بسم الله الرحمن الرحيم

ACCIDENT INVESTIGATION AND COORDINATING COMMITTTEE
CIVIL AVIATION DEPARTMENT
MINISTRY OF TOURISM AND CIVIL AVIATION

ACCIDENT REPORT ON
8Q-MAS (TWIN OTTER) COLLISION WITH A SPEED BOAT
Near the Floating Platform at Adaaran Club Bathala, Maldives
On 14th of July 2008

Operator: **Maldivian Air Taxi**
Manufacturer: **De Havilland (Canadian)**
Model: **DHC-6-300 (Floatplane)**

INTRODUCTION

Maldives is a signatory to Convention on International Civil Aviation (Chicago 1944) which established the International Civil Aviation Organisation. Article 26 of the Chicago Convention obligates the conduct of accident investigation of civil aircraft occurring in their state.

The Accident Investigation Coordinating Committee (AICC) under the authority of the Executive Director, Civil Aviation conducted the investigation.

The AICC was assisted by Aerodrome and Air Navigation Services staff, Flight Operations staff and Airworthiness staff of Civil Aviation Department (CAD).

The Accident was notified to CAD at 1340 hrs (LT) by Maldivian Air Taxi. ICAO, and Transport Canada was notified by CAD.

In accordance with Annex 13 to Convention on International Civil Aviation, it is not the purpose of this investigation to apportion blame or liability. The sole objective of this investigation and the Final Report is to prevent accidents and incidents.

Unless otherwise stated recommendations in this report are addressed to the CAD. It is CAD who will decide on implementation.

All times in this report are in Local Time unless otherwise stated. Time Difference between Local and UTC is +5 hrs.

The report is released by the Chairman of the Accident Coordinating Committee on 20 July 2008.

CONTENTS

List of Abbreviations

C of A : Certificate of Airworthiness

C of R : Certificate of Registration

CAD : Civil Aviation Department

LH : Left hand

LT : Local time

MAR : Maldivian Airworthiness Requirements

MAT : Maldivian Air Taxi Pvt. Ltd

MEL : Minimum Equipment List

MTOW : Maximum takeoff weight

PIC : Pilot in command

PROP : Propeller

RH : Right hand

SIC : Second in command

VFR : Visual Flight Rules

Synopsis

The 8Q-MAS aircraft departed, with 14 passengers and 3 crew on board, at 12:11 hrs from MAT dock, Male International Airport, water aerodrome, to Adaaran Club Bathala (North Ari Atoll). The weather was windy and sea was rough. The estimated flight time to destination was 20 minutes. Around 12:30 the aircraft approached for landing near the floating platform located in the lagoon north of Adaaran Club Bathala. The wind was on a westerly direction 20 to 25 knots and the aircraft approached for a westbound landing. The aircraft made an orbit over the lagoon to inspect water and approached towards the platform for landing. The aircraft touched down and was cutting the top of the wave, as they usually do to find an appropriate location for stopping. Before it could find an appropriate place to stop it hit a big swell. This caused the aircraft to sway to the left and get airborne. The PIC called for a go around and tried to correct the left sway. As it was climbing with a right bank it collided with a speed boat, moored to the buoy which was located to the west of the platform. The RH float collided with the bow of the speed boat, which caused the RH float and the RH engine to detach the aircraft. The aircraft yawed to the right and the PIC managed to land the aircraft and bring it to a halt on LH float. Due to high wave current the aircraft drifted towards the shallow area and sank. The passengers and crew was able to escape the aircraft without any fatalities.

The accident occurred due to collision of the RH float with the Speed Boat.

The investigation identified the following causal factors:

- The crew's decision to land on rough waters without giving due considerations for a rejected landing and obstacles nearby

- Speed Boat moored to a buoy, close to the landing area

1. FACTUAL INFORMATION

Operator:	Maldivian Air Taxi Pvt. Ltd. (Maldivian Air Operator Certificate Holder No.005)
Aircraft Type:	DHC-6-300 (on CAP floats)
Aircraft Manufacturer:	De Havilland
Aircraft Owner:	Kenn Borek Air Ltd. (Canadian Company)
Nationality:	Maldivian registered
Registration:	8Q-MAS
Place of Accident:	Lagoon, North of Adaaran Club Bathala (04 04' 43.5" N, 072 56' 38.8" E)
Date and Time:	14th July 2008 at 1230 hrs

1.1 History of Flight.

14th July 2008 was a Monday; the busiest day of the week where there is an average of 150-200 movements.8Q-MAS completed six sectors prior to the accident, with the same flight crew.

