 ft in a shallow descent towards nearby Flinders Reef.

The aircraft's descent rate began to increase with no significant changes to direction or speed. At 1626:26, the pilot made a MAYDAY call identifying the aircraft but not its position or nature of the emergency. At this time, the aircraft was east of Flinders Reef and descending at about 1,400 ft/min through 300 ft with a groundspeed of about 115 kt. The aircraft continued north-east for 15–20 seconds after the MAYDAY call before colliding with water.

On 29 January 2020, the aircraft was located on the ocean floor to the north-east of Flinders Reef, about 45 m from the estimated point of impact with water. The pilot and passenger were not located.

What the ATSB found

The nature of any in-flight emergency or abnormal situation, and any effect it had on the pilot's ability to control and configure the aircraft for ditching, could not be established.

ATSB analysis found that the engine's power was reducing over the last part of the flight, over a period of about 100 seconds. At the time of the accident, the weather conditions were conducive to carburettor icing. These conditions are common in the region. However, a conclusion regarding the possible influence of carburettor icing on the development of the accident could not be drawn with any certainty.

The ATSB also found that the pilot had descended over water beyond the glide range of a suitable landing area twice on a previous flight, limiting the options for a forced landing in the event of an emergency.

Safety message

Although it could not be determined whether the aircraft's descent out of glide range was intentional, pilots are reminded that the operation of single engine aircraft over water should at all times be conducted with consideration of the aircraft's glide distance to a suitable landing area.

Contents

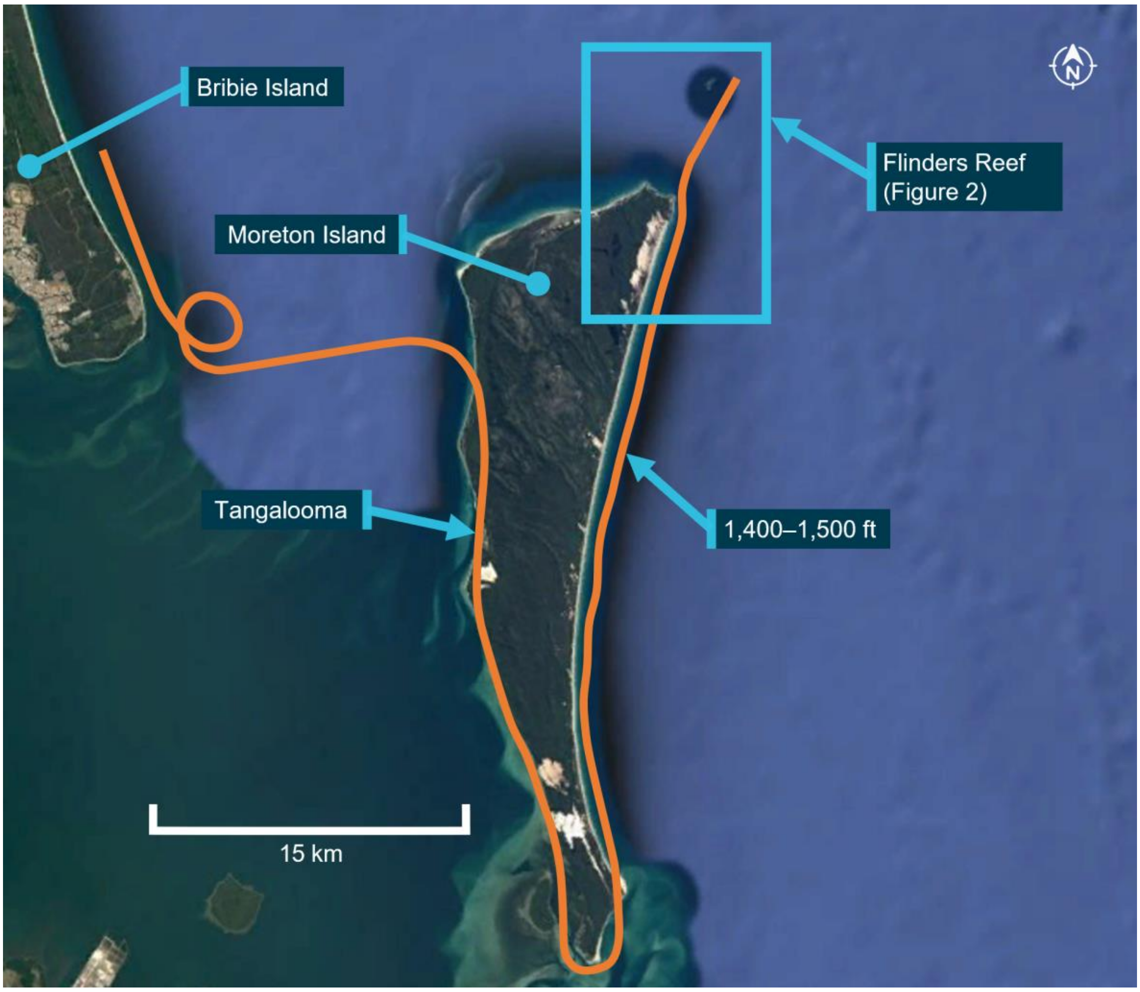
The occurrence

On 22 January 2020, at about 1530 Australian Eastern Standard Time,[1] a Cessna 182Q, registered VH-WNR, took off from Caloundra Aerodrome, Queensland. The pilot was conducting a private sightseeing flight with one passenger on board. The flight was being conducted under visual flight rules (VFR).[2] Weather observations and the short-term forecasts for the area indicated that good visual flying conditions existed at the time of the flight.

The aircraft flew south to the VFR route[3] at Bribie Island, climbing to transit at 3,500 ft to Moreton Island. At 1606, the pilot reported on the Brisbane Centre air traffic control (ATC) frequency that the aircraft's position was overhead Tangalooma at 2,500 ft. The pilot broadcast their intention to track south to the southern end of Moreton Island and then north up the eastern side of the island.

Recorded radar data at 5-second intervals indicated that, from about 1613, the aircraft flew north along Moreton Island's eastern coastline at 1,400–1,500 ft above mean sea level with a groundspeed of 100–110 kt (Figure 1). The wind was about 19 kt from the north-north-east, meaning the aircraft's airspeed would have been about 120–130 kt.

