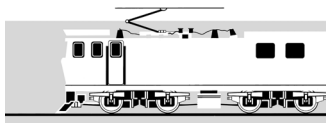
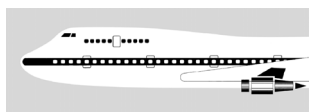


MARINE OCCURRENCE REPORT

03-203 jet boats *Wilderness Jet 3* and *un-named private jet boat*, collision, 2 February 2003
Dart River, Glenorchy, Queenstown, New Zealand



TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND

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Report 03-203

jet boats *Wilderness Jet 3 and un-named private jet boat* collision

Dart River, Glenorchy, Queenstown, New Zealand

22 February 2003

Abstract

On Saturday 22 February 2003 at about 1130, the commercial jet boat *Wilderness Jet 3* was travelling downstream on the Dart River, with a driver and 4 passengers on board, when it collided with *Private Jet Boat* proceeding upstream with a driver and one passenger on board. The boats came to rest on a shingle bank with the commercial boat on top of the private boat. The *Private Jet Boat* was extensively damaged. Both drivers and 4 of the passengers sustained minor injuries.

Safety issues identified included:

- the concentration of traffic on the Dart River
- the radio traffic on the Dart River
- the promulgation of information concerning private jet boaters on the river
- the training of persons in charge of a pleasure craft.

Safety recommendations were made to the Chief Executive of Queenstown Lakes District Council, the Managing Director of Dart Wilderness Adventures and the General Manager of Dart River Safaris.



(Photo courtesy of T. Mills)

The *Wilderness Jet 3* and the *Private Jet Boat* at the accident site

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Abbreviations

GRP	glass reinforced plastic
km/h	kilometres per hour
UTC	universal co-ordinated time
VHF	very high frequency

Glossary

knot	one nautical mile per hour
midstream	centre of the main channel flow
port	left-hand side when facing forward
shoaling	shallowing of the water
starboard	right-hand side when facing forward
true river left	left-hand side of the river when proceeding downstream
true river right	right-hand side of the river when proceeding downstream

Data Summary

Vessel Particulars:

Name:	<i>Wilderness Jet 3</i>	<i>Private Jet Boat</i>
Type:	commercial jet boat	private jet boat
Class:	passenger (under 6 m)	private
Limits:	Dart River	n/a
Allowable occupants:	driver plus 6 passengers (at drivers discretion)	seating for driver plus 3 passengers
Length:	16 feet [4.877 m]	15 feet [4.57 m]
Construction:	aluminium alloy	aluminium/GRP
Built:	1999	1994
Propulsion:	Chevrolet 350, 8 cylinder engine driving a HJ 212 Hamilton water jet unit with a HJ series 2 tail housing.	Chevrolet 350, 8 cylinder engine driving a HJ 151A mk.II Hamilton water jet unit with a HJ 773 tail housing.
Normal Operating Speed:	70 kph	90 kph
Owner/operator:	Dart Wilderness Adventures	private
Date and time:	22 February 2003 at about 1115 ¹	
Location:	Dart River, Glenorchy, Queenstown, New Zealand	
Persons on board:	crew: 1 passengers: 4	crew: 1 passengers: 1
Injuries:	crew: 1 minor passengers: 3 minor	crew: 1 minor passengers: 1 minor
Damage:	minor to port shoulder of boat	extensive to whole boat
Investigator-in-charge:	Captain IM Hill	

¹ Times in this report are New Zealand Daylight Time (UTC + 13 hours) and are expressed in the 24-hour mode.

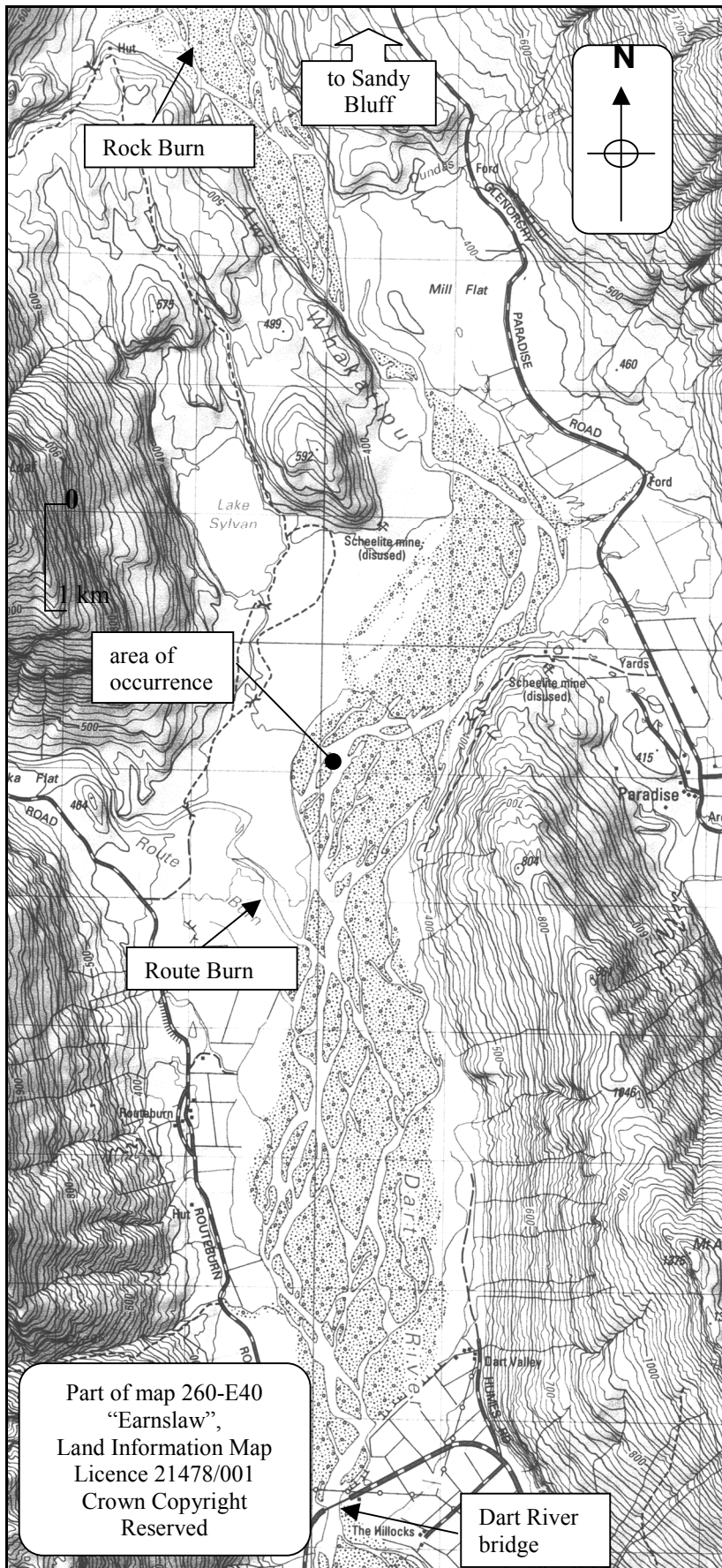


Figure 1
 General area of the accident (note braids in the river are indicative only due to continual changing of the channels)

