The sole objective of safety investigations is the prevention of future accidents and incidents.

The Commission does not apportion blame or liability The investigation is independent and separate from any judicial and administrative proceedings.

Any use of the Resolution for any purpose other than prevention of air accidents and incidents may lead to wrong conclusions and interpretations.

FINAL RAPORT

of the State Commission on Aircraft Accidents Investigation

of 30 December 2024

regarding **aviation accident**

2024-0083

OCCURRENCE NUMBER

Cessna Aircraft Company, Cessna 172 P, SP-RBI

4 September 2024, Lake Lednica,
52°31'46,45" N 017°22'26,97" E

ARC: Abnormal runway contact

This Report was issued by the State Commission on Aircraft Accidents Investigation on the basis of information available on the date of its issue.

This Report presents the circumstances of the aviation occurrence concerned, as well as its causes, contributing factors and safety recommendations, if issued.

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1. History of the flight

On 2 September 2024, a pilot (a citizen of Switzerland), a holder of the professional pilot licence ATPL(A)[1], booked a Cessna 172 aeroplane at the Aviation Training Centre ATO Biernat S.j. for a floatplane flight on 4 September 2024. On 3 September 2024, the pilot, supervised by an instructor, performed a check flight in the Cessna 172. The flight included a take-off from the Żerniki aerodrome (EPZE), three landings on the nearby Lake Bnińskie and a landing on the take-off aerodrome. The instructor assessed that the pilot had performed a float landing on the lake, and that the whole flight had not raised any objections.

On 4 September 2024, the pilot arrived at EPZE together with a female passenger, submitted a flight plan, and next topped up the fuel tanks to 150 l and carried out a pre-flight inspection on the aeroplane. At around 12:00 hrs[2], after the engine start and run-up, the pilot taxied to RWY[3] 05 and took off to perform several landings on Lake Lednica located near the town of Lednogóra.

At around 12:23 hrs, during the third landing on the lake, the aeroplane collided with the water surface with its left float and overturned. The witnesses standing nearby notified rescue services immediately. Meanwhile, the pilot and female passenger got out of the submerged cockpit on their own and awaited help holding on to the aeroplane's floats protruding above the water surface. The pilot and the female passenger were evacuated onto the nearby beach by firefighters.

Neither the pilot nor the female passenger sustained any injuries.

2. Relevant information

2.1. Damage to aircraft

The aeroplane was seriously damaged.

The following was either damaged or destroyed:

1) Right wing (Fig. 1);
2) Float struts (Fig. 2);
3) Fuselage skin at the cockpit's rear window (cracks)
4) Lower engine cowling (Fig. 3);
5) Left door (Fig. 4);
6) Float mounting elements (Fig. 5).

[1]Airline Transport Pilot Licence (aeroplanes)
[2]Times in this Report are provided in LMT = UTC + 2 h.
[3]Runway

Fig.1. Destroyed right wing with the broken-off aileron

Fig. 2. Broken and bent float struts

Fig. 3. Dents in the lower engine cowling

Fig. 4. Dents in the left door skin

Fig. 5. Deformed and dislocated float mounting elements

2.2. Aircraft information

The aeroplane had a CofA[4] with an ARC[5] valid until 11 May 2025.

The following maintenance was confirmed in the aircraft's CRS[6]

Airframe: serial no. 17275837:

- the latest 50h maintenance was carried out on 8 August 2024, with the airframe at 5,218 h total time since new.

Lycoming engine: serial no. L 34380-36A:

- the latest 50h maintenance was carried out on 8 August 2024, with the engine at 2,920 h total operating time since new and 919 h operating time since last overhaul.

McCauley/ABG46017 propeller:

- the latest 50h maintenance was carried out on 8 August 2024, with the propeller at 1,773 h total operating time since new and 150 h operating time since last overhaul.

[4]Certificate of Airworthiness.
[5] Airworthiness Review Certificate.
[6]Certificate of Release to Service.