Figure 1: Flight path of VH-WNR on the accident flight

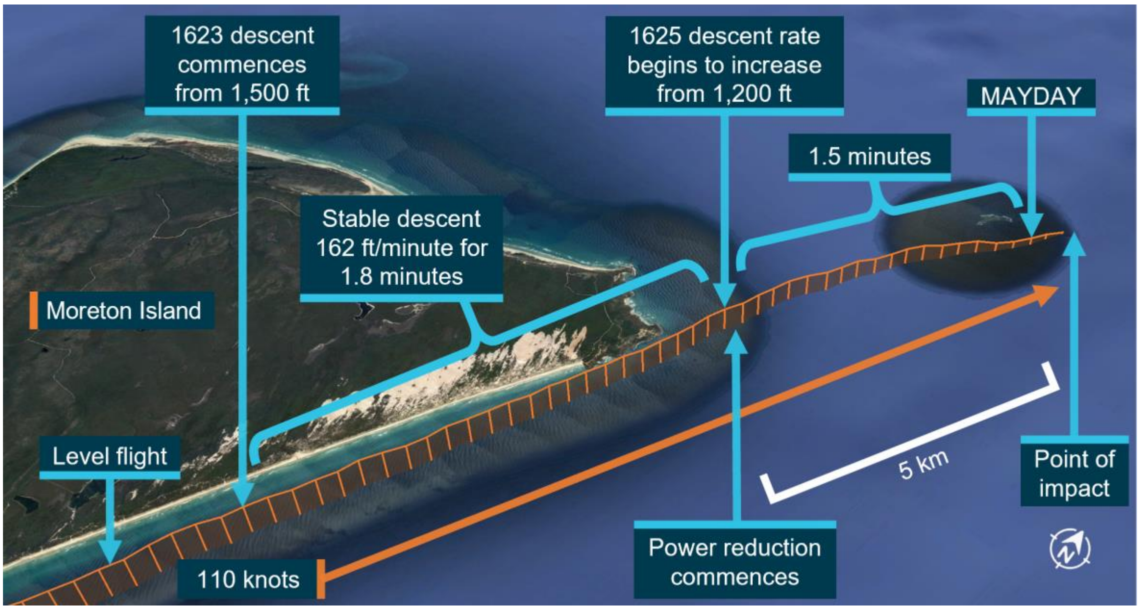


Source: Google Earth, modified by the ATSB

1 Australian Eastern Standard Time (AEST) is Coordinated Universal Time (UTC) + 10 hours.
2 Visual flight rules (VFR): a set of regulations that permit a pilot to operate an aircraft only in weather conditions generally clear enough to allow the pilot to see where the aircraft is going.
3 VFR routes are transit lanes for aircraft operating under VFR.

At 1623, the aircraft commenced a shallow descent (about 162 ft/min) from 1,500 ft. At 1625, the aircraft passed Cape Moreton at the northern tip of the island at about 1,300 ft and continued north-east towards Flinders Reef, at a similar airspeed and descent rate (Figure 2).

Figure 2: Flight path of VH-WNR, near Flinders Reef



Source: Google Earth, modified by the ATSB

At 1625:09, the aircraft passed through an altitude of 1,200 ft and the descent rate began to increase with a concurrent reduction in engine power. At 1626:26, the pilot made a MAYDAY[4] call on the Brisbane Centre ATC frequency, identifying the aircraft's callsign but not its position or the nature of the emergency. At this time, the aircraft was east of Flinders Reef and descending at about 1,400 ft/min through 300 ft with a groundspeed of about 115 kt. The air traffic controller attempted to establish contact with the pilot; however, no further transmissions from the aircraft were received.

The aircraft's transponder continued to transmit. Analysis of the recorded radar data indicated that the aircraft continued north-east for 15–20 seconds, while still descending, after the MAYDAY call. There were no witnesses.

An aerial and marine search was immediately initiated. The aircraft was located on the ocean floor on 29 January 2020, north-east of Flinders Reef (Figure 2). The pilot and passenger were not located.

[4] MAYDAY: an internationally recognised radio call announcing a distress condition where an aircraft or its occupants are being threatened by serious and/or imminent danger and the flight crew require immediate assistance.

Context

Pilot information

The pilot was reported to have flown aircraft overseas and in Australia decades earlier. Logbook records showed that the pilot had an extended break from flying and resumed in late 2019. After conducting 13.5 hours of flight training, the pilot was issued a Civil Aviation Safety Regulation Part 61 Private Pilot (Aeroplane) Licence on 17 October 2019 with a class rating for single engine aeroplanes.

The pilot held a Class 2 Aviation Medical Certificate that was issued on 17 October 2019 and valid until 17 October 2021, with a condition requiring reading correction be available when exercising the privileges of the licence. A review of the pilot's medical records and interview with a close family member identified no significant medical conditions.

The pilot's logbook records showed about 1,700 hours total aeronautical experience and previous night VFR[5] and instrument flight rules[6] experience. The pilot was also reported to have significant experience on the Cessna 182 type and had flown VH-WNR 6 times over the previous fortnight, including around Moreton Island (see also *Previous flights in VH-WNR*). Prior to the accident flight, the pilot's last logged flight was on 19 January 2020.

Aircraft information

General

The Cessna 182Q is a high-wing, all-metal, unpressurised aircraft with a fixed landing gear. The accident aircraft had a single, Continental O-470-U reciprocating piston engine driving a constant-speed propeller. The engine ignition system comprised two magnetos that provided a self-generated charge to the engine spark plugs and was independent of the aircraft electrical system.

An engine driven alternator supplied electrical power to aircraft systems. The alternator was also used to charge the battery and was controlled by a voltage regulator. A battery supplied power for engine starting, and was a reserve source of power in the event of alternator failure.

VH-WNR (Figure 3) was manufactured in 1978 and was first registered in Australia in the same year. The aircraft was privately hired by the pilot for the flight.

---

5 Night VFR: flight at night that meets the visibility requirements for VFR operations.

6 Instrument flight rules: a set of regulations that permit the pilot to operate an aircraft to operate in instrument meteorological conditions, which have much lower weather minimums than VFR. Procedures and training are significantly more complex as a pilot must demonstrate competency in instrument meteorological conditions while controlling the aircraft solely by reference to instruments.

Figure 3: VH-WNR in 2019

Source: Aircraft operator

Maintenance history

At the time of the accident, VH-WNR had about 3,318 hours total time in service, and had flown about 73 hours since the previous periodic inspection (100 hourly), which was conducted on 21 August 2019. The engine was installed new in December 2013 and had accumulated about 742 hours time in service.

During a flight on 19 January 2020,[7] the aircraft began to experience electrical issues over a period of about 3 minutes, resulting in the loss of some aircraft systems including the radio and transponder. After landing, engineers identified that the aircraft charging system was unserviceable and the battery had discharged. The battery was charged for the return flight to Caloundra. A new voltage regulator and alternator were fitted and the battery was charged again. On the morning of 22 January 2020, 6–7 ground runs were carried out to test and adjust the replaced components before the aircraft was released to service.

Weight and balance

According to a witness, the pilot visually checked the aircraft's fuel quantity prior to the accident flight with the aid of a dipstick, which showed there was 135 L on board. A correction was made to the fuel record, which had been incorrectly annotated as 130 L. This amount was more than sufficient fuel for the intended flight.

Based on witness observations as well as estimates of fuel and occupant weights, the aircraft was likely within its weight and balance limits for the entire flight.

---

[7] This flight was conducted by a different pilot to that of the accident flight.