1 Factual Information

1.1 History of the trips

- 1.1.1 At about 0850 on 22 February 2003, after the driver completed his pre-trip checks, the Dart Wilderness Adventures jet boat *Wilderness Jet 3* left the Glenorchy marina for Blanket Bay Hotel, to collect 2 passengers. The boat then returned to Glenorchy marina to collect 2 more passengers before departing at about 0905, for its first trip of the day on the Dart River.
- 1.1.2 At about 1000, a group of private jet boaters, who had arrived in Glenorchy the night before, commenced putting their boats into the water at Glenorchy marina. At the same time, jet boats from Dart River Safaris were being launched and made ready for their commercial trips on the Dart River.
- 1.1.3 One of the private jet boats required workshop facilities to rectify a mechanical fault. The Dart River Safaris workshop was used to carry out the repair.
- 1.1.4 Once all launched, the private jet boats formed into a loose convoy of about 12 boats, and travelled across Lake Wakatipu and up the Dart River.
- 1.1.5 Meanwhile *Wilderness Jet 3* completed the trip up the Dart River without incident arriving at Sandy Bluff at about 1010. After a short stop at Sandy Bluff *Wilderness Jet 3* began the journey downstream stopping at 2 notable tributaries, the Beans Burn and the Rock Burn, where the passengers were allowed to disembark for a short time and a commentary on the local area was given.
- 1.1.6 *Wilderness Jet 3* departed the Rock Burn and continued the trip down the river. After passing Paradise and shortly before the Route Burn confluence, *Wilderness Jet 3* passed round a right-hand bend in the river and encountered 2 private jet boats, the first of the private convoy.
- 1.1.7 The 2 private jet boats were travelling upstream on their left-hand side of the river while *Wilderness Jet 3* was travelling downstream in the deepest part of the channel but towards its left-hand side. All the boats maintained their respective tracks and passed clear of each other, although they were on the incorrect side of the river as required by the maritime regulations.
- 1.1.8 As *Wilderness Jet 3* passed the 2 private boats the driver saw another private jet boat in the distance, which also appeared to be travelling on the left-hand side of the river. The commercial driver, wanting to get back onto his correct side of the river, altered course to starboard to gain the right-hand side of the river. The driver of *Wilderness Jet 3* later said that he made the alteration of course in such a way that he threw a “rooster tail”² into the air.
- 1.1.9 The driver of *Private Jet Boat* said that he saw *Wilderness Jet 3* as it rounded the bend of the river upstream and passed the 2 private jet boats ahead of him on their starboard side.
- 1.1.10 Having gained the true river right, the driver of *Wilderness Jet 3* changed course slightly to port to follow the curve of the river. At this time he noted that the *Private Jet Boat* was still proceeding towards him.
- 1.1.11 The driver of the *Private Jet Boat* saw *Wilderness Jet 3* alter course to starboard to move to the true river right and so altered his course to starboard to give the *Wilderness Jet 3* more room to come down his port side. He then saw *Wilderness Jet 3* alter course to port, back towards the centre of the river. Thinking that the commercial driver had changed his mind about which side

² A projected mass of fine particles of water in the air having an arced shape similar to that of a rooster's tail. The driver of a jet boat can form it by adjusting his jet direction rapidly. It is a common method amongst jet boat drivers to signify an alteration of course.

the boats would pass, the *Private Jet Boat* driver altered course back to port to continue his previous track and follow the private jet boats ahead of him.

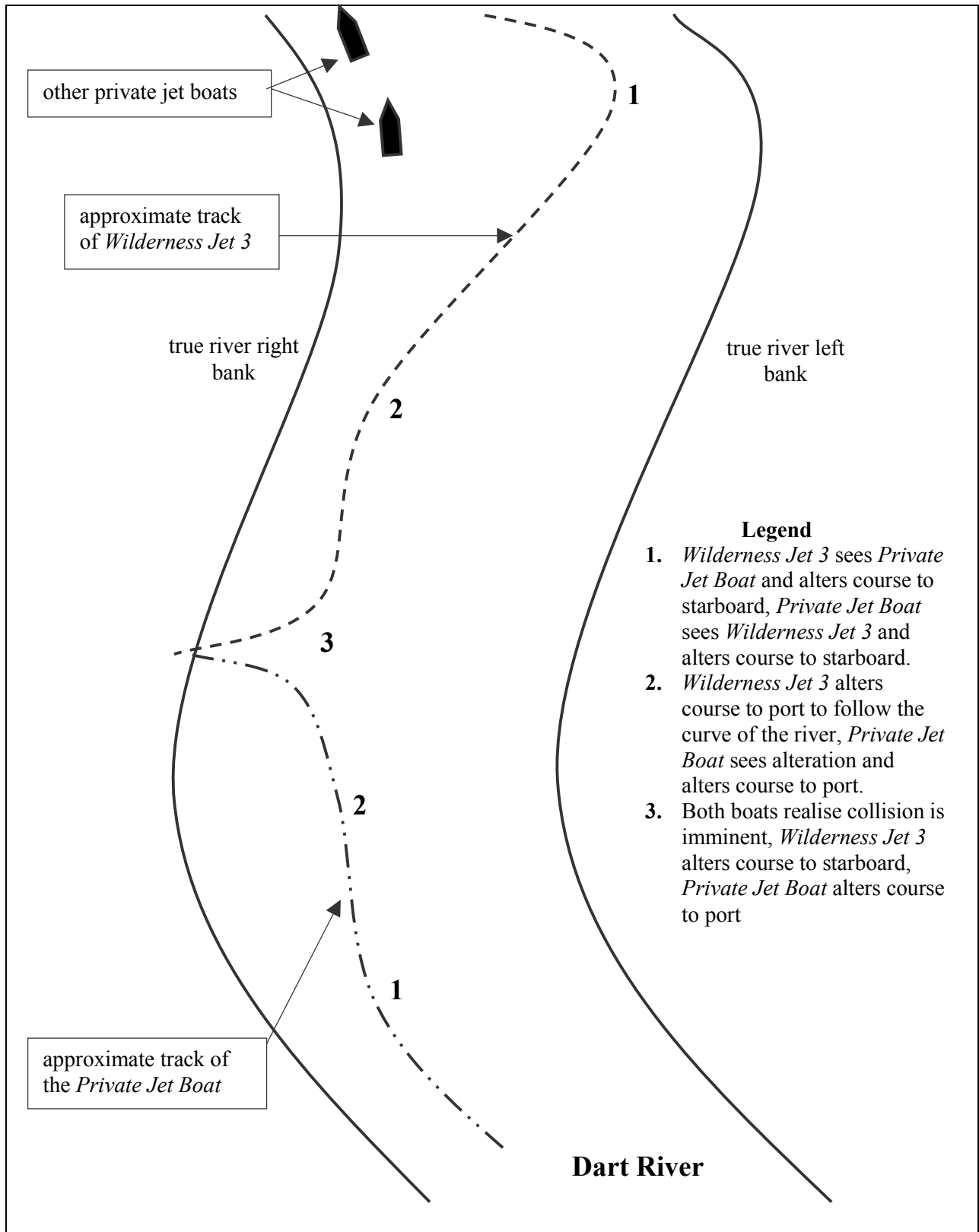


Figure 2
Approximate tracks of the *Wilderness Jet 3* and the *Private Jet Boat* (not to scale)