Sixteen pieces of baggage were loaded, in the aft cabin, with total weight of 458 lbs. The flight manifest signed by Pilot in Command indicated that the aircraft was loaded up to 11874 lbs. The aircraft was boarded with 14 passengers (7 females, 6 males and 1 child) and the flight manifest used approved weights of 77lbs Child, 181 lbs for male and 141 lbs for female to calculate the aircraft weight. The aircraft had 930 lbs of fuel. This particular aircraft was a short nose twin otter aircraft, with main loading in aft cabin.

The MAT seaplane operation was based on a day VFR, non-schedule and a self dispatch system. All pre-flight duties were completed by the crew. The weather was windy and sea was rough. The aircraft departed at 12.11 hrs from MAT dock at Male International Airport, Water Aerodrome to Adaaran Club Bathala with 14 passengers total: 10 passengers to Adaaran Club Bathala, 2 passengers to Nika Maldives and 2 Passengers to W Retreat and Spa (Fesdu). The estimated flight time to destination was 20 minutes.

The W Retreat and Spa Maldives Resort's Speed Boat (Angelina) (a 34 ft Triana Express) was moored at a buoy (located at 04 04' 43.6" N, 072 56' 37.1" E) used by MAT to moor the aircrafts for night stops. The floating platform was located (04 04' 43.5"N, 072 56' 38.8"E) east of the buoy. The distance between the floating platform and buoy is around 165 feet.

Around 12:30 the aircraft approached for landing near the floating platform. The wind was on a westerly direction 20 to 25 knots and the aircraft approached for a westbound landing. The aircraft made an orbit over the lagoon to inspect the water. The aircraft did a touchdown and was cutting the wave tops to find an appropriate location to stop, when it hit a big wave and was airborne. The aircraft veered to the left.

The PIC declared to do a go around. The crew action was 10 degree flap, full throttle and Max Prop RPM.

On climb the aircraft collided with the Speed Boat and the aircraft veered to the right and PIC was able to land on LH float.

1.2 Injury to persons

Injuries	*Crew*	*Passengers*	*Total in the aircraft*	*others*
Fatal	0	0	**0**	**NIL**
Serious	00	00	**00**	**NIL**
Minor	00	00	**00**	**NIL**
None	**03**	**14**	**17**	**NIL**
Total	**03**	**14**	**17**	**NIL**

1.3 Damages to aircraft

RH float was detached from aircraft. Damages were observed on the keel of the RH float and leading edge of the float. 11 feet and 6 inches on the keel was crushed and a ruptured area of 3ft by 4 feet was observed halfway on the keel. The leading outer edge was scraped by approximately 1ft.

LH float was intact but it was twisted under fuselage. The RH engine and prop was detached from aircraft. The leading edge of the RH wing tip was dented and torn approximately 3 feet.

LH Ladders was twisted and obstructing the RH main door. The RH Ladder was detached from aircraft.

1.4 Other damage

The front railing of the speed boat was crushed; the LH windshield shattered, the bow was scratched.

An antenna on the RH side of the speed boat was detached due to the impact from the LH float. Starboard side light of the speed boat was also shattered due to the accident.