Meteorological information

The nearest weather station to the flight path of the aircraft was at Cape Moreton, at the northern end of Moreton Island, 328 ft above sea level. Observations taken at 1600 and 1630 both showed the wind speed at 19 kt from 030°, gusting to 24 kt, with no recorded precipitation.

Other observations at 1630 were:

- temperature – 27.1 °C
- dewpoint – 24.9 °C
- relative humidity – 88%
- QNH[8] – 1,009.5 hPa.

Satellite images taken at 1620 and 1630 indicated visual meteorological conditions in the vicinity of the northern end of Moreton Island. The 1630 meteorological aerodrome report for Brisbane Airport, about 53 km south-west of Cape Moreton, stated the cloud cover as ‘few’ at 2,000 ft and ‘broken’ at 27,000 ft.[9]

Another pilot was conducting a training flight in the vicinity of Bribie Island shortly before the accident. That pilot described the conditions and visibility as good for VFR operations with some low-level turbulence. Above 1,000 ft the conditions were smoother with a north-westerly wind at about 18 kt.

Wreckage and impact information

Wreckage location

Immediately after the accident, after being advised by Airservices Australia that contact was lost with VH-WNR, the Queensland Police Service (QPS) and the Australian Maritime Safety Authority (AMSA) commenced an aerial and marine search operation. That evening, floating debris from the aircraft was found and recovered. The following day the marine search focused on a position near Flinders Reef, but the aircraft could not be located.

At the request of the QPS, the ATSB analysed the supplied radar data and refined the estimated position of the aircraft on 28 January 2020. The wreckage was located by the QPS on the morning of 29 January 2020, about 45 m from the supplied coordinates in about 30 m of water. The engine and propeller were found about 10 m north-east of the main wreckage. The QPS took underwater video of the wreckage on 29–30 January 2020.

Partial wreckage recovery

On 6 February, with assistance from the QPS, specialists from the New South Wales Police Force and the Queensland National Parks and Wildlife Service, the ATSB recovered various aircraft components including the engine, propeller and instruments for detailed examination.

Wreckage examination

ATSB examination of the underwater video identified that the aircraft was likely destroyed by collision with water at a moderately high speed (Figure 4). Damage to the aircraft cabin from the collision with water indicated that it was unlikely to be survivable. There was no evidence of fire.

---

8 QNH: the altimeter barometric pressure subscale setting used to indicate the height above mean seal level.

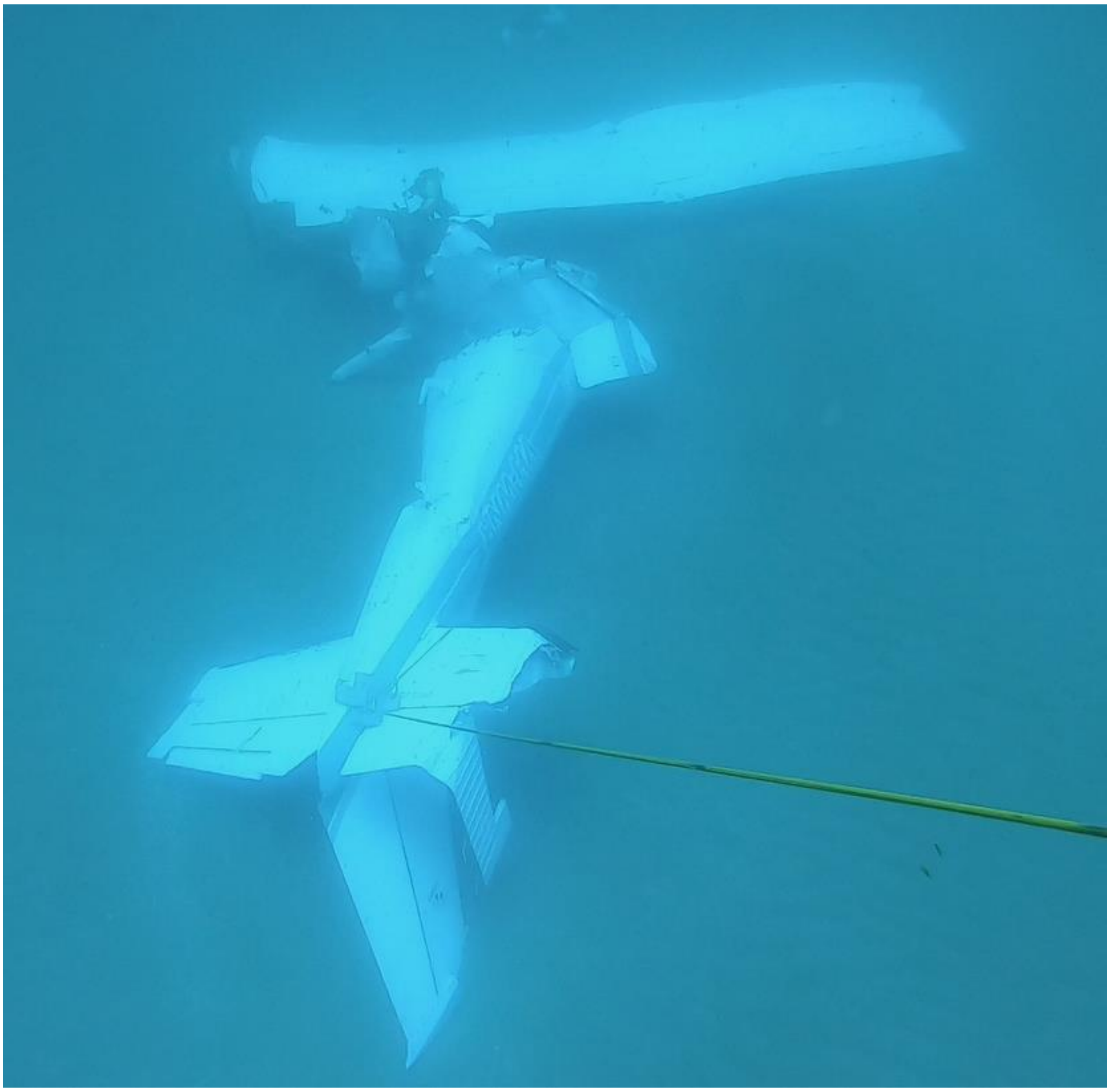
9 Cloud cover: in aviation, cloud cover of the sky is reported using words/abbreviations that denote the extent of the cover. ‘Sky clear’ (SKC) indicates no cloud, ‘few’ (FEW) indicates 1–2 oktas (or eighths) is covered, ‘scattered’ (SCT) indicates 3–4 oktas is covered, ‘broken’ (BKN) indicates 5–7 oktas is covered, and ‘overcast’ (OVC) indicates that 8 oktas is covered.

All major aircraft components were accounted for, and there was no evidence of pre-impact defects or structural failure. As far as could be established, cockpit switch positions were configured as expected for normal flight.