- 1.1.12 The driver of *Wilderness Jet 3* started to slow his boat by reducing the throttle. He stated that as the boat came off the plane, and settled in the water, he felt the stern of the boat just touching the riverbed and heard the water intake starting to pick up gravel. He increased the throttle so the boat would go back on the plane and maintain directional control.
- 1.1.13 The driver of the *Wilderness Jet 3* realised that he was in danger of colliding with the *Private Jet Boat*, so he took evasive action by going hard to starboard intending to beach the boat on the shingle bank.
- 1.1.14 At the same time, the driver of the *Private Jet Boat* also realised that collision was imminent so he took similar evasive action by altering course to port, also intending to beach his boat on the shingle bank.
- 1.1.15 Just prior to beaching, the port bow of *Wilderness Jet 3* collided with the starboard bow of the *Private Jet Boat*. The force of the collision and the rotational force induced by its driver going hard to starboard caused the *Wilderness Jet 3* to spin; its stern being forced up out of the water before coming to rest on top of the stern of *Private Jet Boat*.
- 1.1.16 Both boats beached on a shingle bank in the middle of the river. Other members of the group of private jet boaters beached their boats nearby and came to give assistance to the occupants of both boats.
- 1.1.17 The driver of another Dart Wilderness Adventures jet boat following *Wilderness Jet 3* downstream came round the bend in the river, and saw the 2 beached boats. He reversed his course and disembarked his passengers at a safe spot, before making his way to the scene of the accident to give assistance.
- 1.1.18 The driver of *Wilderness Jet 3* made a call on his very high frequency (VHF) radio advising Dart Wilderness Adventures base of the accident and requesting medical assistance. The base staff contacted emergency services who dispatched an ambulance to the Dart River Bridge. The base staff also contacted the Queenstown Lakes District Harbourmaster to report the accident.
- 1.1.19 The driver of the second Dart Wilderness Adventures boat took the driver and passengers of the *Wilderness Jet 3* to the Dart River Bridge to be met by the ambulance. He then returned to collect his own passengers and finish his trip back to Glenorchy marina.
- 1.1.20 The *Wilderness Jet 3* was re-floated and towed downstream to a safer mooring where the engine was restarted prior to the boat returning to the Glenorchy marina under its own power, driven by a Dart Wilderness Adventures driver who had been a passenger in the boat.
- 1.1.21 The *Private Jet Boat* was towed to a position where it could be recovered overland, before the private jet boaters, including the driver and passenger of the damaged jet boat who had declined medical assistance, continued up river for their excursion.

1.2 Passengers' perspectives

- 1.2.1 The passengers of the 2 boats had differing perspectives and recollections of the accident.
- 1.2.2 The passenger in the *Private Jet Boat* was sitting on the right-hand side of the boat's cockpit and saw the *Wilderness Jet 3* turn to starboard to come across to the true river right, then alter back to port. It then appeared to her that the *Wilderness Jet 3* altered course to starboard again and came directly towards the *Private Jet Boat*.
- 1.2.3 The 2 front seat passengers of *Wilderness Jet 3* saw the first 2 private jet boats on their right-hand side and then the third private jet boat on their left-hand side proceeding up the river. They were aware of their driver veering to the right to cross the river flow and their perception of the *Private Jet Boat* was that it turned in towards them shortly before the collision.

- 1.2.4 The passenger in the rear left-hand seat behind the driver of *Wilderness Jet 3* saw the first 2 private jet boats pass to the right, he then saw the third private jet boat at a distance of 200 to 300 m away. He was not aware of *Wilderness Jet 3* making a major alteration of course, but he was aware of the *Wilderness Jet 3* slowing down but did not hear any gravel being picked up by the water intakes. He saw the *Private Jet Boat* apparently swerving in the river as if unsure which way to go before finally turning directly towards the *Wilderness Jet 3*.
- 1.2.5 The passenger in the rear right-hand seat was a professional jet boat driver with experience in jet boats and their operations in different locations around the world. He was a new employee of Dart Wilderness Adventures and was taking the trip as a familiarisation exercise. He saw the first 2 private jet boats on the true river right as *Wilderness Jet 3* came out of a right-hand bend slightly to the true river right of the deepest flow. He also saw the third private jet boat in the distance with a large gap between the second and third boats. He was aware that when *Wilderness Jet 3* was abeam the second private jet boat the driver made a distinct turn to starboard throwing a rooster tail into the air to indicate his action. He thought the driver of the third private jet boat matched this turn, and the 2 subsequent turns to starboard the driver of *Wilderness Jet 3* made, with a corresponding turn to port. As *Wilderness Jet 3* made its final turn to starboard the passenger lost sight of *Private Jet Boat* due to *Wilderness Jet 3* banking in the turn. Throughout these manoeuvres he was not aware of any indication that the jet unit was picking up gravel, however, he was aware of the boat slowing down.