1.5 Personnel information

1.5.1 Captain –

Age:	33
Nationality:	Maldivian
Gender:	Male
Type of Licence:	Airline Transport Pilot Licence (Aeroplanes)
Medical issued on:	02 January 2008
Medical expires on:	1st February 2009
Type of medical:	Class 1
Licence issued on:	14 February 2008
Licence expires on:	14 February 2010
Types flown:	DHC-6 (on Maldivian licence)
Hours on type:	DHC-6 3150hrs
Ratings:	DHC-6 Float Plane
Last Proficiency check:	25.01.08
Total hours as PIC:	430hrs
Total flight time:	3150hrs

1.5.2 Co-pilot –

Age:	36
Nationality:	Canadian
Gender:	Male
Type of Licence:	Validation of Commercial Pilot Licence issued by Transport Canada (Aeroplanes)
Medical issued on:	24 April 2008
Medical expires on:	24 April 2009
Type of medical:	Class 1
Licence issued on:	29 April 2008
Licence expires on:	Perpetual
Types flown:	DHC-6 (on Maldivian Validation)
Hours on type:	127hrs
Ratings:	DHC-6 Float Plane
Last Proficiency check:	03 May 2008
Total hours as SIC:	127hrs
Total flight time:	2880hrs

1.5.3 Cabin Crew –

Age:	31
Nationality:	Maldivian
Gender:	Male
Licence issued on:	06 December 2005
Medical issued on:	11 August 2006
Medical expires on:	01 September 2008
Type of medical:	Class 2

1.6 Aircraft information

1.6.1 General information –

Aircraft manufacturer:	De-Havilland of Canada
Model:	DHC-6-300 Twin Otter
Serial number:	445
Year of manufacture:	1975
Nationality:	Maldivian
Registration marks:	8Q-MAS
Validity of C of R:	Perpetual
Validity of C of A:	20 Dec 2008
Name of owner:	Kenn Borek Air Ltd.
Name of operator:	Maldivian Air Taxi

1.6.2 Aircraft History –

Total flying hours since: -

- manufacture:	49129.7 hrs
- last periodic inspection:	110. 1 hrs

Last inspection carried out at TAT: 49019.6 hrs (EMMA #27)

1.6.3 Engines and propellers –

Right engine:

Manufacturer:	Pratt & Whitney (Canada)
Year of manufacture:	July 2001
Model:	PT6A-27
Serial number:	PCE-PG 0160
Last overhaul date:	New
Hours since overhaul:	8313.4 hrs
Last check carried out:	Emma #27
Hours since last check:	110.1 hrs

Left engine:

Gas Generator:-

Manufacturer:	Pratt & Whitney (Canada)
Year of manufacture:	No recorded
Model:	PT6A-27
Serial number:	PCE- 51073
Total Hours since new:	9009.5 hrs
Last overhaul date:	
Hours since overhaul:	5783.1 hrs
Last check carried out:	Emma #27
Hours since last check:	110.1 hrs

Power Section:-

Serial Number:	52560-100
Year of Manufcture:	1981
Total hours since new:	9335.4 hrs
Last overhaul date:	New
Last Check carried out:	Emma #27

Right propeller:

Manufacturer:	Hartzell Propellers Inc
Year of manufacture:	not known
Model:	HC-B3TN-3DY
Serial number:	BUA25717
Last overhaul date:	30 March 2007
Hours since overhaul:	1147.4 hrs
Last check carried out:	Emma#27

Left propeller:

Manufacturer:	Hartzell Propellers Inc
Year of manufacture:	not known
Model:	HC-B3TN-3DY
Serial number:	BUA22068
Last overhaul date:	02 Nov 2005
Hours since overhaul:	3045.6 hrs
Last check carried out:	Emma#27

1.6.4 Fuel –

Type of fuel used:	Jet A1
Amount of fuel on board:	930 lbs

1.6.5 Accessories – No Component failed.

1.6.6 Defects – RH Directional Gyro deferred under Mel item No. 34-12 Cat C.

1.6.7 Aircraft load –

Certified take-off mass:	12,500 lbs
Certified landing mass:	12,500 lbs
Take-off mass as per load sheet:	11,874 lbs

1.6.7.1 Load sheet

The load sheet served as the passenger manifest. A copy of the load sheet was retained with dispatch before take-off as required by the company Operations Manual

1.6.7.2 Payload

The payload was the aggregated weight of the pilots, the passengers and their baggage. Payload was not a contributing factor to this accident

1.7 Meteorological information

Meteorological report at Male International Airport at 1200hrs on 14th July 2008 was as follows:

Wind 330/26, Visibility 6km, Rain showers, Clouds scattered at 1500 ft, temperature 27 deg C, dew point 26, QNH 1011mb. The accident occurred during daylight; half an hour after noon (1230 hrs).