The flap control and right flap were found in the ‘up’ position. The left flap was observed to be displaced towards the down position from disruption caused during accident sequence to the adjacent wing structure. One of the front seats was found floating some distance from the wreckage, and the other front seat was not located. The seatbelts for both front seats were found to be attached to the airframe and latched.

The carburettor heat control, used to prevent or recover from engine icing, was in the ‘off’ position. However, due to the disruption of the wreckage, this may not have been indicative of its position prior to the accident.

Figure 4: Wreckage of VH-WNR on the ocean floor

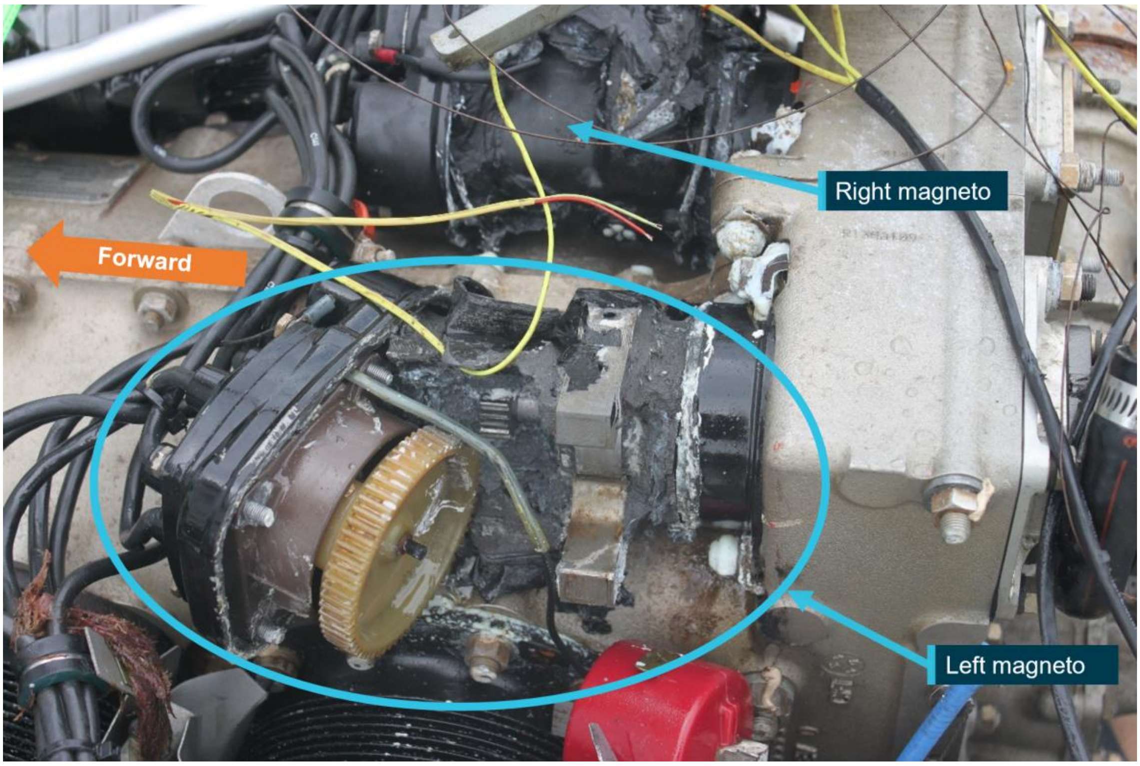


A weight, rope and buoy had been attached to the aircraft tail by the divers.
Source: Queensland Police Service

Engine examination

The engine was disassembled and examined at a Civil Aviation Safety Authority (CASA) approved overhaul facility under the supervision of the ATSB. Apart from impact and submersion damage, the engine was generally in good condition. Some components such as the magnetos, alternator and voltage regulator were extensively damaged by their immersion in seawater and their function could not be tested. No pre-existing defects were evident, and there was no evidence of fire or overheating (Figure 5).

Figure 5: Corrosion damage to the magnetos



Source: ATSB

Propeller examination

The propeller was disassembled and examined at a CASA-approved overhaul facility under the supervision of the ATSB. No pre-existing defects or irregularities were identified. The propeller could not be functionally tested because of internal damage that occurred during the accident sequence.

The propeller blades were observed to be progressively bent out of plane (Figure 6), in a manner indicative of low but non-zero power. The pitch change lugs on all three blades were sheared off, with the direction of the fracture surface smearing being consistent with the blades being forcibly rotated towards low (fine) pitch, which is an indication of low power or windmilling.

Preload plates are fitted to each propeller blade at their base, within the propeller hub. Each blade pitch change lug transverses through a cut-out in the plates. Using damage signatures made by the propeller blade pitch change lugs onto the preload plates (Figure 6, inset), and estimating the propeller speed from the known velocity of the aircraft in the moments prior to impact, an estimate of power and the blade angle at impact was made using established datums with the assistance of the propeller manufacturer. These calculations were limited in accuracy as the preload plates are not indexed (such as with a key or slot), and so during assembly there could be slight variations with their position. The results of the calculations indicated that the propeller was rotating under low power, and with a blade angle at or near the low pitch stop.

Figure 6: VH-WNR propeller blade bending and inset image of example preload plate damage signatures

Source: ATSB

Recorded data

Accident flight radar data

Airservices Australia provided radar data for the accident flight. This data combined primary surveillance radar (PSR) and secondary surveillance radar (SSR) data into a single, smoothed track. PSR has a shorter range than SSR, and is generally less reliable, but it is used to enhance the accuracy of SSR tracks and provide position information when SSR is not available.

Position data for the accident flight was generally recorded at 5-second intervals, and occasionally at a 4- or 6-second interval. It included Mode C altitude data that was obtained from the aircraft static system referenced to the standard atmospheric pressure (1,013.25 hPa) and rounded to the nearest 100 ft. The aircraft's average groundspeed between data points was derived from the position and time data.

The approximate position the aircraft collided with water was determined from the system track by extrapolating the estimate of groundspeed and a fitted altitude curve to sea level.

Engine monitoring recorder

The ATSB identified that the only item on the aircraft that was likely to record any data was a J.P. Instruments EDM-700 engine monitoring recorder. The ATSB recovered the instrument, however the recorded data it contained did not include the accident flight.