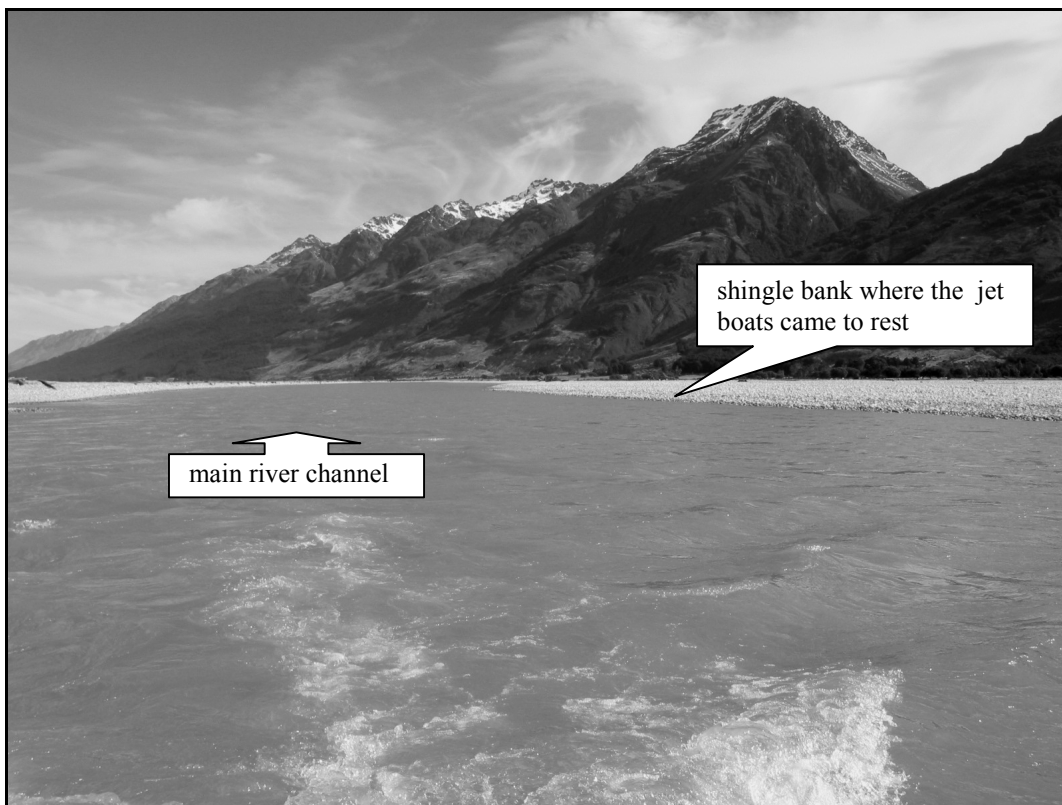


Figure 3

View of Dart River at the scene of the collision looking downstream, true river right is to the right of the picture

1.3 Post accident

- 1.3.1 After the accident it was stated by the driver and some of the passengers of the *Wilderness Jet 3* that the driver of the *Private Jet Boat* was seen to be consuming alcohol after the accident while he was on the shingle bank. When the driver of the *Private Jet Boat* was asked about this he replied that a friend had given him a beer as he was a bit shaky after the accident. He also said that he had not been consuming alcohol earlier that morning.

- 1.3.2 The *Wilderness Jet 3* was inspected at Glenorchy marina by Commission investigators on 24 February 2003, and was found to have minor damage to the port bow section in the form of several indentations. The indentations had already been semi beaten out and the boat had continued operations.
- 1.3.3 The *Private Jet Boat*, also inspected by Commission investigators on 24 February 2003, was extensively damaged with the whole of the glass reinforced plastic (GRP) deck structure being badly cracked, split and detached from the hull throughout. The starboard side hull was set in along most of its length. The upper brace in the engine compartment was bent and the engine air filter was deformed with possible further damage to the engine and mountings as a result of *Wilderness Jet 3* landing on top of it. The only damage evident within the passenger compartment was the deformed steering wheel.



Figure 4

Damage sustained to the *Private Jet Boat* on the left and *Wilderness Jet 3* on the right

1.4 Boat information

- 1.4.1 *Wilderness Jet 3* was of aluminium alloy construction specifically designed for use on the Dart River. The engine was an eight-cylinder, 'V' configuration 350 cubic inch Chevrolet driving a HJ 212 water jet unit fitted with a series 2 tail housing giving an operational speed of about 70 kph.
- 1.4.2 The *Private Jet Boat* had a hull of aluminium alloy construction with a GRP deck. The engine was an eight-cylinder, 'V' configuration 350 cubic inch Chevrolet driving a HJ 151A mk.II water jet unit fitted with a HJ 773 tail housing, giving an operational speed of about 90 kph.
- 1.4.3 All jet boats used on rivers had planing hulls, which was the most efficient design for use with jet drives and are able to operate in shallow water when planing.
- 1.4.4 In a planing hull design, the boat has an underwater hull form which generates dynamic lift. Providing the boat has adequate engine power the boat would rise bodily out of the water and ride over the wave created by its progress through the water. Once the boat was up and planing in this way, a much faster speed was possible and the limit of speed was dictated by engine power and the weight of the boat.³
- 1.4.5 When a jet boat reduced speed the boat lowered in the water, because the dynamic lift caused by the hull could no longer support the weight of the boat. Jet boats on river systems often relied on the fact that the boat planed to enable the boat to navigate in shallow areas of water in which

³ Fast Boats Rough Seas – Dag Pike.

they would otherwise ground. To reduce speed or stop the driver would look for a deeper section of the river to enable the boat to remain afloat and be able to get underway again.

1.5 Personnel information

1.5.1 The *Wilderness Jet 3* driver, who lived in Glenorchy, had been driving commercial jet boats since 1990 and had accumulated over 8000 hours on the Dart River. He had also driven commercial jet boats on the Haast and Waimakariri rivers and also on rivers in Turkey. He was the owner of a private jet boat and a member of the Southland jet boat club.

1.5.2 The driver of *Wilderness Jet 3* complied with the requirements of Maritime Rules, Part 80, Annexe 1 part 7 that stated that:

7.1. Personal requirements

The driver of the jet boat must –

- (a) be 18 years of age or more; and
- (b) be in possession of a medical certificate equivalent to that required for an applicant for a Passenger Vehicle Drivers Licence by the Transport (Drivers Licensing) Regulations 1987; and
- (c) hold a valid First-Aid Certificate issued by the St. Johns Ambulance Association or such equivalent or better first-aid qualification as may be acceptable to the director.

7.2 Experience

Any person driving a jet boat to which section 1 of Part 80 applies must have not less than 50 hours experience as a jet boat driver, under the supervision of an experienced driver before driving solo with passengers. The 50 hours experience must include a period, acceptable to the authorised person, on the river on which that driver is to operate commercially.

1.5.3 The driver of the *Private Jet Boat* had been jet boating for about 15 years in both Australia and New Zealand. He had owned the jet boat involved in the collision for about 4½ years but was not a member of any club or association.

1.5.4 The driver of the *Private Jet Boat* complied with the Lakes District Waterways Authority Control By-laws 1989, in that:

No person under the age of fifteen (15) years shall on any lake or river propel or navigate a motor launch that is capable of a proper speed greater than 10 knots.

1.5.5 The driver of the *Private Jet Boat* was not required to hold any maritime qualification or to be able to show any proficiency in jet boating or understanding of the relevant regulations concerning jet boating.

1.6 Weather and river information

1.6.1 The weather on the day of the accident was fine and clear, with no atmospheric conditions restricting the visibility on the river.

1.6.2 The Dart River in its lower reaches was a braided or anastomosed river with characteristic alluvial and shingle bars and islands between the banks.

1.6.3 The river flow on the day of the accident was normal for that time of year, with a flow rate of about 80 cumecs⁴. However the river was described as being dirty or milky in appearance due to the presence of glacial melt water in the flow. This made “reading the river” or finding the deep-water channels difficult. The only clear waters were at the confluences where streams not containing melt water entered the main flow.