Wipaire 23101/23102 floats:

- the latest 50h maintenance was carried out on 8 August 2024, with the airframe at 1,773 h total time since new.

The next maintenance scheduled for 18 October 2024 was included in the aeroplane's MS[7].

2.3. Aeroplane's mass and balance

The aeroplane's mass and centre of gravity were calculated in accordance with the Cessna 172 Flight Manual and the aircraft weighing report made on 14 July 2022.

Table 1. Aircraft loading data required for mass and centre of gravity calculations

Aircraft load sheet	Load weight [kg / lbs[8]]	Arm [m /inch[9]]	Moment [kgm]
Empty aircraft	805/1773	0.98/38.58	794.7
Pilot + passenger	160/352	0.94/37	150
Fuel	108/237	1.21/47.64	101.52
Total mass	1,073/2,360	Total moment	1,075

Centre of gravity:

$$CG = \frac{\text{Total moment}}{\text{Total mass}} = \frac{1{,}075}{1073} = 1.0025\ [\text{m}] / 39.5\ [\text{inch}]$$

The mass and the CG position[10] are within the envelope of the Cessna 172 P diagram (Fig. 6).

[7] Maintenance Statement
[8] Pound - a mass unit
[9] Inch - a length unit
[10] Centre of Gravity

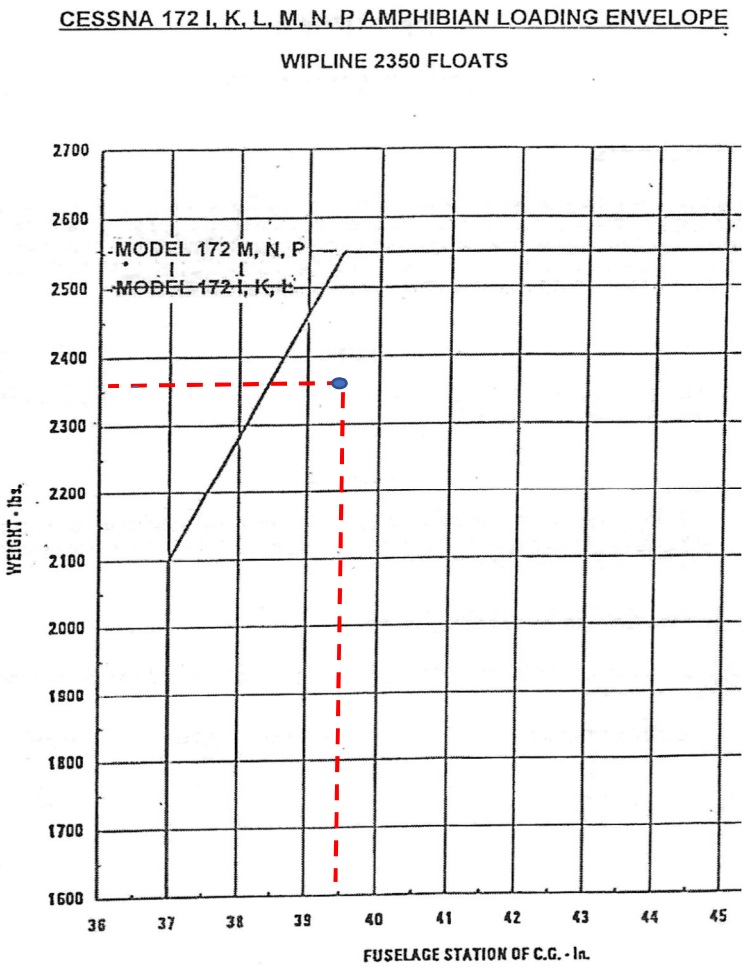

Fig. 6. The CG envelope of the Cessna 172 P

2.4. Pilot information

Male, aged 71 (a citizen of Switzerland), holder of the ATPL(A) and the SEP(S)[11] rating required for the flight and valid until 31 July 2025, Class 2 aero-medical certificate valid until 3 January 2025, the LAPL valid until 3 January 2026.