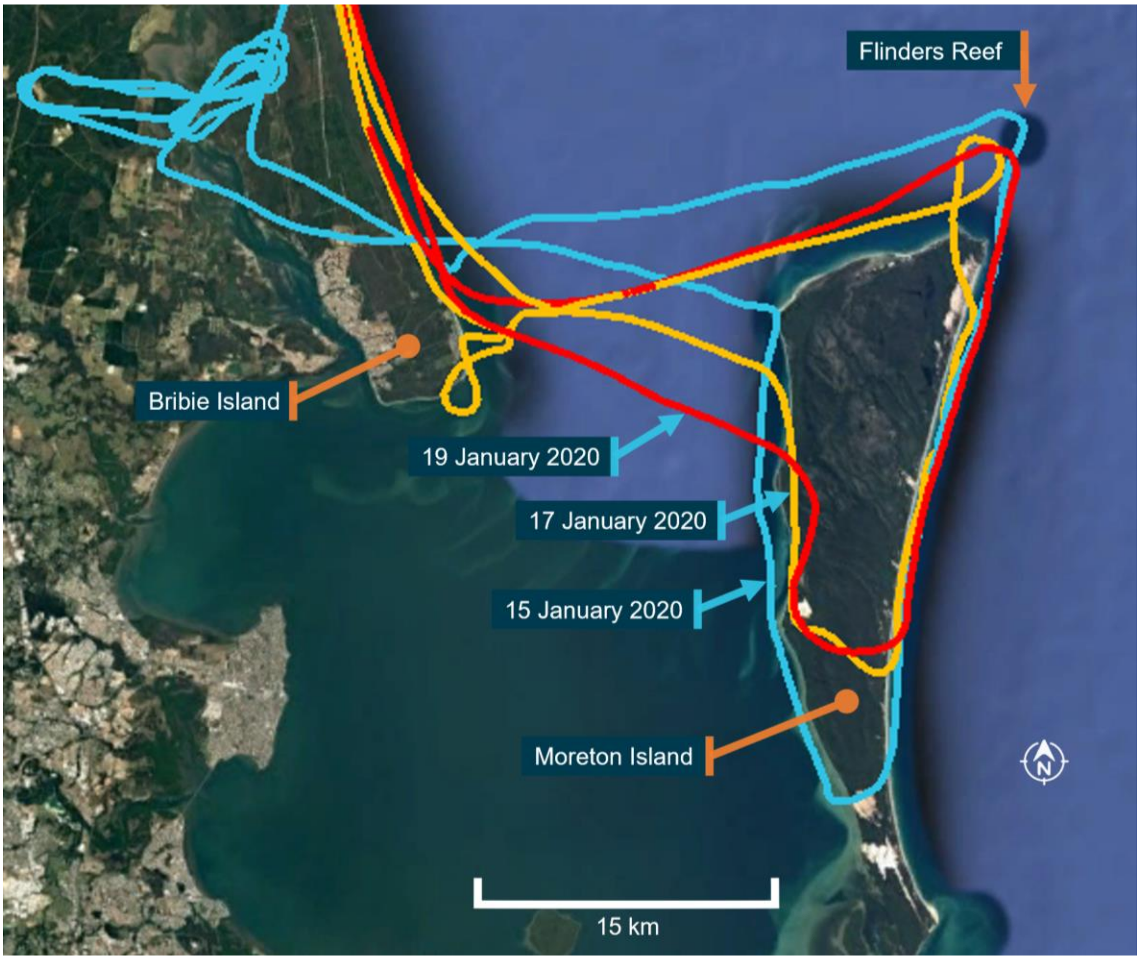
Additional information

Previous flights in VH-WNR

In the weeks prior to the accident, the pilot flew VH-WNR on the following 6 return flights from Caloundra Aerodrome, with available aircraft tracks shown in Figure 7:

- 1.1 hours on 8 January as a proficiency check with an instructor (radar data not available)
- 0.8 hours with one passenger on 11 January (radar data not available)
- 0.8 hours with two passengers on 14 January (radar data not available)
- 1.4 hours with two passengers on 15 January (blue line)
- 1.2 hours with two passengers on 17 January (orange line)
- 1.1 hours with two passengers on 19 January (red line).

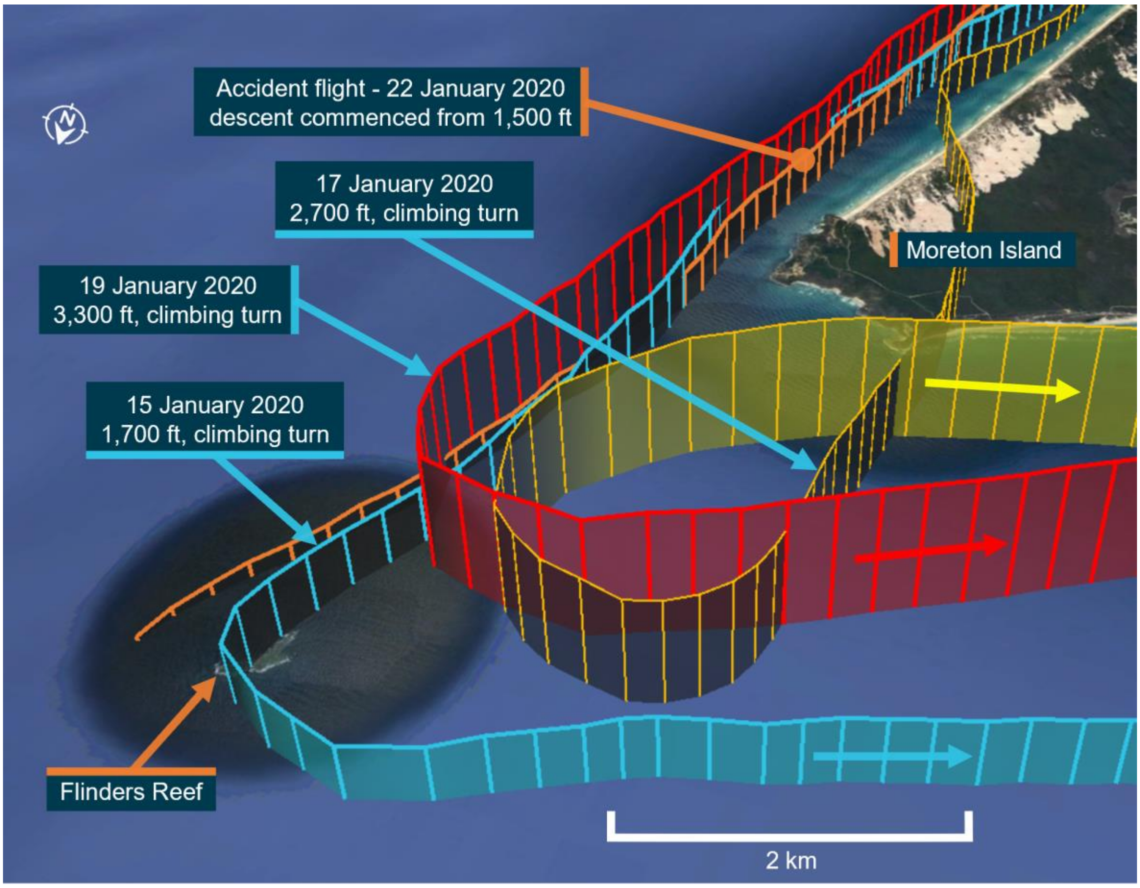
Figure 7: Accident pilot's previous flights in VH-WNR



Source: Google Earth, modified by the ATSB

On the 15 January flight, the pilot transited between Bribie Island and Moreton Island at about 2,000 ft and 80–90 kt groundspeed. The flight profile was broadly similar to the accident flight past Cape Moreton towards Flinders Reef (Figure 8). On the return leg, the pilot flew from Flinders Reef direct to Bribie Island at about 1,800 ft.