1.8 Aids to navigation

No Navigational aids were available at the site of landing. The aircraft was operating under VFR condition. Navigational aids were not a contributing factor of the accident.

1.9 Communications

Two VHF sets COM1 and COM2 were both serviceable at the time of departure. No communication problem was reported.

1.10 Aerodrome information

The area was licensed under Civil Aviation Department of the Maldives (License No AP/P/21). It was observed during the investigation that there were no specific areas marked for takeoff and landing at the site. It was up to the PIC to choose the most appropriate landing site after inspection. Platform was located (04 04' 43.5"N, 072 56' 38.8"E) within the landing area and was equipped with emergency equipments.

1.11 Flight Recorders

The aircraft was not fitted with any flight recorders and none was required by the regulation. (The aircraft is type certified below the weight category 5700kg; Refer MAR Series-C9, 4.2)

1.12 Wreckage and impact information

Floating platform was located at 04 04' 43.5"N, 072 56' 38.8"E and the mooring buoy was located at 04 04' 43.6"N, 072 56' 37.1"E. The speed boat was moored to her stern by a 23 feet mooring line from the buoy and the engines were off. The speed boat was heading Easterly with the currents.

The fist point of contact of the aircraft established was with the bow of the speed boat with the RH float of the aircraft approximately 1 meter above sea level. Upon impact the RH float and the RH engine detached from the aircraft.

At the time of site visit the RH float was located on the beach of Adaaran Club Bathala. Eyewitness accounts that the float was towed to the beach by a dhoni while it was drifting on the sea.

Most of the missing float parts were located between the buoy and the platform. The ruptured keel surface of the RH float was found at 04 04 43.5N, 072 56 38.8E.

The main wreckage of the aircraft was found facing West, tilted towards the left. The LH float was under the belly of the aircraft. The RH engine and RH prop were missing.

No component malfunctioning or technical fault was reported by PIC or the SIC prior or after touchdown.

1.13 Medical and pathological information

Examinations were performed on all the crew of the aircraft. There was no evidence of any pre-existing disease, alcohol, drugs or any toxic substance in either of the pilots which may have caused or contributed to the cause of the accident.

1.14 Fire

There was no evidence of fire before or after impact.

1.15 Survival Aspect

Aircraft came to a halt on the LH float and with no fire. The passengers were instructed and evacuated by the crew from the RH emergency exit.

Some passengers were rescued from the sea to the speed boat, which was involved in the accident.

Fuel leaked to the sea from the, severed fuel lines on RH engine. The Speed boat approached and switched off the engine to minimize any risk of fire.

1.16 Tests and research

No further tests were conducted on any equipment as the cause of the accident was evident.

1.17 Organizational and management information

The company is a Civil Aviation Department (CAD) approved Air Operator Certificate Holder. Operations were conducted in accordance with CAD approved Operations Manual.

Regular inspections and periodical flight checks were conducted on the company and crew respectively by CAD to verify compliance and competency. The company had undergone a ramp check on 27th February 2008. A documentation inspection was carried out on 17th December 2007. Base inspection was carried out on 17th June 2007.

The company has an approved Flight Safety Manual.

1.18 Additional Information

None

1.19 Useful or Effective Investigation Techniques

Material evidence was collected from the speed boat and the area of accident.

2. ANALYSIS

It was observed by the investigation team that;

- The Speed boat was moored to a buoy located west of Floating Platform. The buoy is used by MAT to moor the aircraft when they do a night shut down. Investigation revealed that the Captain of Speed Boat was not aware of any restriction of mooring the speed boat at the buoy as it has been a practice for the past two years. It was also evident that no safety zone has been publicized by CAD Maldives.

- At the time of accident weather was bad and sea was rough. It was evident that no set guidelines by MAT or regulations by CAD have been published for the crew on operating seaplanes on bad weather. The decision to choose an appropriate landing area is left up to professional judgment of the PIC.

- PIC evaluated the situation by doing an orbit around the lagoon; however did not give enough consideration for a rejected landing, hence could not encounter for any obstacles in its path.