⁴ cubic metres per second.

- 1.6.4 At the site of the accident, the main river channel was a relatively straight section of channel with a width of about 30 m and a slight right-hand bend followed by a left-hand bend. The main channel was contained between shingle banks and most of the river flow was through this channel but there were smaller un-navigable braided channels on either side.
- 1.6.5 Downstream of the accident site before the confluence of the Route Burn the width of the navigable channel decreased as the river became more braided for a short distance. Several smaller channels or braids split off the main channel thus reducing the flow and width of the main channel.

1.7 Communication procedures

- 1.7.1 An Environmental Court decision required private jet boaters to inform one of the commercial operators, Dart River Safaris, of their intention to use their boats on the Dart River. Queenstown Lakes District Council erected signs informing private jet boaters of this requirement at the Glenorchy marina and at the Dart River Bridge; the two most probable points for launching jet boats (see Figure 5).



Figure 5
Notice at Glenorchy marina and Dart River Bridge for private jet boaters

- 1.7.2 Dart River Safaris would then inform its own drivers via the VHF radio “river” channel of the presence of private jet boats on the river. All the commercial jet boat drivers were required, under their safe operational plans, to listen to the same “river” channel on the VHF radio and it was, therefore, assumed that all commercial jet boat drivers would be aware of private jet boaters on the river.
- 1.7.3 In this case Dart River Safaris had a logbook entry about the presence of private jet boats on the river. Whether this information was gained from the private jet boaters informing them of their presence, from seeing the private jet boaters arriving and preparing their boats or from a commercial jet boat driver on the river informing them by radio of their presence is unclear. One of Dart River Safaris base workers said that the normal procedure would be to make a general radio call advising the drivers of the private jet boats on the river after receiving such information. It is unclear if this radio call was made.
- 1.7.4 Dart River Safaris used their “river” radio channel when readying their boats for trips and embarking passengers and general contact with their base. This caused a marked increase in radio traffic on the “river” channel.

1.7.5 Both Dart River Safaris and Dart Wilderness Adventures jet boat drivers kept in contact using the VHF radio “river” channel to exchange information on passing, the disposition of the inflatable canoes and any other pertinent navigational information such as the presence of private jet boats on the river.

1.7.6 Private jet boaters were not required to have either a radio or maintain a radio watch whilst on the river.

1.8 Traffic on the river

1.8.1 In the Lakes-Queenstown Wakitipu Combined Transitional District Plan the surface of Lake Wakitipu was un-zoned and commercial use required non-complying activity consent under the transitional provisions of the Resource Management Act. The Dart River was zoned Rural B in the Lakes-Queenstown Wakitipu Combined Transitional District Plan and required discretionary activity consent for commercial boating activities.

1.8.2 In the Proposed District Plan, which was notified in October 1995, both the surface of the lake and the surface of the river were zoned as being rural uplands and non-complying activity consent was required.

1.8.3 The zoning of the lake and river meant that activities other than pastoral rural activities such as farming and some commercial forestry required consent from the Queenstown Lakes District Council. Resource consents were applied for and the Environmental Court granted some after registered objections had been heard.

1.8.4 At the time of the accident there were 3 resource consents current for commercial activities on the Dart River.

- Resource consent 960417 allowed Dart River Safaris Limited to operate 20 jet boat trips per day. This resource consent was a transfer of 2 existing consents and was considered on 11 September 1996.
- Resource consent 960450 allowed Dart Wilderness Adventures to operate 6 jet boat trips per day. This resource consent was considered under both the Lakes-Queenstown Wakitipu Combined Transitional District Plan and Proposed District Plan on 16 February 1996.
- Resource consent 000723 allowed Dart River Safaris to operate up to 60 clients in approximately 30 separate inflatable canoes per day. This resource consent was considered under the Proposed District Plan on 06 October 2000.

This allowed in total 26 jet boat trips per day and approximately 30 inflatable canoes to be on the river. The resource consents made reference to the possibility of private jet boats on the river but did not limit or quantify the numbers expected.

1.8.5 The resource consents bound the commercial operators to operate a timetable, detailed in a Queenstown Harbourmaster’s memorandum, which restricted operations to between 0830 and 1800. The commercial operators were not allowed to run jet boat trips above the Beans Burn confluence between 1130 and 1330, although Dart River Safaris were allowed access during this time to transport the inflatable canoes to their launching point provided the jet boats were clear by 1215. This was to allow for a quiet time for trampers on the Dart-Rees track. There was another quiet time scheduled above the Beans Burn confluence between 1515 and 1615, to which there were no exceptions.

1.8.6 The timetable also allowed for the commercial boats to usually pass without encountering each other at high speed. The downstream boat entered the Beans Burn for a commentary stop and while it was in the Burn the upstream boat passed the confluence.

- 1.8.7 To maintain the timetable Dart Wilderness Adventures jet boats had to leave the Glenorchy marina each morning before the Dart River Safaris boats. This meant that the Dart Wilderness Adventure drivers were not advised of any private jet boats that had notified Dart River Safaris of their intention to use the Dart River, before the commencement of their trip. However, they would expect to hear the radio communications between the Dart River Safaris base and drivers during the trip.
- 1.8.8 Other than informing a commercial operator, private jet boaters were not required to comply with any of the resource consent requirements. In effect they had free access to the river at all times.
- 1.8.9 At the time of the accident, it was common for private jet boats to use the river on a regular basis, adding to the overall traffic volume on the river. The range of expertise of the private jet boat drivers ranged from novice to experienced.

1.9 Navigational regulations

- 1.9.1 At the time of the accident commercial jet boaters on the Dart River were required to comply with Maritime Rules, Part 80 section 1 and appendix 1 part 8 that stated that:

8 Safe Operation.

8.1 Navigation General.

- (a) Boats must only be operated in river and weather conditions that permit a boat to be operated safely. Rides are not to be undertaken in poor visibility.
- (b) Boats must keep to the right at all times.
- (c) Boats going up river must give way to those coming downstream.

8.2. Navigation Specific.

The requirements in Part 80 are additional to and not in place of navigational limits or other operating requirements on a specific river included in any resource consent granted by a local authority under the Resource Management Act 1991.

- 1.9.2 At the time of the accident all jet boaters were required to comply with the Lakes District Waterways Authority Control by-laws 1989 and Maritime Rules, Part 22 collision prevention.

- 1.9.3 By-law 30 concerning maximum speed states:

30.1 No person shall on any lake or river propel or navigate a small craft at a proper speed greater than 5 knots:

- (a) When passing through a recognised anchorage or marina; or
- (b) When passing within 200 metres of any structure; or
- (c) When passing within 200 metres of the edge of the water EXCEPT in the Frankton Arm of Lake Wakatipu where the expression "100 metres" shall be substituted for the expression "200 metres" in this provision; or
- (d) When passing within 30 metres of any other vessel whether underway or moored, or at anchor, or any person bathing or fishing; or
- (e) Within 200 metres of any vessel or craft that is flying a Flag "A" of the International Code of Signals (ie indicating that a diver is operating there from, or in the vicinity of any such vessel or craft, or that diving operations are in progress).

