



**Australian Government**

**Australian Transport Safety Bureau**

# Collision with a tree involving the airboat *Gale Force*

Sweets Lagoon, Northern Territory, on 22 June 2019

**ATSB Transport Safety Report**  
Marine Occurrence Investigation  
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#### Addendum

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# Safety summary

## What happened

On 22 June 2019, the airboat *Gale Force* was operating on a wetlands tour. The tour involved sections of at-speed driving through Sweets Lagoon, 55 km to the south-west of Darwin, Northern Territory. The tour was along a well-defined, at times shallow, muddy and vegetation-covered watercourse through open swampland. While negotiating a turn, control of the airboat was lost, resulting in collision with a tree. The airboat driver and the four passengers on board were injured. The airboat was damaged and disabled, requiring removal ashore for repair.

The passengers and the airboat driver received first aid and were evacuated to Darwin for further treatment. The airboat driver and two of the four passengers were taken to Darwin hospital for treatment and were discharged later that day. The remaining two passengers only required first aid.

## What the ATSB found

While negotiating a turn to starboard, the airboat was slightly off-track with insufficient reserve engine power to drive the boat safely through the turn. The stern likely rode up and skipped over the mud and plant surface, control was lost, leading to the airboat spinning and impacting the tree stern-first on the starboard side.

The ATSB also identified that operational limitations, such as safe speed, which would have reduced the likelihood of the collision and reduced the injury consequences, had not been fully identified and implemented.

## What's been done as a result

Outback Floatplane Adventures have updated safety management system procedures and requirements to better reflect the company's focus away from 'adrenaline-based', toward 'nature-based' tours. Specific airboat training, guidance and competency requirements have been implemented along with updated emergency procedures. Prior to taking command, airboat skippers are to be competent in operating the designated airboat in specific tour areas.

## Safety message

All business operations should be carefully and regularly assessed for risk. Such assessments should include specific, targeted appraisal of vessel operations as well as the suitability of passengers to undertake tours. In addition to responding to an emergency situation, particular attention should be paid to identifying and implementing safety controls to reduce the likelihood and consequence of an incident.

# The occurrence

## What happened

At about 0630 Central Standard Time<sup>1</sup> on 22 June 2019, eight guests arrived at the Outback Floatplane Adventures (OFA) office at Darwin Airport, Northern Territory. They had all booked on the OFA 'half day ultimate adventure tour' and had been transported to the OFA office to complete formalities and commence the tour. At the office, the passengers signed documentation to acknowledge that they had read, understood and agreed to conditions on an indemnity form. This form provided the passengers with some awareness of the risks involved in the tour and advised them to listen to and obey all OFA directions. The passengers were also shown a short aviation safety video prior to boarding the flight from Darwin to Sweets Lagoon, the site of the tour.

Sweets Lagoon is about 55 km south-west of Darwin and the flight, in OFA's float plane, took about 20 minutes. The eight passengers and pilot arrived at the Sweets Lagoon pontoon at about 0730 and were greeted by the airboat skipper and the site host. A helicopter pilot who was also qualified to drive airboats was also at the lagoon.

The tour activities proceeded as planned. Initially, all guests were taken on a one-hour breakfast cruise of Sweets Lagoon on board the custom house boat *Cyclone Creek*. This was followed by a one-hour rainforest cruise on board the airboat *Gale Force* (Figure 1).

**Figure 1: *Gale Force***



Source: Outback Floatplane Adventures

Prior to boarding the airboat, a safety briefing was conducted during which passengers were instructed to remain seated unless advised otherwise by the skipper and to remain within the airboat at all times. The locations of emergency equipment (fire extinguisher, life ring, radio, satellite phone and first aid kit) were pointed out and passengers informed that the tour would remain within mobile phone range at all times. All passengers donned life jackets and were provided with hearing protection against the noise of the airboat engine and fan. Finally, passengers were advised to hold on to the seat in front in the event of a need to brace. However, no specific advice was given to occupants of the front row regarding how to brace.

The rainforest tour was held in a watercourse off the southern end of the lagoon. It was a slow-paced tour winding along confined tracks through the surrounding forest. The tour included regular stops to view the wildlife and scenery. Once completed, the tour returned to the pontoon.

<sup>1</sup> Central Standard Time (CST): Coordinated Universal Time (UTC) + 9.5 hours.

At the pontoon, the tour party was separated into two groups of four. One group remained at the pontoon while the other group were taken on a ‘hot lap’ wetlands tour in *Gale Force*. The passengers could not recall any specific notice of what this tour would involve. The tour progressed without incident and the four guests remaining at the pontoon could clearly hear the airboat. The impression gained was that this tour would be more fast-paced than the earlier rainforest tour and would be more exhilarating.