- The crew of the aircraft acted swiftly to save lives, after the aircraft came to a halt.

- Investigation revealed that some metal parts of float were embedded in the bow of speed boat, indicating the aircraft float had impacted with the speed boat.

- Investigation also revealed that some of the metal parts found underwater near the buoy had pieces of broken glasses inside it and paint of speed boat. This further gives an indication that the right float had impacted with the speed boat.

- The measurements of the impact marks on the speed boat and the RH float suggests that it had both come in contact, taking into account the ruptured area of the RH float.

3. CONCLUSIONS

(a) Findings

- The PIC was qualified, well experienced, competent, adequately rested and medically fit to conduct the flight.
- The SIC was adequately rested, medically fit and competent to perform the role of 'second pilot' as specified in the Company Operations Manual.
- The aircraft was within the certified weight limitations for both take–off and landing.
- The aircraft was serviceable for take-off and landing.
- The aircraft was airborne after hitting a big swell while landing.
- The aircraft was not able to do a safe go around due to the obstacle (speed boat).
- No publication has been issued by CAD establishing a safe zone or obstacle free zone for takeoff and landing area of sea plane.
- PIC did not take in to consideration the obstacles in the landing area for a missed approach or rejected landing.
- No Operational guidelines by MAT or a regulation by CAD has been issued on rough water operations of sea plane.
- No warning or caution signs evident on the floating platform indicating for general public that the area or the platform is for sea plane operational purpose only.

(b) Causal Factors

- The crew’s decision to land on rough waters without giving due considerations for a rejected landing and obstacles nearby was a causal factor.
- The Speed Boat moored to a buoy, close to the landing area was also a causal factor.

4. RECOMMENDATIONS

The following recommendations were made on 20 July 2008:

Recommendation 4.1

CAD to publish designated safe landing areas for sea plane operations and limit, unauthorised movements of boats around this area by strengthening the existing regulations.

Recommendation 4.2

Operators to develop procedures for operating on rough water conditions and train crew to take obstacles in to considerations for rejected landings / take-off and similar emergencies.

Recommendation 4.3

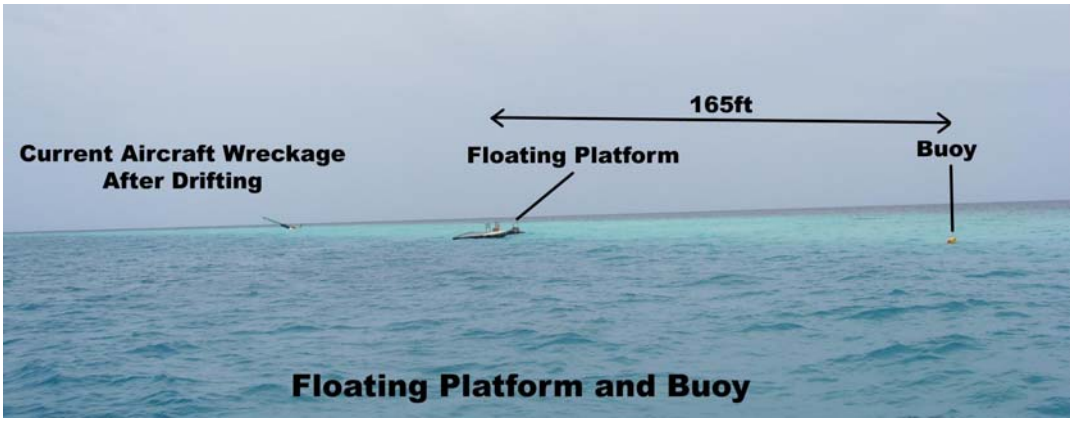
Operators to give additional training to boat crew on safety aspect, while operating near aircraft manoeuvring areas and floating platform.

Recommendation 4.4

Operators to mark the Floating platform with appropriate warning or cautionary notice to indicate the floating platform is used for seaplane operation purpose only

2008-07-20

5. APPENDICES



Aircraft Drifting During Rescue

RH Damaged Float

Speed Boat Angelina

Damage to Bow Speed Boat

END OF REPORT