The pilot has broad aviation experience on many aeroplane types:

- total flight time – 15,900 h;
- flight time on floatplanes – 400 h;
- flight time in the last 3 months – 45 h, 66 landings.

2.5. Meteorological conditions

According to METAR[12] for the EPPO aerodrome, the meteorological conditions on 4 September 2024 at 12:30 hrs (10:30 hrs UTC) were as follows:

METAR EPPO 041030Z AUTO 12O14KT CAVOK 31/12 Q1018=

which means:

- date: 4 September 2024;

[11]Single Engine Piston (Sea)
[12]Meteorological Aerodrome Report

- time: 10:30 hrs UTC;
- wind direction: 120°;
- wind speed: 14 kt;
- visibility 10 km and more;
- ambient temperature: 31 °C;
- dew point temperature: 12 °C;
- pressure: QNH 1018 hPa.

The meteorological conditions may have contributed to the occurrence.

The witnesses who were in a boat confirmed that there had been strong wind gusts in the area of the lake.

2.6. Pilot actions

At around 12:20 hrs on 4 September 2024, the pilot arrived at the north-eastern area of Lake Lednica and commenced an overview of the lake's surface for any visible obstacles and persons in the water. Next, he determined the wind direction and chose the most convenient landing site.

After completing the above actions, the pilot positioned the aeroplane up wind and landed on the lake with a heading of around 155°. After float landing, the pilot took off in the same direction and commenced a right circle. He performed the next landing approach with a right circle and the same heading as in the first flight. The second landing was recorded by the witnesses with a mobile phone camera, and the footage shows that it was correct.

According to the pilot's statement, the third circle was more elongated (Fig. 7), but he aimed for the same point on the water during the landing approach. The aeroplane was rolling sideways slightly during the approach, which was not a problem for the pilot. However, shortly before the landing, there was a sudden and strong wind gust from the starboard side. The pilot did not manage to compensate for the gust, as a result of which the right wing rose significantly, thus causing the aeroplane to roll to the left wing.

As a secondary effect of the left roll, the aeroplane's nose to pitch down.