Figure 8: Previous flights and the accident flight compared



Source: Google Earth, modified by the ATSB

ATSB analysis indicated that two segments of the 15 January flight, including between Moreton Island and Flinders Reef, were further from land than the aircraft was capable of gliding with no engine power. Although complete analysis of glide distances was not feasible, the ATSB estimated that the aircraft was also flown near or beyond the limits of its glide range to land on other flights in this area. During the accident flight on 22 January, the aircraft similarly reached a point further from glide distance to land about halfway between Moreton Island and Flinders Reef.

On the 19 January flight, when the aircraft was approaching Moreton Island, the Brisbane Centre controller attempted to contact the pilot to advise that the aircraft was 2 NM west of Moreton Island at 3,900 ft (that is, they had entered controlled airspace by climbing above 3,500 ft in that area). After receiving assistance from the pilot of another aircraft in the area, the pilot of VH-WNR made contact with the controller, who explained the problem. The pilot apologised and stated that the entry to controlled airspace was unintentional, and they confirmed they were now at 3,000 ft approaching the eastern side of the island. The controller reminded the pilot to keep at or below 3,500 ft on the way back to Caloundra. On that flight, the pilot did not descend when travelling along the eastern side of Moreton Island.

As noted in *The occurrence*, during the accident flight on 22 January, the pilot contacted Brisbane Centre to report they were at 2,500 ft approaching Moreton Island. There was no requirement for the pilot to make a call on that frequency in that area while they remained at or below 3,500 ft.

Analysis of thrust required

A performance analysis was carried out on the last minutes of the accident flight based on the radar data, documented performance characteristics of the aircraft type (such as lift and drag coefficients), and estimates of aircraft weight. The analysis calculated the propulsive power that would be required for the aircraft’s estimated airspeed and altitude. For the section of flight analysed, the aircraft was flown with likely minor changes in heading and pitch, for which the radar data was considered sufficiently accurate. The analysis provided an estimate of the thrust power, not engine power, as efficiencies and other power losses were not calculated.

The analysis relied on the following assumptions:

- Thrust opposed drag along the longitudinal axis of the aircraft.
- The aircraft was not accelerating longitudinally (as indicated by the relatively constant groundspeed).
- The aircraft was not banking, slipping, or accelerating vertically (turbulence).
- Wing flaps were retracted.
- Wind did not vary.

The analysis indicated that there was a reduction in thrust during the last 100 seconds of the flight.[10] At the end of the recorded data, due to the flight path being flown, the thrust power required by the aircraft was approximately zero.

Speech analysis

The ATSB conducted a basic speech analysis on the pilot's ATC and Caloundra Aerodrome common traffic advisory frequency (CTAF)[11] radio transmissions. The pilot's response times, delay between microphone keying and speaking, microphone un-keying delay, duration to annunciate the aircraft callsign, average speech rate, and voice pitch were analysed. The analysis was inconclusive regarding whether there were any changes to the pilot's speech during the accident flight.

Carburettor icing

According to the CASA *Visual Flight Rules Guide*:

> Carburettor icing is of particular concern because, unlike airframe icing, the risk of ice build-up in the carburettor can be high even with no visible moisture and an OAT [outside air temperature] of up to 38°C.
>
> Carburettor icing occurs when the air temperature adiabatically decreases sufficiently to condense water vapour and for the localised air temperature to reduce below freezing. Ice builds up as the chilled condensed water makes contact with localised surfaces, such as the butterfly valve and the venturi walls. Carburettors experience additional cooling because of the evaporation of fuel. Furthermore, the risk of carburettor icing is significantly increased at partial power settings (for example, when power is reduced during descent), because of the cooling effect of a partly-closed throttle.

The effect of carburettor icing on aircraft may result in reduced power output, poor engine performance, rough running and in extreme cases engine failure. The onset of this may be evidenced by an unexplained drop in manifold pressure.

The pilot's operating handbook (POH) for VH-WNR was not recovered. A reviewed sample of Cessna 182Q POHs required pilots who suspect carburettor icing to apply full throttle and set the carburettor heat control to 'on' until the engine ran smoothly.

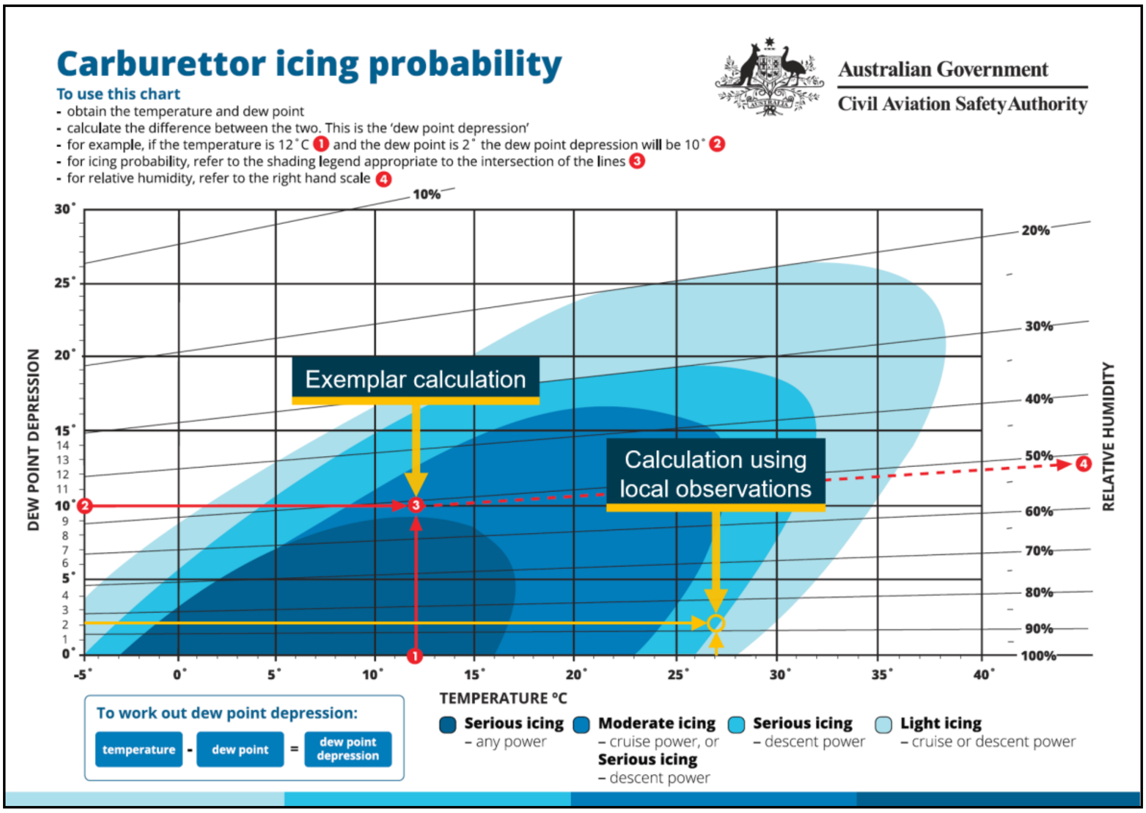
To assist pilots in anticipating the potential for carburettor icing, CASA published a carburettor icing probability chart (Figure 9). The temperature recorded at Cape Moreton at the time of the accident was 27.1 °C, and the dewpoint 24.9 °C. This gave a dewpoint depression of 2.2 °C. The

10 This type of analysis cannot always distinguish between an increase in drag and a decrease in thrust. However, with no evidence of in-flight damage and the aircraft's flaps likely retracted, there would have been no significant source of increased drag.