The first tour group returned about 15 minutes later. The passengers appeared impressed and happy with the ride. The second group of four, consisting of two couples, then boarded. The skipper directed them to sit in the front row of seats. The tour departed and the airboat proceeded at low speed, away from the pontoon, off the lagoon and into a nearby watercourse. The tour passed through a narrow, winding, treed area, along a clearly defined channel, and entered a more open swampland area. From here, the airboat speed was increased.

A few minutes into the ride, the airboat was at speed when the track into a turn to starboard was slightly misjudged and control was lost. The airboat’s stern swung to port and left the channel. The starboard aft corner of the airboat swung round and made contact with a tree a few metres from the water’s edge (Figure 2).

**Figure 2: Location of the collision**



Source: Outback Floatplane Adventures; annotated by the ATSB

The impact threw the occupants backwards and then, as momentum swung the bow round, they were propelled forward, out of their seats. The skipper was injured and dazed from being thrown against the airboat side cage. The passengers sustained varying degrees of injury, including cuts and bruising, depending on where they were seated.

The skipper stopped the airboat engine, and gathered the first aid kit and passed it to the passengers. The skipper then telephoned the staff at the pontoon, reported that the collision had occurred and that the airboat was disabled. Immediate assistance was requested including pick-up using the stand-by airboat stationed at the pontoon.

About 15 minutes later, the skipper and passengers were transferred to the second airboat and returned to the pontoon. A short time later, all eight guests and *Gale Force*'s skipper boarded the float plane for return to Darwin. OFA staff arranged medical transport to meet the aircraft upon its arrival and the skipper and two of the passengers were taken to Darwin hospital for further assessment and treatment. All three were released from the hospital later that day. The other two passengers only required first aid.

*Gale Force* was retrieved from the site and taken ashore for inspection and repair. The airboat had damage to the fan, the protective cage and the hull and the transom had been pushed to port by the impact (Figure 3).

The airboat was stripped and the hull repaired. New components were obtained and fitted and the airboat was inspected, surveyed and approved prior to returning to service.

**Figure 3: *Gale Force* stern damage**



Source: Outback Floatplane Adventures

## **Regulation**

The regulatory requirements for vessels such as *Gale Force* were set out in the *Marine Safety (Domestic Commercial Vessel - DCV) National Law Act 2012*<sup>2,3</sup> and associated standards and regulations. Specific requirements were dependent upon factors such as the category of vessel, its date of construction, its size, and its intended operation. While there was no definition of ‘airboat’ in the National Law, the Australian Maritime Safety Authority (AMSA) advised that they were considered to be a novel, or special, vessel.<sup>4</sup>

## **Certificate of operation**

The key mechanism in the National Law relating to safe operations was the certificate of operation. The certificate of operation sets out the conditions under which a domestic commercial vessel, or fleet of vessels, must operate. These included details of the vessels used, how and where the vessels could operate, and other conditions AMSA considered necessary due to the nature of either a vessel or an operation.

<sup>2</sup> Domestic commercial vessel means a vessel that is for use in connection with a commercial, governmental or research activity.

<sup>3</sup> The *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* (the national law) information is available at [www.amsa.gov.au/about/regulations-and-standards-vessels/national-law-act](http://www.amsa.gov.au/about/regulations-and-standards-vessels/national-law-act).

<sup>4</sup> The National Standard for Commercial Vessels (NSCV), Part B, Chapter 3, paragraph 2 states that the regulator may categorise a vessel as novel if it does not have the shape, form, function or propulsion power of most vessels of a similar kind. The NSCV is available at [www.amsa.gov.au/about/regulations-and-standards/national-standard-commercial-vessels-nscv](http://www.amsa.gov.au/about/regulations-and-standards/national-standard-commercial-vessels-nscv).

### **Safety management system**

One requirement of the National Law was that the vessel must have a safety management system that complied with the requirements in marine order 504.<sup>5</sup> A safety management system (SMS) is the key way that vessel owners are expected to manage the risks of their operation and the regulations require that all operations are covered by a SMS.<sup>6</sup>

With regard to the operation of airboats in particular, AMSA expected that the SMS would include:

- a comprehensive risk assessment which addressed (identified and controlled) organisational and operational risks including risks to people, the vessel, the business, and the environment
- detailed information on:
  - passenger management and passenger safety including briefings
  - emergency management, including how to deal with incidents in remote, difficult to access locations
  - communications
  - training, including that specific to airboat operation.

To fulfil the requirements of the National Law Act, OFA held a certificate of operation and maintained a system of safety.

### **Outback Floatplane Adventures**

Outback Floatplane Adventures (OFA) offered seasonal tours of the Northern Territory's natural and wildlife sights from its base in Darwin.