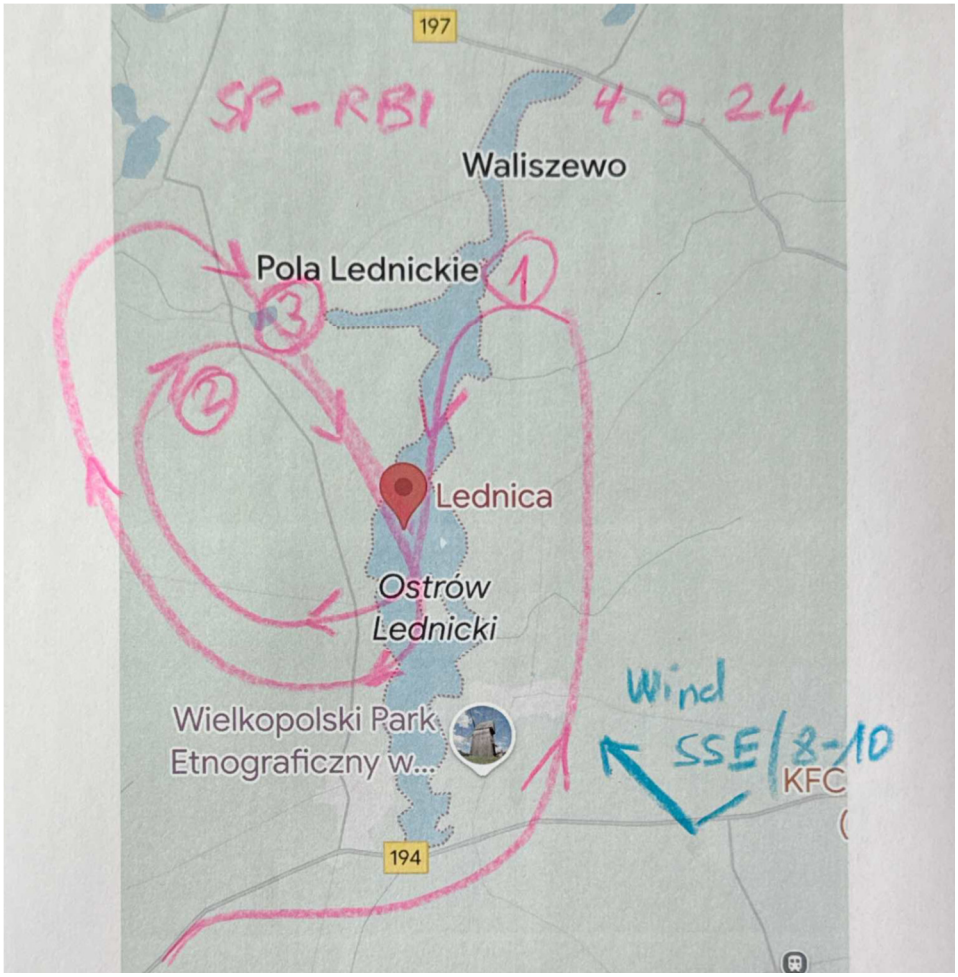

Fig. 7. A sketch of the flights performed over Lake Lednica [source: the pilot]

The front of the float submerged and almost at the same time the left wing tip touched the water surface. The aeroplane started to roll around the vertical and lateral axes without any control from the pilot. The right wing hit the water very violently, which was confirmed by witnesses who were at a short distance from the site of the occurrence.

The sequence of the events was possible because the wind gust from the starboard side caused the right wing's lift to increase and the wing to rise, thus causing the aeroplane to roll to the left. As the aeroplane rolled significantly to the left, its speed dropped and the angle of attack decreased, which caused the left float to submerge gradually. Meanwhile, with the air speed decreased and the wind gust gone, the right wing had lost its lift and hit the water surface.

While overturning, the aeroplane moved to the left relative to the flight direction, which is confirmed by its roll to the left wing at the moment of the collision with water (Fig. 8.)

Fig. 8. The aeroplane after overturning, with the deviation to the left visible.

The pilot estimated the wind speed in the lake area to be 8-10 kt. After arriving at the occurrence site, the National Fire Service personnel measured the wind speed and the result was around 14 kt.

Based on an analysis of photographs from the occurrence site, it was established that during the third flight the pilot had approach to landing at the heading of around 155° and wind blowing from 120° (Fig. 9), and float landed around 50 m offshore (the town of Rybitwy).