30.2 Every person who propels or navigates a small craft on any water shall as far as is practicable do so at such a speed so that waves caused by the movement of the craft through the water do not break against the shore or against any structure or moored craft.

30.3 No person shall propel or navigate a small motor craft on any water at a proper speed greater than 5 knots while any person is sitting or otherwise positioned at or on the forepart, bow or side of that craft with any portion of his body extending over the forepart, bow or side of that craft.

30.4 Upon application duly made, the Authority may, in its absolute discretion, grant such waivers and exemptions from the provisions of Paragraphs (a) and (b) hereof as it sees fit.

This by-law had been uplifted on the Dart River by Queenstown Lakes District Council to allow jet boats to operate. No other navigational by-laws were applicable to all jet boaters at the time of the accident.

1.9.4 The relevant sections of Maritime Rules, Part 22 collision prevention, state in part:

22.9 Narrow Channels

A vessel proceeding along the course of a narrow channel or fairway must keep as near to the outer limit of the channel or fairway which lies on its starboard side as is safe and practicable.

22.14 Head – On Situation

(1) when two power-driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision, each must alter its course to starboard so that each passes on the port side of the other.

22.15 Crossing Situation

When two power – driven vessels are crossing so as to involve risk of collision, the vessel which has the other on its own starboard side must keep out of the way. The vessel required to keep out of the way must, if the circumstances of the case allow, avoid crossing ahead of the other vessel.

1.9.5 On 21 March 2003, Maritime Rules Part 91, Navigation Safety Rules, came into force. This part superseded the Water Recreation Regulations 1979 and carried over some provisions of the General Harbour (Nautical and Miscellaneous) Regulations 1968 and formalised some generally accepted practices. Part 91 set basic navigation standards to complement and supplement local bylaws put into place by regional and district councils. Rule 91.17 concerned river safety rules and stated:

A person in charge of a vessel on a river must –

- (a) ensure that the vessel keeps to the starboard (right) side of the river channel; and
- (b) if going upstream, give way to any vessel coming downstream; and
- (c) not operate the vessel unless river and weather conditions permit safe operation of the vessel.

1.9.6 The New Zealand Jet Boat Association (NZJBA) promulgated in their rules for jet boating, as did most jet boating clubs, whether they were affiliated to the NZJBA or not, that boats going upstream give way to those coming downstream. The practice was widely adopted by private jet boaters.

1.10 Safe operational plan

1.10.1 The driver of the *Wilderness Jet 3* was operating the boat under the Dart Wilderness Adventures Safe Operational Plan.

1.10.2 Section 5 covered the driver's responsibilities as to the boat, conduct of the trip, river levels and trip recording.

1.10.3 Section 7 covered river navigation and stated in part that:

As the driver proceeds up-river existing navigational rules apply whilst listening for any other information that may be relayed by radio. If unsure of position of other boats, make sure you call and get a reply, always proceed with caution remembering that private users may be on the river without notification.

1.10.4 Section 10 covered private jet boaters and stated that:

Drivers are not always informed of private jet boaters on the river. Drivers should always be aware that this possibility exists. Look out for other indicators, boat trailer parked on side of river, obvious signs of boats ahead of you: i.e. i Wash marks on rocks; ii Rooster tails etc. With liaison between commercial companies being ready to relay whereabouts of private boats..... Downstream journey: Passengers may want to see the other boats i.e. spin, rooster tails, etc. Driver to decide with passengers input at all times remembering safety: i.e. wakes, spray, channel selection.

1.10.5 Under the driver training programme, section 7 covered what to do in the following situations and specifically covered “oncoming boat on wrong side of river”, although the section did not specify what action to take. Section 14, covered other river users and specifically mentioned “jet boats and jet skis (caution at all times, these craft can be on the wrong side of the river)”.

1.10.6 The *Wilderness Jet 3*'s driver was unaware of any references to private jet boats contained in the safe operational plan.

1.11 Human factors

1.11.1 Human behaviour can be categorised as skill-based, rule-based and knowledge-based. Skill-based behaviour is unconscious, rapid, seemingly effortless and most importantly automatic. Rule-based behaviours are those for which a routine procedure has been learned and may comprise a set of discrete skills. These rules are often procedures we have learned through trial and error and then apply to situations in an “if..then..” manner. Knowledge-based behaviours are those for which no procedure has been established, the individual must think out a response using his experience or knowledge.

1.11.2 Human error, or more precisely unsafe act, is a generic term used to describe those occasions where a planned sequence of mental or physical activities does not achieve its intended outcome, which cannot be attributed to outside intervention.

1.11.3 Unsafe acts can be further broken down into 2 main groups:

- Slips and lapses, which occur at the skill-based level, and are sometimes referred to as automatic or absent-minded errors. Slips refer to attentional errors of action, and lapses refer to errors in the memory for actions.
- Mistakes, where the actions involved are intended, although misguided. Mistakes occur at two main levels, rule-based and knowledge-based.

1.11.4 Rule-based mistakes generally occur in situations where the person has the expertise to deal with the task but where this expertise is wrongly applied. One of the most common rule-based errors is where a person makes an assumption about the task they are performing, without checking that assumption. A further common rule-based error is where a rule or procedure which works in most situations is applied to a situation where it is not appropriate.

1.11.5 Knowledge-based mistakes involve evaluating an unfamiliar or unusual situation and deciding on a course of action. Essentially knowledge-based thinking can be equated with higher-level decision-making. The history of accidents and disasters is frequently the history of poor decisions. More often than not the people who made these decisions were properly trained and had the necessary information available to them, but for some reason arrived at a poor decision.