OFA had implemented a safety management system which addressed the operational requirements specified in marine order 504. This included the following documents:

- a safety management system—updated September 2018
- a standard operations manual
- an employee handbook—updated March 2018.

OFA required that the minimum competency as airboat skipper was to hold a Coxswain grade 1<sup>7</sup> near coastal qualification. Since assuming control of the company, the current management focus had shifted from one of promoting the adrenaline/thrill side of company tours, to emphasising the natural aspects (scenery and wildlife). The guests interviewed as part of this investigation confirmed that the appeal of the airboat tour experience did not require the adrenaline component. This shift in approach included updating of company promotional products in conjunction with changes in operating procedures and verbal instruction to staff. Airboat operating speeds were reduced and previous airboat coxswain guidance regarding spins and fast laps was removed from procedures. These changes were implemented prior to this occurrence.

### **Airboat skipper-coxswain**

*Gale Force's* skipper had worked in various positions within the tourism industry for more than 10 years. The skipper had obtained a Coxswain grade 1 certificate of competency in 2015 while working on board a dive boat. Since that time, the skipper had continued in the tourism industry commanding a variety of different small tourism vessels in northern Australia waters. In 2018, the skipper drove a five-person airboat conducting private tours of a buffalo station in the Northern Territory, and after about six months moved to Darwin and commenced with OFA. Under the

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<sup>5</sup> Marine Order 504 (Certificates of operation and operation requirements — national law) 2018. Available at [www.amsa.gov.au/about/regulations-and-standards](http://www.amsa.gov.au/about/regulations-and-standards).

<sup>6</sup> Further information is available at [www.amsa.gov.au/vessels-operators/domestic-commercial-vessels/safety-management-systems](http://www.amsa.gov.au/vessels-operators/domestic-commercial-vessels/safety-management-systems).

<sup>7</sup> The Coxswain grade 1 near coastal qualification allowed the holder to command, and operate the engines of, a vessel less than 12 metres long with unlimited outboard engine propulsion, or inboard engines less than 500 kilowatts in inshore waters.

supervision of OFA's experienced airboat skipper, this skipper commenced conducting tours on *Gale Force*, starting with the rainforest tour, for the final few weeks of the 2018 season.

The OFA 2019 tour season commenced in March. *Gale Force's* skipper was assessed by the OFA representative as competent and assigned full operation of the airboat for both tours. Prior to the collision, *Gale Force's* skipper had a total of almost 500 hours experience as an airboat driver.

At the time of the incident, new airboat drivers worked in a 'buddy' system with an experienced OFA airboat driver. Once considered competent, the candidate was given command of the airboats and ultimately the responsibility as tour manager for the Sweets Lagoon airboat operations.

### ***Gale Force***

*Gale Force* met the requirements applying to Australian DCVs which included having a unique identifier, a certificate of survey, a certificate of operation and was crewed by suitably qualified persons. *Gale Force* was an Australian-registered domestic commercial vessel in survey as a class 2E vessel—certified to carry 12 unberthed passengers and 1 crewmember on smooth waters in daylight hours only. It is square-bowed, 7.5 m long with a 2.5 m beam and hull depth of 0.870 m aft tapering to 0.575 m at the bow. Freeboard was about 0.5 m, fully loaded, measured three-quarters of the length from the bow. The hull bottom was fitted with a 12 mm-thick nylon sheet as a protective and lower friction surface for driving over vegetation or mud.

On board, the passengers were accommodated in three rows of bench seats, separated by a centre aisle into port and starboard seats each able to hold two people. The rows were step-mounted from the bow to aft—the first row was below the gunwale, the second level with it and the third above it. The driver's seat was mounted on the centreline behind and above the third row of passenger seats. Behind the driver, mounted within a protective cage, were the 415 kW engine, fan and rudders.

*Gale Force* was built by Diamondback Airboats, Florida, United States in 2013. The vessel passed survey in Australia in 2013, and entered service with OFA soon after. The airboat was delivered with passenger seatbelts which were removed after discussions between the owner and the regulator. The operating conditions were to be in smooth, shallow waters at low speed, and it was thought the restraints would increase the risks to passengers should the airboat turn over.

However, *Gale Force* was fitted with minimal other forms of passenger restraint—low backed bench seats with end rails only and side fences extending well above seat height. Occupants of the second and third rows could hold on to the seat in front but the front row passengers were essentially unrestrained in the case of a sudden stop.

Furthermore, the risk of injury to airboat occupants in the event of a sudden stop, such as collision, was not specifically assessed. Even at slow speeds, it is possible for people and equipment to be thrown about in an unsafe manner. Protection measures, such as some form of restraint or additional grab bars, were not available to all passengers, resulting in injuries during the collision.