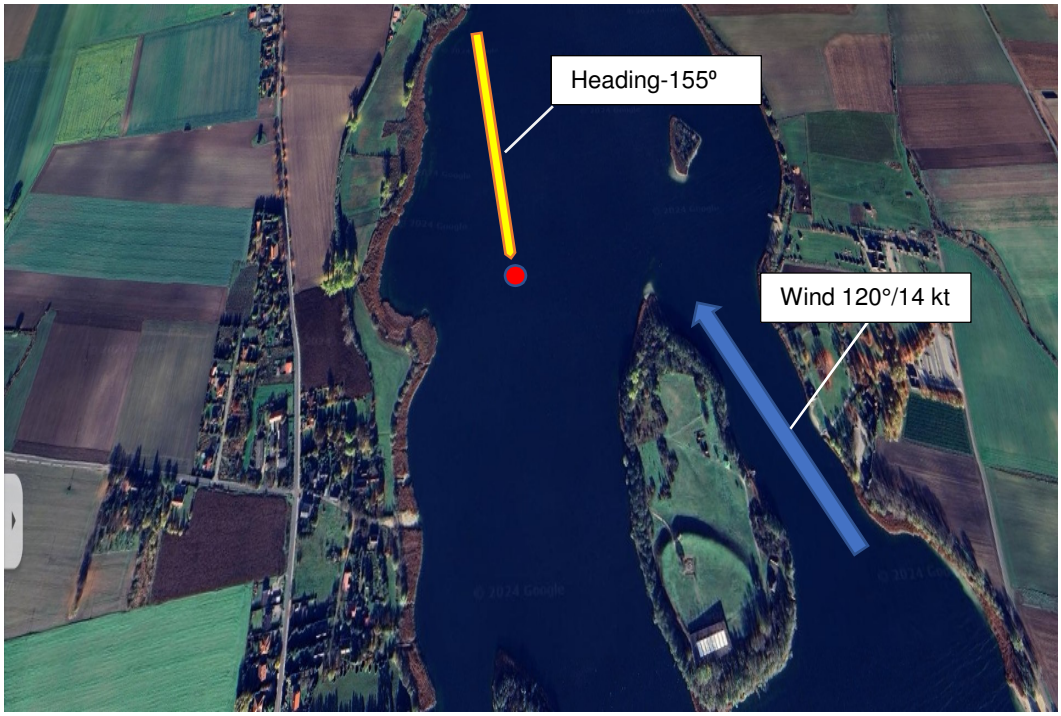

Fig. 9. The landing approach in the third flight (the place where the aeroplane collided with water is marked in red)

The pilot flew in quite strong, gusty winds (14 kt), which could have limited the safe execution of the landing.

In addition, the side wind from the port side required maintaining the roll to the left wing (an approach with the so-called hover), which further increased the aeroplane's roll to the left when the wind blew from the starboard side.

The Cessna 172P Flight Manual states demonstrated crosswind component speed at 90° of 10 kt. The crosswind component at the time of the occurrence was approximately 8 kt.

Based on many years of experience of ATO pilots operating this aeroplane type, it was established that the safe head wind limit for a landing is 15 kt. With the wind speed above 15 kt, the surface of a water area can produce fairly strong waves which make a landing "hard" compared to a touchdown on a hardened RWY. However, the floatplane structure does not have any dampers in the float system, which causes the aeroplane to brake suddenly at landing and entails a risk of the float tip dipping, which in turn may cause the aeroplane to overturn.

Comprehensive statements by US pilots concerning the safety of floatplane flights can be found in aviation manuals and magazines. The pilots strongly suggest that the permitted head wind speed should be set at 15 kt. Similarly to ATO pilots, they emphasise that the impact of waves on the aeroplane during landing at speeds above 15 kt is so strong that it poses a threat to the flight safety of flying personnel and passengers. Furthermore, passengers tend to express very negative opinions about flying in such conditions. The pilots warned that no landing on water areas should be attempted when white wave crests can be seen from the air.

2.7 Supplementary information

Before the publication of the final report, the PKBWL conducted a consultation on its draft, requesting comments from interested parties and from the NTSB, STSB, and EASA. The Commission took into account the comments submitted by the NTSB and STSB in the Final Report.

3. Conclusions,

3.1. Findings

1) The pilot held a valid rating to perform the flight in accordance with applicable regulations.
2) The pilot held a valid aero-medical certificate.
3) The aeroplane's mass and centre of gravity were within acceptable limits.
4) No evidence was found of any defects or irregularities in the aircraft functioning that could have contributed to the accident.
5) The damage sustained by the aircraft was the result of the collision of the aeroplane with the surface of the lake.

6) The meteorological conditions, in particular the wind speed and gusts, may have contributed to the occurrence.

3.2 Cause of the incident

1) A probable strong wind gust at the moment of landing, which may have surprised the pilot, making him unable to take any effective response.

3.3 Contributing factors

1) Inaccurate visual determination of wind speed in the area of Lake Lednica by the pilot.

2) Landing on a lake with sudden increases in wind speed.

4. Safety recommendations

None.

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