11 A common traffic advisory frequency is a designated frequency on which pilots make positional broadcasts when operating in the vicinity of a non-controlled aerodrome or within a broadcast area.

intersection between the resulting temperature and dewpoint lines was just inside the shaded area where 'serious' icing under descent power is possible.

Figure 9: Carburettor icing probability chart with local observations



Source: CASA, annotated by the ATSB

An ATSB review of temperature and dewpoint observations for the south-east Queensland region showed that, over a 12-month period, carburettor icing conditions are frequent.

Previous ATSB investigations found to be, or potentially be, related to carburettor icing include:

- AO-2018-050, *Wirestrike and collision with terrain involving Cessna 172RG, VH-LCZ, Parafield Airport, South Australia, on 3 July 2018*
- AO-2016-059, *Engine failure involving Piper PA-28, VH-IPO, Mangalore Airport, Victoria, on 16 June 2016*
- AO-2014-149, *Collision with terrain involving Van's Aircraft RV-6, VH-TXF near Mudgee Airport, NSW on 14 September 2014*
- AO-2012-078, *Collision with terrain - Robinson R44, VH-HOU, 93 km S Alice Springs Airport, NT, 10 June 2012*.

Flights over water

Civil Aviation Regulation (CAR) 258 (*Flights over water*) stated:

> The pilot in command of the aircraft must not fly over water at a distance from land greater than the distance from which the aircraft could reach land if the engine… were inoperative.

The Aeronautical Information Publication (AIP) stated in ENR 1.1 (section 11.11) that CAR 258 did not apply to charter, aerial work or private operations if each occupant was wearing a life jacket, unless they were exempted from doing so under Civil Aviation Order (CAO) 20.11 (*Emergency and life saving equipment and passenger control in emergencies*). CAO 20.11 paragraph 5.1.1 (a) stated that a single engine aircraft must carry a life jacket for each occupant when the aircraft was operated over water at a distance from land greater than that it could reach with its engine inoperative. In such cases, paragraph 5.1.7 also stated that each occupant shall wear a life jacket, but this was not required for occupants of aeroplanes during flight above 2,000 ft.

The operator stated that the pilot was briefed to transit between Bribie Island and Moreton Island (a distance of about 15 km) at 3,500 ft using the VFR route. The operator also stated that, after some previous flights, it briefed the pilot that its preference for the pilot was to not operate on the northern side of Cape Moreton.

The operator stated that it encouraged the pilot to take life jackets on board the aircraft, which was done on previous flights. However, witnesses reported that no life jackets were taken on the accident flight.

Carriage of emergency locator transmitter

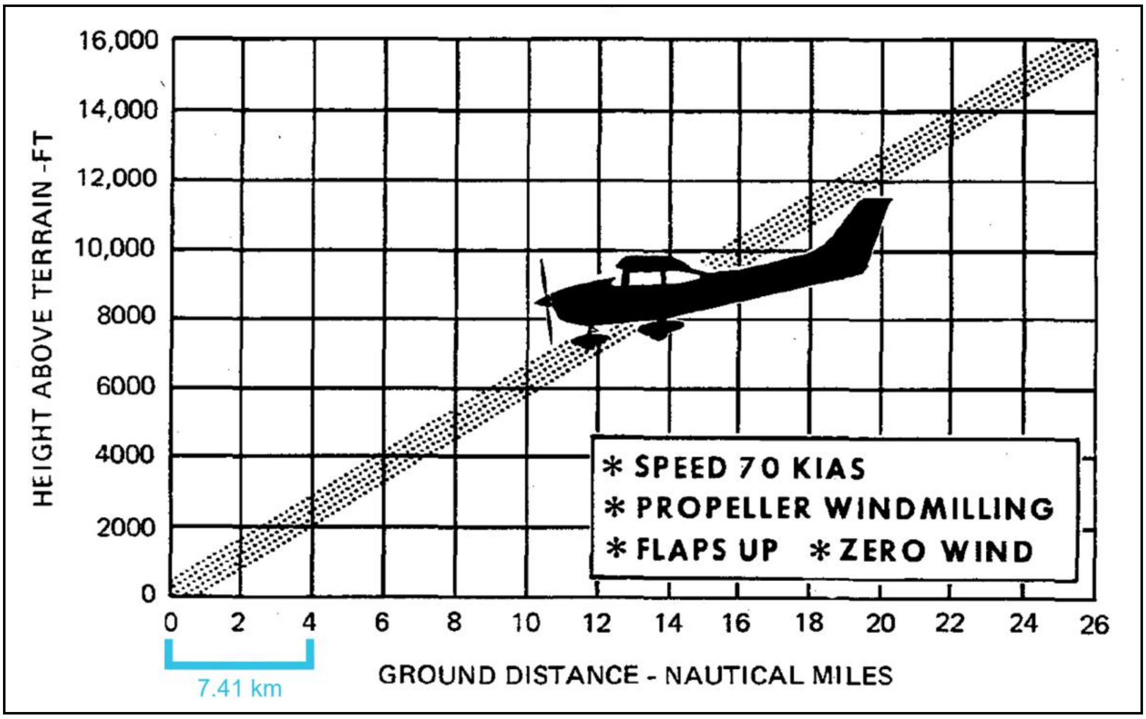
The aircraft was fitted with a deceleration-activated emergency locator transmitter (ELT), which was not serviceable at the time of the accident. The carriage of an ELT was not required for flights within 50 NM of the origin. A personal locator beacon was carried on board the aircraft at the time, in the glove box of the aircraft.

Cessna 182 emergency procedures

Engine failure

The POH for the Cessna 182Q contained an emergency procedure for an engine failure in flight. For this scenario, pilots were required to establish a best glide speed of 70 kt with the wing flaps retracted, and to identify a suitable landing area (Figure 10).