### ***Previous incident***

In 2016, *Gale Force* was involved in a collision on Sweets Lagoon with another airboat operated by OFA. As a result of that incident, operating procedures were updated and track signage was improved. At the time of this occurrence, the Sweets Lagoon tour operations had changed to operating only one airboat at a time in the area.

### ***Airboats***

Airboats are unlike other craft in design, operation and capability. They are suited to specialised types of work in shallow, vegetation-choked, or muddy conditions where conventional craft cannot

travel. Generally, airboats have shallow draught, are flat-bottomed, and have a high centre of gravity and low freeboard. They often have large amounts of engine power. Weight distribution, surface conditions (including the presence of mud and vegetation) and power significantly affect their stability and handling.

#### ***Airboat handling/manoeuvrability***

Power is required for both control and propulsion. Engine power is necessary to force air over the rudder to initiate and complete turns. The combination of power and speed are used to force the rear of the boat to ride up onto the surface of the water and slide through a turn. However, when the operator reduces power, significant steering ability is lost. Essentially, a good operating speed is the slowest speed that will maintain the boat on the plane. This provides control with minimal draught yet is slow enough to stop or to take evasive action if needed.

Although the most basic operator instructions are relatively simple, the subtleties and skills required for safe operation are quite complex. Sufficient experience and good judgement of the operator are essential for safe airboat use.

## **Safety analysis**

### ***The incident***

As the airboat was being driven through a confined swampland watercourse on the second wetlands tour, it was at or near full throttle when going into a turn to starboard. In contrast to the earlier tour, the approach into the turn was misjudged and the airboat was slightly off track to port. In this area, the channel narrowed and the surface of the water was broken by grass, water plant and mud patches (Figure 2).

As the airboat crossed this surface, it rode up onto the material and control was lost. The airboat engine was at full throttle and there was insufficient reserve power available to drive the boat forward and through the turn. Consequently, the stern swung to port, through about 120°, and left the channel. The stern swung round until the starboard quarter impacted a tree a few metres from the water's edge.

### ***Risk assessment***

The Outback Floatplane Adventures safety management system documents contained several risk tables, principally concerned with business, environmental and personnel risk. The change in management focus had reduced operational risk through lowering airboat speeds and it would be reasonable to expect that the new airboat operating conditions, while driving within constricted and changeable waterways, would also have been assessed and documented. However, at the time of the incident, the risks associated with the airboat operations, such as a collision (which still existed), were not explicitly documented.

Therefore, measures to prevent such an occurrence and to limit the consequences were not shown to have been considered or implemented. Such measures would include detailed airboat operational guidance and assessment of occupant restraint arrangements.

While the company had changed the tourism focus away from adrenaline/thrill activities, the amended tour operations had not been assessed in sufficient depth. Consequently, lingering risks associated with the ways the tours were conducted, and in which the airboat was operated, were not fully identified and implemented.

## Findings

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

- *Gale Force* was being driven, at speed, through a confined swampland watercourse when the track and engine power into a turn were misjudged. During the turn, the stern likely rode over the changing water surface, spun round and impacted a tree.
- Operational limitations, which would have reduced the likelihood of the collision and reduced the injury consequences, had not been fully identified and implemented.

## Proactive safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

### ***Outback Floatplane Adventures***

Outback Floatplane Adventures has advised the ATSB that they have taken the following proactive safety actions:

- reduced the speed of operation of the airboats
- updated the safety management system documents, procedures and processes
- implemented specific airboat training, operational guidance and competency requirements, relating to airboat stability and driving
- introduced updated and expanded procedures for emergency preparedness.

The future assessment of suitably qualified airboat skippers will be conducted by an independent and experienced airboat operator. The assessment will ensure that, prior to taking command, the skipper is competent in airboat operations in the tour areas and on the specific vessel they will be in charge of.

# General details

## Occurrence details

Date and time:	22 June 2019 – 1010 CST	
Occurrence category:	Serious incident	
Primary occurrence type:	Collision with tree	
Location:	Sweets Lagoon, 55 km south-west of Darwin, Northern Territory	
	Latitude: 12° 53.03' S	Longitude: 130° 34.08' E

## Ship details

Name:	<i>Gale Force</i>	
Unique Identifier:	429374	
Flag:	Australia	
Type of operation:	Tourism – smooth waters, 12 passengers or less	
Departure:	Sweets Lagoon, Northern Territory	
Destination:	Scenic wetlands tour	
Injuries:	Crew – 1 serious	Passengers – 2 serious, 2 minor
Damage:	Hull panel damage and transom pushed to port. Propeller, rudders and guard damaged.	

## About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: 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 that fall within the ATSB's jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to operations involving the travelling public.

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

### Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine 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.

### About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.