2 Analysis

- 2.1 The presence of about 12 jet boats, their trailers and the occupants could not reasonably be expected to go unnoticed in a small community such as Glenorchy, population about 200. The jet boaters used the facilities of Glenorchy including the camp site and dining and drinking establishments the evening before the accident. The residents would have been aware of their presence but not necessarily of their intentions.
- 2.2 Whether the private jet boaters officially notified Dart River Safaris of their intention to use their boats on the Dart River was not clear. However, they may have assumed that as they were launching their boats at the same time as Dart River Safaris and had used the workshop facilities of Dart River Safaris to repair one of their boats, Dart River Safaris were aware of their presence if not their intentions.
- 2.3 Dart River Safaris did not have a procedure to formally notify Dart Wilderness Adventures of the presence of private jet boaters on the river. The usual practice was that Dart Wilderness Adventures gained their information about private jet boaters on the river by listening to the river channel on the radio.
- 2.4 With the usage of the radio channel between the Dart River Safaris boats and their base at a maximum around the time that both the private jet boaters and Dart River Safaris were readying their craft a message concerning the private boats may have gone unnoticed by the Dart Wilderness Adventures drivers.
- 2.5 The Dart Wilderness Adventures drivers, having departed earlier and knowing that the Dart River Safaris drivers were readying their boats, may not have been monitoring the radio traffic as closely at that time as when the Dart River Safaris boats were on the river.
- 2.6 The driver of *Wilderness Jet 3* was required to operate his boat in accordance with the Dart Wilderness Adventures safe operational plan; he was unaware of the contents of the safe operational plan regarding private jet boats. The driver-training manual specifically mentioned proceeding with caution due to the possibility of private jet boats.
- 2.7 The driver of the *Private Jet Boat* had several years of jet boat experience in both Australia and New Zealand. In this time, even if he were not a member of a jet boat club or association, he would have come into contact with other jet boaters and could be expected to know the correct procedures to adopt when encountering other jet boats on river systems. However, there was no system in place to ensure that the *Private Jet Boat* driver had the necessary knowledge and skills to operate the craft in a safe manner.
- 2.8 The driver of the *Wilderness Jet 3* was an experienced driver and as such would have been aware of his obligations under the regulations to keep to the right-hand side of the river. After passing 2 jet boats on the incorrect side he made a conscious attempt to gain the correct side of the river. In doing so, and knowing he was approaching another boat on the incorrect side of the river he put his boat into a situation where a risk of collision existed. Had he remained on the incorrect side of the river he would probably have passed *Private Jet Boat* safely, as he had the first two.
- 2.9 In wishing to be legally correct the driver of *Wilderness Jet 3* made a rule-based mistake in applying a good rule at an inopportune time. In moving to the right-hand side of the channel the driver of the *Wilderness Jet 3* assumed that the driver of the *Private Jet Boat* was as conversant with the navigational regulations as himself and would also apply the rules correctly and keep to his right-hand side of the channel.
- 2.10 Had the driver of *Wilderness Jet 3* remained on the incorrect side of the river he would most probably have had to stay on that side for some time as he passed the remainder of the private jet boat convoy, which was likely to be following the lead boats. If any of the other private jet

boats had attempted to gain their correct side of the river, he would have been in an invidious situation of having less room to manoeuvre in a narrowing channel to avoid a risk of collision. He may have wished to reduce speed further as the width of the channel narrowed in the braid system before the confluence of the Route Burn. He would have been concerned that his boat was about to ground in the shallows or pick up gravel and stop the jet unit as the boat came off the plane.

- 2.11 The driver of the *Private Jet Boat* could reasonably be expected to know the correct passing side and the requirement to give way to the downstream boat. He saw *Wilderness Jet 3* alter course to starboard and so altered his course to starboard to give the *Wilderness Jet 3* more room. However, he did not move to the right-hand side of the channel. Seeing what he thought was the *Wilderness Jet 3* alter course back to port, as the *Wilderness Jet 3* was following the course of the channel, he altered course to port to follow the 2 private jet boats ahead of him. In altering course towards the *Wilderness Jet 3*, the driver put his boat into a situation where risk of collision existed.
- 2.12 When collision appeared inevitable, the driver of *Private Jet Boat* altered course to port, to beach the boat, although by the time the alteration was made it would most probably not have prevented the accident. None of the actions of the driver of *Private Jet Boat* could be considered as giving way to the downstream boat.
- 2.13 The driver of the *Private Jet Boat* made a knowledge-based mistake in his evaluation of what may have been an unfamiliar situation to him, as an occasional jet boater, of a jet boat approaching at high speed from around a bend on an unfamiliar river caused him to make a poor decision.
- 2.14 The resource consents issued under the Resource Management Act allowed a maximum of 26 trips by commercial jet boats on the Dart River daily. The resource consents acknowledged that there was private jet boat traffic on the river. Due to the length of the trip it was necessary at some point for the commercial jet boats to pass each other thereby increasing the danger already posed by the unregulated private boats.
- 2.15 When the resource consents were made the amount of private jet boat traffic on the river was relatively small. However, the use of the Dart River by private jet boaters had steadily increased. The increase in traffic on the river was reaching its maximum capacity for safe operation and any further increase might require better regulation.
- 2.16 Due to the length of the trip taken by the jet boats and the limited time span available for river use by the commercial operators, there were only a finite number of commercial jet boats that could utilise the river without compromising the safety of the operation. This did not include an unspecified number of private jet boats using the river at irregular intervals.
- 2.17 Commercial operators were restricted to time and number of operations during any day. The private operators were unrestricted in their frequency and use of the river. This mixture often caused encounters between boats at critical points on the river. These encounters rarely had an adverse outcome, but the potential for accidents to occur existed if the drivers' abilities or adherence to collision avoidance regulations were not adequate.
- 2.18 The commercial boats were equipped with radios that allowed them to arrange passing places amongst themselves, if required, and find the disposition of the inflatable canoes, thus increasing the safety of the operation.
- 2.19 The private jet boaters were not required to have radio communication, and few did, relying on their visual acuity to spot oncoming boats and canoes. On the Dart River with its high alluvial and shingle banks between the sinuous channels in the lower reaches, the line of sight was less than optimum for the speeds at which jet boats travelled. Where the accident happened the river was relatively wide and straight. However, the operational speeds of the boats and the visibility

would mean that the time available, from first possible sighting to passing would be about 10 seconds.

- 2.20 The lack of radio communication amongst the private jet boaters could mean that when undertaking trips in wilderness areas, such as the Dart River, in the event of a serious accident it could be difficult to get help from the emergency services.

3 Findings

Findings are listed in order of development and not in order of priority.

- 3.1 The commercial jet boat *Wilderness Jet 3* and the *Private Jet Boat* collided while the drivers of both boats were beaching their boats to avoid a collision.
- 3.2 Had both the commercial and private boat drivers followed the river rules of keeping to the right-hand side of the river, and the upstream boat giving way to the downstream boat the collision would have been avoided.
- 3.3 Shortly before the collision, the driver of *Wilderness Jet 3*, travelling downstream, had moved his boat to the right-hand side of the river, having encountered and passed 2 other jet boats while on the left-hand, incorrect, side of the river.
- 3.4 The driver of the *Private Jet Boat*, the third in a convoy of 12 such boats travelling upstream, was operating on the left-hand, incorrect, side of the river but was following the jet boats ahead of him.
- 3.5 The driver of the *Private Jet Boat* did not move to his right-hand side of the river and misinterpreted the movement of the *Wilderness Jet 3* following the curve in the river, assuming that its driver intended to pass in the same way as he had the first 2 boats in the convoy.
- 3.6 By moving to his right-hand side of the river, the driver of the *Wilderness Jet 3* complied with the navigational requirements but in doing so when another boat was already on that side of the river, created a potential conflict and placed himself in an invidious situation of having to rely on the actions of another party to avoid a collision.
- 3.7 The driver of the *Private Jet Boat* held no maritime qualification and had no formal training in safety or collision avoidance, his knowledge being gained over time observing his peers. It is unclear if this knowledge was sufficient to equip him to take the required corrective action to avert the risk of collision.
- 3.8 The attempt by both drivers to beach their boats might have been an effective anti-collision manoeuvre but was left too late. However, neither driver made any attempt to stop their boat which may also have been an effective manoeuvre and the driver of *Private Jet Boat* did not comply with the navigational requirement to give way to the downstream boat.
- 3.9 The river flow at the time of the accident was normal for the time of year and, although the water was discoloured, did not contribute to the accident.
- 3.10 The weather at the time of the accident was good and did not contribute to the cause of the accident.
- 3.11 Although Dart River Safaris had a logbook entry about private jet boaters on the river, whether the private jet boaters formally informed Dart River Safaris of their intention to use the river was unclear and if they had, whether the driver of *Wilderness Jet 3* was aware of their presence.
- 3.12 All the commercial jet boats on the Dart River were fitted with VHF radios, however, the private jet boats were not fitted with VHF radios. The radios were used for communication on