Figure 10: Cessna 182Q maximum glide distance chart



Source: Cessna, annotated by the ATSB

Ditching

The POH procedure for ditching included transmitting a MAYDAY message over the radio, unlatching the cabin doors, and establishing a level attitude during descent. If engine power was available, the flaps were to be set to 20–40° and the aircraft established in a 60 kt and 300 ft/min descent. In an engine failure situation, the glide speed and configuration should be 70 kt with flaps up or 65 kt with 10° of flap.

Safety analysis

Descent and impact with water

The aircraft's flight path was not indicative of uncontrolled flight, and no pre-existing defects with the aircraft could be identified. Other than a likely gradual loss of engine power, discussed below, there was no evidence of engine overheating, fire, loss of control, or other in-flight emergencies. However, as the entire aircraft could not be recovered, it was not possible to verify the operation of all aircraft systems.

The existence of secondary surveillance radar data for the aircraft almost to its collision with water, as well as the reception of the MAYDAY call, indicated that the aircraft's electrical systems were receiving power. However, it was not possible to determine whether this was battery or alternator power. In any case, electrical power was not necessary for flight or ditching.

Analysis of the radar data showed there was likely a gradual reduction in thrust (and therefore engine power) during the last 100 seconds of the flight, and that this correlated with the increasing descent rate. The impact signatures on the propeller and propeller pitch change lugs were also consistent with a low level of engine power or windmilling at impact. Although the power reduction may have been due to pilot action, no reason for doing so at this point in the flight could be identified.

The aircraft maintained a moderately high speed until radar contact was lost at about 180 ft. Had the engine been inoperative, the radar data would have indicated a significantly steeper descent profile.

Regardless, a gradual reduction in engine power should not necessarily lead to very serious consequences. If detected early enough, with a suitable emergency landing area within range, a pilot could attempt to land. If no such landing area was available, a pilot could attempt a forced landing or ditching.

In this case, the aircraft maintained course away from suitable landing areas at a speed well above the aircraft's best glide speed. The pilot may have been initially unaware of the gradual reduction in power and resulting descent. Although this would have been indicated on the aircraft's instruments, the constant-speed propeller would maintain engine and propeller speed, and a gradual power loss would result in little or no change in sound and feel.

The MAYDAY call shortly before the impact indicated that the pilot was not totally incapacitated. However, in the absence of other evidence, a partial incapacitation could not be excluded.

The aircraft's final position on the sea floor close to the last radar position strongly indicated that it continued along the established flight path without turning or, more critically, reducing descent rate and speed for a ditching. Furthermore, examination of the video footage of the wreckage on the sea floor showed the flaps were likely up at impact and that the aircraft had been significantly disrupted by a relatively high-speed collision with water.

In summary, the nature of any in-flight emergency or abnormal situation, and any effect it had on the pilot's ability to control and configure the aircraft for ditching, could not be established.

Descent over water beyond glide range

On 15 January 2020, the pilot descended over water beyond the maximum glide distance of a suitable landing area for a Cessna 182Q during two segments of that flight. However, there was insufficient evidence to determine if an emergency landing on Moreton Island was possible had the pilot been able to turn the aircraft and establish the optimal glide speed. Nevertheless, flight outside of the glide range of a suitable landing area limits the opportunities for recovery in the event of an engine failure or other emergency. The same situation occurred on the accident flight, although the extent to which this was intentional could not be determined.

Carburettor icing

Carburettor icing can be insidious in its development and have serious consequences. Weather observations taken at Cape Moreton at the time of the accident, and plotted on the carburettor icing probability chart, showed that carburettor icing was possible. The plotted point was just inside the serious icing range at descent power and adjacent to the light icing range in cruise or descent power.

The likely reduction in power in the last 100 seconds of recorded flight could plausibly have been due to carburettor icing. However, carburettor icing conditions are frequently encountered in the region, and prevention and management of carburettor icing is easily done through use of carburettor heating. As the pilot had significant experience on the Cessna 182, they would very likely have been familiar with the use of carburettor heating. Due to wreckage disruption during the impact sequence, the position of the carburettor heat control during the accident flight could not be established. Overall, a conclusion regarding carburettor icing could not be drawn with any certainty.

Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include 'contributing factors' and 'other factors that increased risk' (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition 'other findings' may be included to provide important information about topics other than safety factors.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the collision with water involving Cessna 182, registered VH-WNR, 6 km north-west of Moreton Island, Queensland, on 22 January 2020.

Contributing factors

- After passing the northern end of Moreton Island at 1,200 ft, the aircraft continued descending away from the island at about 110 kt groundspeed, with no significant change in direction and with reducing engine power. The pilot broadcast a MAYDAY when passing 300 ft; however, for reasons that could not be determined, the flight path and speed of the aircraft did not significantly change after this point until it collided with water.

Other factors that increased risk

- The pilot had descended over water beyond the glide range of a suitable landing area twice on a previous flight, limiting the options for a forced landing in the event of an emergency.
- At the time of the accident, the meteorological conditions were conducive to carburettor icing. However, such conditions are common in the region, and able to be easily managed with the aircraft's carburettor heat control.

Other findings

- From the limited evidence available, no pre-existing aircraft defects could be identified.

General details

Occurrence details

Date and time:	22 January 2020 – 1626 EST	
Occurrence class:	Accident	
Occurrence categories:	Collision with water	
Location:	6 km north-east of Moreton Island, Queensland	
	Latitude: 26º 58.55’ S	Longitude: 153º 29.68' E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company 182Q	
Registration:	VH-WNR	
Operator:	Inspire Aviation	
Serial number:	18266543	
Type of operation:	Private-Pleasure / Travel - (Private)	
Activity:	General aviation / Recreational-Sport and pleasure flying-Pleasure and personal transport	
Departure:	Caloundra, Queensland	
Destination:	Caloundra, Queensland	
Persons on board:	Crew – 1	Passengers – 1
Injuries:	Crew – Fatal	Passengers – Fatal
Aircraft damage:	Destroyed	

Glossary

AMSA	Australian Maritime Safety Authority
ATC	Air traffic control
CASA	Civil Aviation Safety Authority
POH	Pilot’s operating handbook
PSR	Primary surveillance radar
QPS	Queensland Police Service
SSR	Secondary surveillance radar
VFR	Visual flight rules

Sources and submissions

Sources of information

The sources of information during the investigation included:

- another pilot who flew VH-WNR
- the aircraft operator
- Civil Aviation Safety Authority
- Queensland Police Service
- the maintenance provider
- Hartzell propeller
- Airservices Australia
- Bureau of Meteorology.

References

National Aeronautics and Space Administration 1973, *Point and path performance of light aircraft*, Contractor report NASA CR-2272.

Submissions

Under section 26 of the *Transport Safety Investigation Act 2003*, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

- the aircraft operator
- the maintenance provider
- Civil Aviation Safety Authority
- US National Transportation Safety Board
- Hartzell propeller.

Submissions were received from the aircraft operator, the Civil Aviation Safety Authority, and Hartzell propeller. The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, international agreements.

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.