the river between the boats and between the boats and their respective bases. At times the radio traffic could become excessive and missing traffic in the background noise was possible.

- 3.13 The driver of the *Wilderness Jet 3* was not fully aware of the contents of the Safe Operational Plan under which he was operating.
- 3.14 At the time of the accident the Dart River system was reaching maximum capacity for the safe operation of commercial and private jet boats.
- 3.15 The mixture of timetabled commercial jet boat operations and unrestricted and possibly un-announced private jet boats on the river increased the possibility of an adverse outcome to any encounter between boats.
- 3.16 The requirement that private jet boaters were to inform a commercial operator of their intention to use the Dart River system was not adequately enforced.
- 3.17 There was no documented procedure for the commercial operator in receipt of the information from private jet boaters to promulgate that information to the other commercial operator. However, in general the procedure was to make a broadcast VHF radio call advising commercial boats of private jet boats on the river.

4 Safety Actions

- 4.1 Since the accident the Queenstown Lakes District Council Harbourmaster updated the signage requiring private jet boaters to inform the commercial operators of their intentions. The new sign was more forcefully worded than the previous sign.



Figure 6
Updated notice for private jet boaters at Glenorchy marina and Dart River Bridge

5 Safety Recommendations

Safety recommendations are listed in order of development and not in order of priority.

- 5.1 The following safety recommendation was made to the Director of Maritime Safety on 14 February 2003, and was included in Marine Occurrence Report 01-216, regarding a collision between a yacht and a tug and barge. On 24 February 2003, the Director of Maritime Safety replied that he accepted the recommendation.

in line with the recommendations made by the Pleasure Boat Safety Advisory Group in 1999, continue to monitor for the five-year period to December 2004, the impact of education initiatives introduced in New Zealand against set safety targets. Further, that the systems of compulsory boating safety education in the Canadian and other jurisdictions, continue to be monitored for success through the same period, with a view to implementation of such a system in New Zealand. (057/02).

In view of the safety recommendation already made, no further recommendation relating to the requirements for training of persons in charge of a pleasure craft has been made.

- 5.2 On 10 September 2003, the Commission recommended to the Chief Executive Officer, Queenstown Lakes District Council that he:

5.2.1 evaluate and quantify the traffic on the Dart River and put in place a policy that will prevent conflict between and within the various user groups (042/03).

- 5.3 On 15 October 2003, the Chief Executive Officer of Queenstown Lakes District Council replied, in part, as follows:

it was agreed that the council will prepare a brief, including costs for the purposes of implementing a safety study of the Dart River to evaluate and make any necessary recommendations to improve safety between various user groups. This will include any recommendations concerning changes to the 'Memorandum – Dart River Operating Procedures', under which commercial users presently operate.

It is envisaged that the study will commence and be completed by the end of the 2003/04 summer period.

- 5.4 On 10 September 2003, the Commission recommended to the Managing Director of Dart Wilderness Adventures that he:

5.4.1 in conjunction with the other commercial operators on the Dart River system formulate a procedure to ensure that:

information concerning the presence and intentions of private jet boaters on the river system is promulgated to all commercial operators at the earliest possible time (043/03).

the river VHF radio channel is available solely for radio traffic necessary for the safe operation of jet boats on the river. This channel should be monitored by all operators and their boats and used for the passing of safety information, including the disposition of private jet boats on the river. A separate VHF radio channel should be utilised for routine radio traffic of the commercial operators (044/03).

5.5 On 13 October 2003, the Managing Director of Dart Wilderness Adventures replied, in part, as follows:

I can confirm after a positive meeting between all parties it was resolved to implement a logging system for making sure all commercial operators on the Dart River were aware of private boat movements. I will send more details when the system is finalised in the next few weeks

5.6 On 10 September 2003, the Commission recommended to the General Manager of Dart River Safaris that he:

5.6.1 in conjunction with the other commercial operators on the Dart River system formulate a procedure to ensure that:

information concerning the presence and intentions of private jet boaters on the river system is promulgated to all commercial operators at the earliest possible time (045/03).

the river VHF radio channel is available solely for radio traffic necessary for the safe operation of jet boats on the river. This channel should be monitored by all operators and their boats and used for the passing of safety information, including the disposition of private jet boats on the river. A separate VHF radio channel should be utilised for routine radio traffic of the commercial operators (046/03).

5.7 On 25 September 2003, the General Manager of Dart River Safaris and Funyaks replied, in part, as follows:

Dart River Safaris (DRS) would like to advise the TAIC that we are carrying out the following procedures to comply with the recommendations that TAIC has recommended after the report:

1. DRS is drawing up new procedures to ensure that both the communication and recording of daily hazards such as private jetboats complies with the suggestions of the report and is agreed by all operators. This will be completed no later than the end of October 2003. A copy of the procedures will be included into the SOP and authorities will also be sent a copy.
2. DRS are meeting with Queenstown Lakes District Council, local Harbourmaster and DWA on the 3rd of October to discuss and resolve any identified issues / recommendations that were raised in the report.
3. DRS is going to propose a change in daily operating procedures to mitigate any potential dangers with both "other" commercial users and private users when entering and exiting the Rockburn stream. We have identified this area as a medium risk level for traffic using the Dart River/Rockburn confluence with motorised or non-motorised craft.



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- 03-202** launch *Barossa* and trimaran *Triptych*, collision, Hauraki Gulf, 18 February 2003
- 03-201** passenger ferry *Harbour Cat*, engine room fire, Auckland Harbour, 16 January 2002
- 02-208** bulk cement carrier *Westport*, collision with old Mangere Bridge, Onehunga, 21 November 2002
- 02-206** bulk carrier, *Tai Ping*, grounding, Bluff Harbour, 8 October 2002
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